THE IMPLEMENTATION OF THE RISK APPROACH ON PREGNANCY OUTCOME BY TRADITIONAL BIRTH ATTENDANTS

The Tanjungsari study in West-Java, Indonesia

(DE TOEPASSING VAN DE RISICO BENADERING GEDURENDE DE ZWANGERSCHAP DOOR TRADITIONELE VROEDVROUWEN

Een studie in Tanjungsari, West-Java, Indonesia)

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In memory of my parents

Contents:

Chapter 1. INTRODUCTION

Only recently have we begun to understand that events occurring long before and during pregnancy can affect our reproductive capabilities. The reason for the increasing attention being paid to perinatal mortality and morbidity was the observation that the fall in infant mortality derived mainly from the reduction in deaths surviving beyond the first few days of life. The most striking feature in the post-World War II period is the relative fall in the perinatal mortality rate in Japan which parallels similar growth of the Japanese economy. More modest relative gains have been accomplished by Denmark, Finland, Sweden and Scotland (Bakketeig et al.,1984). This steady and continuing decline in perinatal mortality rates is especially shown since 1960.

While the overall improvement in perinatal health in developed countries over the last 30 years (with the development of neonatal intensive care) is possibly the most impressive achievement in public health, the present inter- and intranational variability in perinatal and maternal mortality and morbidity indicates that significant gains in the health of mothers and newborns continue to be possible. Although an improvement is observed, all the related problems are far from being solved. Especially our understanding of perinatal events and its relationship to mortality and morbidity is still incomplete. A number of factors are known to be associated with perinatal mortality and morbidity, such as the socioeconomic status, age, education and nutritional status of the mother. Perinatal mortality is also recognized as an indication of the extent of pregnancy wastage, as well as the quality and quantity of health care available to the mother and her newborn.

In less developed countries, the perinatal period as well as infancy and early childhood are particularly hazardous. Yet perinatal mortality does not appear to have high priority and to be a very important part of infant and child mortality as a whole. However if we consider the problem of the perinatal risks associated with low birth weight, the association is clearly obvious. Low birth weight is a source of increased mortality and causes numerous handicaps, usually reflects intrauterine growth failure and is more or less linked with inadequate maternal nutrition, birth-spacing and other medical problems (Kardjati et al., 1983; Falkner and Manciaux, 1984).
The Republic of Indonesia is the largest archipelago in the world, only 25 per cent of the

surface area of the country is land, spread out over 13 667 islands (Central Bureau of Statistics,1988). According to the Intercensus Population Survey in 1990, the total population is almost 180 million with an uneven distribution pattern, 60 per cent living on one island, the island of Java which represents only 6.9 per cent of the total land surface. The population consists of hundreds of ethnic groups with more than 200 languages and dialects, although the official language, the Indonesian language (Bahasa Indonesia) is spoken all over Indonesia. The Islamic religion is the main religion in Indonesia.

The outstanding characteristics of Indonesia is the heterogeneity of the country which is also reflected in the health situation. The disease pattern is the classical one for a developing country dominated by communicable diseases, poor nutritional status and unhealthy environmental conditions. However there has been a rapid decline in the infant mortality rate (IMR): one decade ago (1975) the national average rate was 90 per thousand live births and in 1985 the IMR had declined to 71 per thousand. The IMR varies widely between the 27 provinces, the lowest 29 per thousand in Jogyakarta and the highest 139 per thousand in Nusa Tenggara Timur (a province in eastern Indonesia).

Data on perinatal mortality and morbidity are available mostly from hospital records, and considering that in general about 30 per cent of deliveries in urban areas and 20 per cent in rural areas are hospital deliveries, the data available cannot be representative for Indonesia (Central Bureau of Statistics,1989). A community based survey was conducted previously in two provinces, East Java and West Java (Kardjati et al., 1983; Alisjahbana et al., 1990). From the second study the perinatal mortality was 45 per thousand and the incidence of low birth weight 14 per cent. The East Java survey showed similar rates and a low birth weight rate of about 13 per cent. Births are for 80 per cent attended by traditional birth attendants, showing the important role of the TBA as primary health care provider for the rural community. Perinatal events are also closely related to behaviour and attitudes which is in itself a result of the culture of each community. Considering the diversity of ethnic groups, culture, habits and attitude in Indonesia and the low coverage of pregnant women there is a need to conduct more population based surveys. Lack of data on the natural history of pregnancies and their outcome, as well as on the extent of the problem of perinatal mortality and morbidity and low birth weight, especially at the community level, makes health planning difficult.

In spite of the considerable efforts to improve the health services, there are still many areas of the world where access to medical care is very limited for most of the population, while at the same time high quality care may be available only to a small section of the population.
In less developed countries, universal coverage of pregnant women and their infants is limited by lack of resources and lack of trained manpower (WHO,1978). The disparity in the health status especially of women and their infants that exists between the developed and less developed countries is primarily due to an inability to implement health strategies already known to be effective (McCarthy, 1991). In less developing countries, home delivery is the rule rather than the exception. In these countries traditional birth attendants are mostly the primary health care provider for the poor women in the rural community. Therefore after a long period of neglect traditional birth attendants have lately been receiving a lot of favourable attention especially the recognition in the World Health Organization which has made a continuous effort to identify and disseminate information on relevant developments on TBAs (Bullough, 1983).

Many approaches to improve coverage and care for this risk group have been reported such as the primary health care approach (Primary Health Care, 1978). In Indonesia, it is implemented through the integrated health services conducted by women volunteers (Ministry of Women Affairs, 1989). The development of the "Risk Approach" for improved maternal and child health care by a WHO task force is a reflection and result of this constant search for promising approaches. In 1976, the World Health Organization with sponsorship from United Nation Family Planning Association (UNFPA) published its first document on the Risk Approach (WHO, 1984). The fundamental principle is "Something for all, but more for those in need, and in proportion to that need". The primary concern is coverage, while the approach implies a method for establishing priorities based on the needs of individuals and communities. Secondly, the risk approach is a tool for improving the use of health care resources to meet those needs. One important step in the development of the risk approach is to identify risk factors and pregnancy complications. This will give a clearer idea of what should be done to reduce excess mortality. But risk identification and assessment alone is not the only component of the risk approach strategy. The basic objective of the risk approach is to improve health as part of the complex social, psychological and physical process (Davies et al.,

1991). In health services research, the risk approach addresses two basic questions. First; "are we doing the right things"? Have we selected interventions that most effectively and efficiently reduce health? Second, "are we doing the things right"? More specifically, have the activities we planned been put into action, and are tasks being performed correctly (McCarthy,1991)?

There are four basic steps in the implementation of the risk approach; The first step is to identify priority problems including risk factors and risk groups associated with those problems. The second step is to assess performance within the health care delivery system, particularly those in association to the health problems in step one. The third step is to develop and implement intervention strategies for modifying the risk factor and improving the performance of the health care delivery system. The last step is to monitor and evaluate the intervention strategy in terms of effectiveness, efficiency and acceptability as well as on the impact (Workbook of the Risk Approach, WHO.1984).
At grassroot level prevention through simple identification of risk and pregnancy complications by local midwives was the first step in the development of a preventive program and the involvement of the community. At a more sophisticated level the problems in implementation of the risk approach are twofold: those of identifying individuals and groups at different levels of risk and those of appropriate resource allocation and service reorganization (Davies et al., 1991). The relative importance of risk factors in predicting outcomes varies greatly in different populations and the great number of intervening and confounding variables therefore requires local studies.

The goal of the risk approach intervention study by traditional birth attendants was to devise a tool for program and health planners to assess risk factors and to study the effect of training of the risk approach on pregnancy outcome. To use epidemiological results of the relationship between risk factors or pregnancy complications to estimate the effect on the health of mothers and infants of changes of risk prevalence. From this goal, three main objectives of the study can be derived:

1. To extract from existing epidemiologic studies the data necessary to apply the above tool in West-Java. There already exist a vast body of data of literature on risk factors and intervention trials, but less reported are the implementation of the risk approach at the very grassroot level, especially in less developed

countries.

2. To study the effect and impact of training traditional birth attendants in the risk approach on maternal and child health.
3. To use the epidemiologic result of the relationship between risk factors or pregnancy complications to estimate the effect of the implementation of intervention on the health of mothers and infants in Tanjungsari (West Java).

The organization of this book reflects these three objectives. The second chapter deals with the background information and includes the situation of the health care delivery system and the problem of perinatal health care in Indonesia. An overview of previous epidemiological studies is presented in the chapter perinatal epidemiology (chapter 3). A special chapter 4 is devoted to "what" is a traditional birth attendant, her characteristics, and the efforts of many countries to include or exclude her from the formal health care delivery system. The risk approach concept is discussed in chapter 5, while presenting the results of several countries which had already successfully applied the risk approach strategy. Chapter 6 deals with methodology and the tools developed for the purpose of risk identification. It reviews the existing epidemiologic measures and techniques on which the methodology is based. A special section is devoted to TBAs training assessment in the risk approach. Chapter 7 covers the results generated by the implementation of the risk assessment and action by traditional birth attendants. A section discusses women knowledge and perception of risk factors. This is followed by an evaluation of the formal health care delivery system, case reviews are presented as part of the evaluation of the health care delivery system. The final section is a general overview of pregnancy related morbidity in Tanjungsari. Chapter 8 is the general discussion of the study and comparison to other studies in the field of perinatal epidemiology. This is followed by conclusion and recommendation for further research and action to improve perinatal care.

Although the main theme of this thesis is training of traditional birth attendants in West-Java and the implementation of the risk approach, general epidemiological results of perinatal care will be presented due to the importance of this information as a baseline to improve perinatal health care in West-Java in particular and Indonesia in general.

Chapter 2. BACKGROUND INFORMATION

This chapter will discuss the demographic and socioeconomic conditions of Indonesia, with special reference to Java and West-Java, the province where the intervention study was implemented. Beside the above mentioned variables this chapter will discuss in particular welfare indicators in Java. Welfare indicators is a collection of reprocessed basic statistics produced by the Central Bureau of Statistics and various government institutions such as the Ministry of Health, the Ministry of Education and Culture, the Ministry of Justice and the National Family Planning Board (CBS, 1988).

2.1. Demographic and socioeconomic situation

Communities in Indonesia are basically rural with about five sixth of the population living in agricultural areas. Although there is great potential for socioeconomic development, the per capita income of US$ 450 annually is still considerably lower than in other neighbouring countries. The population of nearly 180 million in 1990 (Central Bureau of Statistics, 1991) places Indonesia as the fifth most populous country in the world after China, India, the Soviet Union and USA.

Table 2.1 Population and growth rate by province in Java

Province	Number of population (x1000)				Growth rate		
	1971	1980	1985	1990	'61-71	'71-80	'80-90
Jakarta	4 579	6 503	7 886	8 223	4.46	3.93	2.41
West-Java	**21624**	**27454**	**28830**	**35378**	**2.09**	**2.66**	**2.57**
Central-Java	21 877	25 373	26 945	28 617	1.76	1.64	1.18
Jogyakarta	2 489	2 751	2 930	2 913	1.07	1.10	0.57
East-Java	25 517	29 189	31 262	32 488	1.59	1.49	1.08
Indonesia	119 208	147 490	164 047	179 194	2.10	2.32	1.97

Source : Central Bureau of Statistics (1990).

Table 2.1 projects the 1990 Population Census and the result of the Intercensus Population Survey in 1985. For the purpose of this thesis only population data and vital statistics from Java will be presented. Java is compared to other islands in many aspects the most developed and advanced island. West-Java shows the highest number of population and the decrease in growth rate is - except for Jakarta - smaller compared to

the other provinces in Java. The growth-rate is caused by natural increase in all provinces except for Jakarta, which has also the highest migration saldo. The national population growth is expected to decline to 2.1 percent per annum, West-Java and Jakarta have a relatively higher growth rate. In Indonesia, net migration could be neglected since the net international migration rate is relatively marginal. Hence the growth of the population is almost entirely due to natural increase. Demographic analysis shows that Indonesia has a young age structure, the percentage of population under fifteen is relatively high; it was 44.0 per cent in 1971, 40.9 per cent in 1980 and 39.4 per cent in 1985, and expected to be 36.4 per cent in 1990.

One of the objectives of composite indicators which is commonly used to measure the level of wellbeing is the Physical Quality of Life Index (PQLI). This index is composed of three indicators namely infant mortality rate, life expectancy at one year of age and literacy rate of adults (10 years and over). The reasons for selecting these indicators are as follows: the infant mortality rate indicates states of indoor environment, availability of hygienic drinking water and mother's health. The expectation of life at one year of age reflects the nutritional status of households and the conditions of the outdoor environment. The literacy rate of adults is included as an indicator because it measures the minimum skills needed for participation in a development process (CBS, 1989). According to the national figures, the level of wellbeing as indicated by the PQLI steadily increased from 51 in 1971 to 55 in 1976 and 59 by 1980. PQLI varies among provinces in Java, showing West-Java with the lowest PQLI and the highest for Jakarta (table 2.2).

Table 2.2 Physical Quality of Life Index (PQLI) by Province in Java.

Province	1971	1976	1980	1985
Jakarta	57	66	72	87
West-Java	**44**	**50**	**54**	**68**
Central-Java	44	53	60	72
Jogyakarta	43	60	71	82
East-Java	46	53	59	69

Source: Central Bureau of Statistics (1989).

In 1971, nearly all provinces in Java had the same PQLI. The improvement was better for Central-Java and Jogyakarta while West-Java still shows the lowest PQLI in 1985. Fertility variables are expressed by the child-woman ratio (CWR), the age specific

birth ratio and the total fertility rate. Table 2.3 shows the ratios and average number of children ever born per ever married woman age 45-49 years by province in Java.

Table 2.3. Estimated fertility variables for Indonesia and provinces in Java (1985)

Province	Child-woman ratio	Average number of children ever born per ever married woman aged 45-49 years.	
	1985	1980-1985	1985-1990
Jakarta	446	4.70	2.7
West-Java	**556**	**5.06**	**3.6**
Central-Java	489	4.96	3.3
Jogyakarta	379	4.64	2.5
East-Java	430	4.10	2.9
Indonesia	536	4.91	3.5

Source : Central Bureau of Statistics (1987 and 1990)

Fertility rate is the average number of children per woman that would be born alive during her childbearing period and if she could survive until the end of her reproductive period, assuming that fertility behaviour of each age group of women remains unchanged. The projection of the total fertility rate (TFR) for the period 1985-1990 shows a decrease in all provinces with West-Java still on the highest place. The TFR for Indonesia is estimated to be 3.5.

Table 2.4. Percentage of women (<50 years) who participated in Family Planning Programmes by province (1980 & 1985)

Province	1980	1985
Jakarta	25.49	45.00
West-Java	**21.66**	**44.54**
Central-Java	31.56	40.32
Jogyakarta	40.61	54.92
East-Java	37.51	41.45
Indonesia	26.00	38.52

Source : Central Bureau of Statistics (1987).

Indonesia is considered very successful in promoting family planning and contraception programmes, which can be seen in the changes of crude birth rates from 1965 to 1988.

Compared to the twenty most populous developing countries which received population program assistance from the United States for International Development (Gillespie and Seltzer, 1990), Indonesia is on the second place after South Korea which has the highest percent change in crude birth rate (40 per cent and 47.2 per cent respectively). Table 2.4 shows the percentage of married women aged less than 50 who participated in Family Planning programmes by province for the years 1980 and 1985. Compared to other provinces, West-Java and Jakarta show a remarkable (two fold) increase in the percentage of family planning acceptors.

A number of socio-cultural and traditional values are not supportive to the advancement of health of the women in Indonesia. One problem closely related to socio-cultural values is the problem of early marriage. A situation analysis (Ministry of Women Affairs, 1989) reveals that 29.7 per cent of the women in the urban areas and 37.5 per cent of those in the rural areas, women are married at the age of 16 or lower.

2.2. The health system in Indonesia

Political ideology in each country may result in a certain degree of intervention in the health service market. In its extreme form, the free market for buying and selling health services has been virtually eliminated and replaced by a centrally planned and highly organized health system (Roemer, 1988). The type of health system and the involvement of the market intervention (from minimal to virtually complete) range from entrepreneurial, welfare oriented, comprehensive to socialist health system. The type of the national health system in Indonesia is classified as a welfare oriented health system (Loedin, 1988). Basically a welfare oriented health system is characterized by services rendered by private health practitioners including treatment of children and adults as well. For preventive maternal and child health (MCH) services the government of Indonesia is providing services at low cost through health centers. The MCH services are an integral part of the programmes of every health center. Affluent families may obtain MCH care from private doctors only.

2.2.1. Health facilities

Since the implementation of the first five year development plan (Pelita) in 1969, new general and specialized hospitals have been constructed or upgraded. The number of

general hospitals at the end of Pelita I (1974) was 581 units. It increased to 688 units in the first year of Pelita IV (1985). Due to the fast growing population however, the ratio of beds per 100 thousand population remains low and stable at about 51 beds/100 000 for general hospitals and 16 beds/100 000 for specialized hospitals. Important health facilities providing a wide range of services are public health centers, supporting public health centers, mobile health centers and dispensaries.

The following table shows the distribution of public health centers by province in 1985. It appears that the ratios of these facilities per 10.000 population are quite small, particularly in the densely populated provinces such as Java.

Table 2.5. Number of public health centers and supporting public health centers by Province (1985)

Province	Public health center		Supporting public health center	
	Number	per 10.000 population	Number	per 10.000 population
Jakarta	124	0.16	287	0.36
West-Java	**690**	**0.24**	**1578**	**0.55**
Central-Java	772	0.29	1 266	0.47
Jogyakarta	103	0.35	326	1.11
East-Java	849	0.27	1 629	0.52

Source: Central Bureau of Statistics (1985)

As can be seen in table 2.5, except for Jakarta which is more or less an urban area with more hospitals available, the ratio of public health center to population is lowest in West-Java although more supporting public health centers are available. The total number of health centers in West-Java is about 690 health centers showing a ratio of 0.24/10 000 population. Supporting health centers are headed by a nurse or midwife. The total number is 1578 with a ratio of 0.55/10 000 population (table 2.5).

The decline in infant mortality rate was highest in Jogyakarta. During a period of 15 years the decline was 78.6 per cent compared to almost 50 per cent in West-Java (table 2.6). Compared to other provinces in Indonesia, West-Java had the second highest infant mortality rate after Nusa Tenggara Timur (South-east province) in 1980, but has improved its position to be on the fourth place in 1985. Even though infant mortality rates have decreased in 1985 compared to 1980 the infant morbidity rate has been

relatively constant (15.8 per cent in 1980 and 16.3 per cent in 1986). In 75 per cent of the cases, the cause of death of infants was preventable such as tetanus, upper respiratory infections and measles.

Table 2.6. Infant mortality rate by sex and province in 1971, 1980 and 1985

Province	1971		1980		1985	
	M	F	M	F	M	F
Jakarta	134.5	114.7	88.7	73.0	38.0	28.5
West-Java	**171.7**	**146.1**	**141.0**	**119.7**	**87.4**	**71.7**
Central-Java	158.6	1134.5	106.4	88.9	67.8	54.3
Jogyakarta	158.6	134.5	69.9	56.1	35.9	26.7
East-Java	144.5	122.1	108.9	91.1	73.7	59.5
Indonesia	152.2	128.9	117.0	98.4	78.3	63.6

M= male, F = female
Source: Central Bureau of Statistics (1985)

A household survey conducted in Sukabumi (West-Java) by the Ministry of Health in 1980 pointed out that the main causes of death for infants less than 12 months were diarrhea, acute respiratory infections and tetanus (table 2.7). In general, diarrhea (0.82 per 1000 population) and tuberculosis (0.59 per 1000 population) are the major causes of death for the entire population (Budiarso,1980).

Table 2.7. Causes of infant mortality in Sukabumi (1980)

Causes of death	percentage
1. diarrhea	24.1
2. acute respiratory infection	22.1
3. tetanus	20.2
4. neonatal conditions	9.5
5. others	24.1

Budiarso, Household survey (1980)

2.3. Perinatal health problems with special reference to West-Java

As in most developing countries perinatal health care provision is still insufficient in Indonesia. Although standards of maternal care and family planning have much improved

in recent years, perinatal health care is far from satisfactory. In Indonesia, perinatal health care is incorporated in maternal and child health activities of the health center. Maternal and child health care at the health centers is responsible for the following program activities:

1. Health care for expectant women, during childbirth, lactating mothers, infant and preschool children
2. Nutritional education to prevent protein energy malnutrition and other nutritional deficiencies and, when available distribution of supplementary food
3. Immunization
4. Health education
5. Family planning
6. Treatment of minor ailments
7. Home visits to the mothers and the children for the purpose of identifying those in greatest need
8. Training and guidance of subcenters and traditional birth attendants

Table 2.8. Percentage of births by province and birth attendants in urban and rural areas

Province	MD	Nurse/midwife	TBA	Others
Jakarta	17.3	63.4	15.5	3.7
West-Java	**2.5**	**16.7**	**76.5**	**4.2**
Central-Java	3.1	20.0	71.2	5.6
Jogyakarta	6.5	24.9	61.8	6.8
East-Java	3.8	21.4	70.2	4.7
Indonesia	3.7	25.8	62.8	7.6

Source: CBS, Welfare indicators (1989)

The percentage of births by province and birth attendant for 1985, as reported by the Central Bureau of Statistics can be seen in table 2.8. The table also shows that the percentage of deliveries attended by birth attendants is still high, although some variation may exist especially between urban and rural areas. Health services are concentrated in the cities. This can be seen in the distribution of percentage of deliveries by birth attendant in urban and rural areas which results in the maldistribution of health services, exposing the rural population to less quality health care (table 2.9). It shows that the number of births attended by traditional birth attendants ranges in rural

areas is 2 - 3 times higher than births in urban areas. This figure is a reflection of the maldistribution of health services and health care providers for perinatal care in Java in particular and in Indonesia in general, which may be due to the health infrastructure itself or to the capability of the people to pay for quality health care.

Table 2.9. Percentage distribution of births by traditional birth attendant. A comparison between urban and rural areas.

Province	Urban	Rural
Jakarta	15.4	16.7
West-Java	**49.9**	**85.1**
Central Java	33.0	82.2
Jogyakarta	21.4	71.6
East-Java	33.3	80.7
Indonesia	28.9	73.3

Source: CBS, Welfare Indicators, 1989

The beneficial effect of improved perinatal care on mortality rates is rather conflicting, especially in areas where improvements in health status take place simultaneously. Some authors claim that a considerable proportion of the decline in the perinatal mortality rates among low weight births is likely to be due to improved perinatal care, particularly the increased provision and use of neonatal intensive care as is the case in developed countries. In less developed countries the situation is very much different. The availability of health services usually favours the urban residents as can be seen in the impact on perinatal mortality. The disparity between mortality rates in urban and rural areas is related to the distance to health centers and to specialized hospitals. The choice of place of delivery is mainly on the basis of available services and probably the costs and distance. Lack of proper facilities and health services result in 90 per cent of deliveries taking place at home in Burma and Indonesia (Perera and Lwin, 1984).

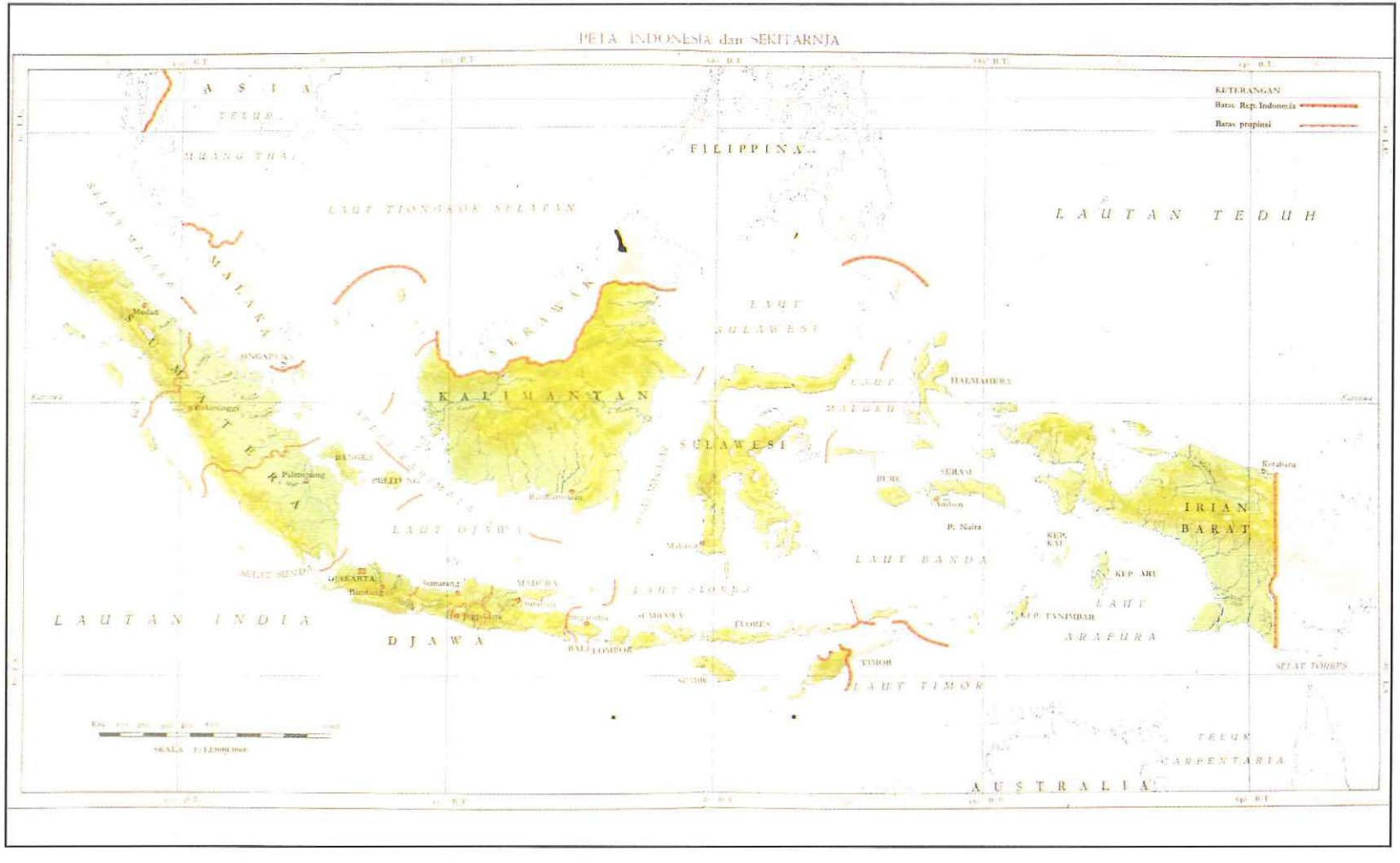
Because most of the deliveries are home deliveries and attended by traditional birth attendants it is very difficult to collect precise information on the magnitude of the perinatal problems in Indonesia in particular for West-Java (Alisjahbana, 1980).

It was for this purpose that the author committed herself to a collaborative survey organized by the World Health Organization-South East Asia Region (WHO-SEARO) in 1978-1980. The results of the perinatal mortality and morbidity and low birth weight survey will be discussed in chapter 5.

2.4. Summary

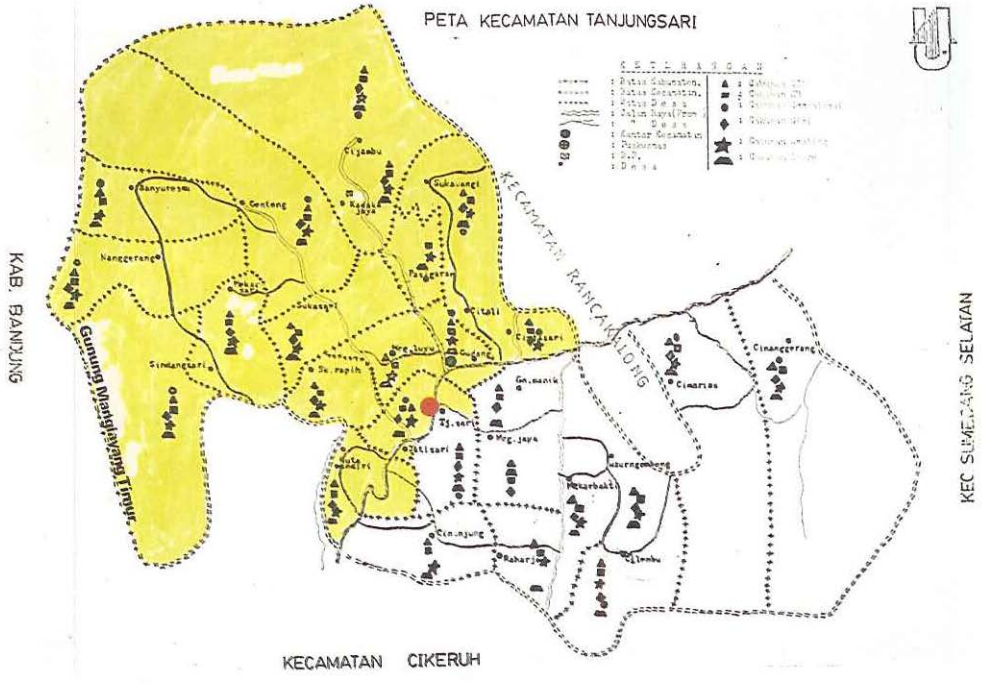
From a socioeconomic point of view, the condition and agricultural structure of West-Java are nearly the same as in other provinces in Java except for Jakarta which has the highest population mobility. The main issues of West-Java are the low literacy rate of adults (10 years and over), high infant mortality rate, child to woman ratio and fertility rates. Because of the high infant mortality rate, life expectancy at one year of age is low. The physical quality of life index of West-Java is also the lowest among the other provinces in Java.

The type of health system in Indonesia is classified as a welfare oriented health system, which is characterized by services rendered by private health practitioners including treatment of children and mothers. For preventive MCH services the government of Indonesia is providing services at low cost through health centers. MCH services are an integral part of the health care programmes. Factors such as infrastructure of the provinces and the associated maldistribution of health care facilities mostly, available in the urban parts, may play a role in the lowest health performance of West-Java.



Picture 2.1 Java and Indonesia

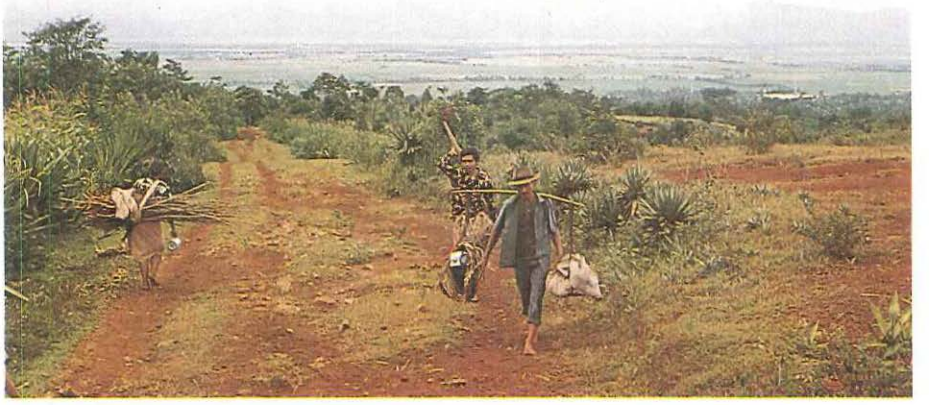
Picture 2.2 West-Java



Picture 2.3 Subdistrict Tanjungsari in the highlands of West Java. The northern part of the main road as intervention area and the southern part as control area

Picture 2.4 The terrace rice field of Tanjungsari

Picture 2.5 A field visit by the research team



Picture 2.6 The problem of transportation. Sandy road which becomes slippery during the rainy seasons

Picture 2.7 People using improvised transportation due to road condition and lack of transportation

Chapter 3. PERINATAL EPIDEMIOLOGY

It is generally accepted that events during pregnancy influence the health and well-being of the newborn. The need to provide integrated care to both mother and child has led to the establishment of perinatal medicine that bridges the gap between the obstetrician's concern for the pregnant woman and the care of the newborn by the pediatrician.
Population-based studies of these phenomena fall within the domain of perinatal epidemiology, which has evolved into a major subspeciality of epidemiology and has become an important component of perinatal medicine (Bracken, 1984). The epidemiology of perinatal death involves the associations with such general factors as time and place, the behavioural and social milieu surrounding mothers and their pregnancies, as well as the biological factors and the medical conditions that affect the health of mothers and the outcomes of their births. Advances in medical treatments and improved delivery of medical care also have an impact on the epidemiology of perinatal mortality (Bakketeig et al., 1984).

3.1. Deficiencies in national and international perinatal statistics

Both in national and international health statistics there is lack of information on perinatal mortality and on the factors that cause it. In less developed countries this may be due to various reasons such as deficiencies in vital statistics or the absence of it. Analysis of the data that are available is fraught with difficulties. This is more alarming because international comparison of perinatal mortality is not only the concern of health workers but play a decisive role in the formulation of national health policies (WHO, 1978). Lack of comparability may also result from different data processing practices such as the inconsistency of grouping of perinatal mortality by e.g. age of mother, weight at birth and other relevant variables. Therefore international standardization of computational methods for the various fetal and perinatal mortality data is essential to avoid confusion or misuse of data.
Epidemiological findings in the field of perinatology in less developed countries are lacking because of the unreliable reporting and recording system. In many less developed countries there is a lack of data on the natural history of pregnancies and their outcome

as well as on the extent of the problem of perinatal mortality and morbidity and particularly birth weight distributions at community level.

Further obstacles to an analysis of information on perinatal mortality are related to the fact that in less developed countries, particularly in Indonesia, relevant information is not recorded and information through birth registration is lacking while stillbirths are never reported (Alisjahbana et al., 1983). Information of death certificates about the cause of death is often inaccurate or incomplete, due to such difficulties as lack of diagnostic evidence, inexperience on the part of the certifying doctor, absence of a postmortem or lack of knowledge of its result at the time of completion of the certificate (Dunn, 1988).

Perinatal mortality and morbidity may be considered to reflect standards of obstetric and pediatric care as well as the effectiveness of social measures in general and public health actions in particular, which means that it occupies a key position in determining health policy (Grant, 1989). Perinatal mortality is a problem of serious dimensions in all countries. In less developed countries between 1 per cent and 4 per cent of all pregnancies may result in perinatal death. In some of these countries deaths during the perinatal period outnumber deaths occurring in the following 30 to 40 years of age. Although many less developed countries rightly give priority to the reduction of post-neonatal and early childhood mortality, with increasing success in their efforts, perinatal mortality is until now relatively resistant to public health measures.

3.2. Definition and the importance of the perinatal audit

Perinatal audit may be described as the formal examination and reporting of medical events and their outcome during the perinatal period in respect to a specific outcome population (Dunn and Vulliamy, 1988). The perinatal period lends itself to audit in that its events are time related to conception and birth. The FIGO Standing Committee conference in 1982 on Perinatal mortality and morbidity recommended that national perinatal mortality statistics should include all fetuses or infants weighing 500 g or more (equivalent approximately to 22 weeks gestation) whether alive or dead. However for international comparison, data should be confined to fetuses and infants weighing 1000 g or more (equivalent to 28 weeks' gestation). In addition the International Federation of Gynecology and Obstetrics (FIGO) working party pointed out that as the number of preventable deaths decrease with improved care, an increasing proportion of

residual deaths would be due to lethal malformation. If perinatal mortality statistics were to be used to evaluate the effectiveness of care, then it was important to be able to distinguish deaths due to lethal malformation from those due to other causes (FIGO, 1983).

Measurements of fetal and perinatal mortality in population based studies have used denominators such as a count on live-births or of total-births (live and stillbirths) of 28 and more weeks of gestation. Perinatal mortality thus comprises of late fetal death (stillbirths) and early neonatal deaths and includes deaths between the 28th week of pregnancy and of the first week after birth (ICD 9th revision, 1975). In order to reduce such confusion it has been urged that the terminology "fetal death ratio" and "perinatal mortality ratio " be reserved for calculations where the population base is a count of live births; the terms "fetal death rate " and the "perinatal mortality rate " should be used when the denominator is a count of live births plus fetal deaths of 28 or more weeks of gestation (stillbirths). However the rate is - in most cases - to be preferred to the ratio (WHO, 1978). The same measurement can be used for "maternal mortality rate" and "maternal mortality ratio".

Perinatal mortality rate is in itself a poor indicator of perinatal problems (Bakketeig et al., 1984; McCarthy, 1990) and the overall perinatal mortality rate has been critisized because no allowance is made for the varying incidence of low weight births (LBW) among populations. The need for the analysis of more refined mortality measures has been stressed by Chalmers (1979) and Macfarlane (1981). The mortality differences between countries are most likely to reflect the real differences in the chances of survival if birth weight distributions are comparable.

3.3. Regional surveys on perinatal mortality

Although most epidemiological studies on perinatal mortality and morbidity have been performed in industrialized countries, there is more and more evidence that perinatal events play also an important role in less developed countries. Birth weight strongly influences child survival, while infant mortality and morbidity is closely related to birth weight. As low birth weight is more common in less developed countries the consequences will be more marked in these areas.

So far the etiology and epidemiology of perinatal mortality and morbidity as well as low birth weight are not fully understood and preventive efforts have, in general, not been effective (WHO,1978; Perera and Lwin,1984). Therefore, it was decided that the collaborative surveys should put emphasis not only on the natural course and outcome of pregnancy but also on the various biological and sociological aspects contributing to a high incidence of low birth weight deliveries. The WHO has therefore conducted two regional surveys one of which is in the Western region (1978) and the second survey in South East Asia Region (Perera and Lwin, 1984).

3.3.1. The WHO Report on Social and Biological Effects of Perinatal Mortality

The report was the result of a collaborative survey in eight countries: Austria, Cuba, Hungary, Japan, New Zealand, Sweden, United Kingdom (England & Wales) and the United States of America. The general objective of the study was: to serve as a stimulus to countries to make better use of the information to be derived from vital statistics, and to encourage detailed studies of the determinants of perinatal mortality and their relationships as a basis for the planning of public health programmes designed to reduce perinatal mortality. A second objective was to obtain precise and detailed information on the significance and the international comparability of perinatal mortality rates in the participating countries (WHO, 1978).

3.3.2. Perinatal mortality and morbidity and low birth weight in South East Asia Region

A collaborative study was coordinated and supported by the WHO Regional Office for South East Asia in 1974-1980. The objective of the study was to collect accurate information not only on the natural course and outcome of pregnancies but also on the various biological and social factors contributing to the high incidence of low birth weight, the extent of the problem and the factors playing a major role. The result can be considered as an important step towards reducing perinatal mortality and morbidity and the incidence of low birth weight. Four less developed countries were collaborating in an intercountry community-based survey on perinatal mortality and low birth weight deliveries. Countries participating in this survey were Burma, India, Thailand and

Indonesia.

In contrast to the western countries as previously described, in South East Asia, reporting and record keeping remain far from satisfactory, with the result that the data obtained are of limited value for purposes of planning. Country data are based on hospital reports and the representativeness of the data available is questionable. In rural communities most deliveries are carried out by traditional birth attendants (TBAs), therefore information concerning delivery and aftercare might not be as reliable as in the hospital phase. Yet information in both India (Puna) and Indonesia (Bandung) given by TBAs, both trained and untrained, was found to be fairly consistent and reliable (Perera and Lwin, 1984; Puffer and Serrano, 1987).

3.3.3. The British Births 1970

The success of the 1958 perinatal survey in England prompted a second survey on perinatal events which was conducted in 1970 for a period of one week in England, Wales, Scotland and Northern Ireland. The purpose was to conduct a national survey and detailed analysis of high risk pregnancies. In this survey data was collected from all hospitals, maternity clinics and midwives in domiciliary services. The total of births was 17,005, the perinatal mortality rate for singletons was 21.4 per thousand births.

3.4. Trends in perinatal mortality

All developed countries have adopted laws that require the registration of births and deaths and reporting of fetal deaths for instance; it is believed that over 99 percent of the births and deaths occurring in the USA are reported. In developed countries, perinatal mortality rates are markedly reduced since 1950. The most striking decrease is the perinatal mortality in Japan which parallels the post-World War II growth of the Japanese economy. Japan is now among the top countries which bear the lowest perinatal mortality rates. Also of importance is the continuing decline in perinatal mortality rates for countries such as Denmark, Finland, Sweden, Scotland and Norway. Norway no longer has the lowest perinatal mortality rate in the world as was the case in 1950-1959. The trend for the United States is very similar to that of Norway. The United States has been displaced from a position among the best three countries in the decade of 1950s to a relative ranking of only thirteenth among developed nations (Bakketeig et al.,1984) In

the United States perinatal mortality rate was higher for the black population (17.4 per thousand births) than the white population (9.6 per thousand births). The race differential widened between 1981 and 1985 because the rate of decline for the white population (15 percent) exceeded that of the black population (10 percent). This widening gap was observed for both the fetal and the neonatal components of perinatal mortality (Powell-Grineer, 1989).

Trends in perinatal mortality in the British Birth surveys conducted in 1946, 1958 and 1970. showed a sharply falling neonatal mortality rate between 1946 and 1958 contrasted with an only slowly declining stillbirth rate. Between 1958 and 1970 the contrast was reversed; neonatal mortality declining more slowly and the stillbirth rate very much faster than between 1946-1958. The perinatal mortality has been reduced from 33 per thousand deliveries in 1958 to 23 per thousand in 1970, an improvement of 30 per cent. The reduction is greater among stillbirths (39 per cent) than in the first week death.

Table 3.1 Perinatal mortality rates per thousand births/year, for selected countries

Country	Perinatal mortality rate.
Austria *	21.4
Cuba*	26.9
Hungary*	29.1
Japan*	13.0
New Zealand*	17.3
Sweden*	12.6
USA (part.)*	14.9
Netherlands(1982)**	10.0
France (1982)**	13.0

Source: * WHO report on social and biological effects on perinatal mortality(1975)
** Rao, 1990

The perinatal mortality rates as result of the international comparative studies on social and biological effects on perinatal mortality organized by WHO in two regions can be seen in the tables 3.1 and 3.2.

Contrary to the results in developed countries where most of deliveries take place in hospitals and are attended by trained health professionals the results of the perinatal

mortality rates in 4 selected countries in SEARO region show a different picture.
The perinatal mortality rate for Indonesia is between Burma and India, while Thailand showed a better perinatal mortality rate but had a higher maternal mortality ratio per one hundred thousand livebirths (table 3.2). One important factor that may play a role in the high mortality rates in the three other countries is the number of deliveries by trained health personnel.

Table. 3.2 Perinatal Mortality Rate and Maternal Mortality Ratio in Rural Areas in South East Asia (WHO-SEARO,1984)

Country	Stillbirth rate*	Early Neonatal mortality rate**	Perinatal mortality rate*	Maternal mortality ratio**
Burma	17.4	29.6	51.2	1.4
India	27.2	22.0	48.6	-
Indonesia	13.7	32.9	45.0	1.7
Thailand	8.9	19.7	28.3	5.4

* per thousand births.
** per thousand live births.

In rural Burma, India and Indonesia more than 75 per cent of deliveries are attended by traditional birth attendants (TBAs) compared to only 20 per cent in Thailand. Reports of perinatal mortality in Africa came from Voorhoeve et al.(1989) in Kenya showing a perinatal mortality rate of 46.7 per thousand and Barros et al. (1987) from Brazil with a rate of 33.7 per thousand births. In most developed countries, the perinatal mortality rates have been reduced to one-third or one-fourth of those prevalent three decades ago. However in less developed countries where 80 per cent of the global births occur the perinatal mortality rate is comparable to those prevalent in the developed countries four decades ago (Rao, 1990).

3.5. Social and biological effects on perinatal mortality

There is no clear distinction between social and biological factors (WHO, 1978). This statement generally applies to health and illness but it is especially relevant in the perinatal field. The age of a mother is a biological factor, but the distribution of maternal age in a population reflects social factors and constitutes a social variable. The same applies to parity. Factors that are inherently social are socio economic status, place of residence, place of delivery and legitimacy although in Indonesia the latter is less of a

problem. Social differences between groups of mothers and infants have been observed for many years in all countries to be associated with varying degrees of risks for perinatal mortality and morbidity.

The British Births 1970, found a marked social class gradient, the lower the social class the less certain the woman is of her last menstrual period. The least certain were unsupportive women where only 60 per cent recorded as certain of their dates (Chamberlain, 1975). The British Births survey found that social class appears to have a greater affect on birth weight distribution than on the length of gestation.
In less developed countries few mothers were certain of their dates, about 20 per cent in hospitals and only 10 per cent in rural areas. The certainty of their dates is also closely related to their level of education.

3.5.1. Occupation and risk for perinatal mortality

Very little is known about the mechanisms underlying the association between maternal occupation and different risks for perinatal mortality. Maternal employment has been a favoured issue in perinatal epidemiology. Attention to the methodology of these studies suggests that this is normally an association accounted for by the disadvantaged social circumstances of the women who must continue to be employed throughout pregnancy (Bakketeig et al., 1984). There has to be a difference between economically active women who have a more favourable outcome compared to those associated with poor outcome. Certain features of employment appeared to be associated which poor outcome. These features include long working hours, standing during work, having a lengthy and difficult journey to and from work and performing especially heavy physical work. Maternal employment indicates the relevance of the entire work and family situation of pregnant women (although maternal employment does raise family income and expose women to public discussion of health care issues)(Bakketeig et al., 1984).
A failure of the perinatal researcher's interest in maternal employment is not to take into account the unpaid work that women perform at home. Studies of housework show that unemployed women put in at least the equivalent of a 40-hour working week on housework. For employed women housework counts as a second job. The possible effect of the physical activity has scarcely been examined. An apparent beneficial effect on birth weight of having household help or change in life style during the last trimester of

pregnancy has been described for two groups of women: primiparas and multiparas giving birth after a birth interval of two years or less (Douglas, 1950; Papiernik,1990).
In relation to fathers occupation, the most striking feature in the British survey is the persisting steep social class gradient in mortality. Class I (the best social class) showed an exceptionally low rate nearly a quarter of social class V, although even the rate for social class II is not much more than half of social class IV (Chamberlain, 1975).

3.5.2. Education and occupation

Socioeconomic status appears to have greater relevance to levels of perinatal mortality when measured in terms of education than compared to occupation. In developed countries data on fathers occupation are often lacking particularly in countries in which a substantial proportion of births are to unmarried mothers and not enough information is available from vital records. Educational status of mother on the other hand is not only a more sensitive measure, but this information is also more readily available for a greater number of infants. Education of a more specific type (educational classes for childbirth and motherhood during the antenatal period) does not appear to be by itself associated with improved perinatal mortality. However most studies on the possible effect of antenatal education on perinatal outcome have not met the requirement of random assignments of subjects to experimental and control groups.
The degree of differentiation between the educational backgrounds of parents in different social classes depends also on the structure of - and the access to - the educational system in any society. In a society where length of education does not vary to any great extent among different groups of mothers - a situation frequently found in less developed countries - there will be no marked association between perinatal mortality and socio-economic classes as indicated by education (Alisjahbana et al., 1983; Perera and Lwin, 1984).

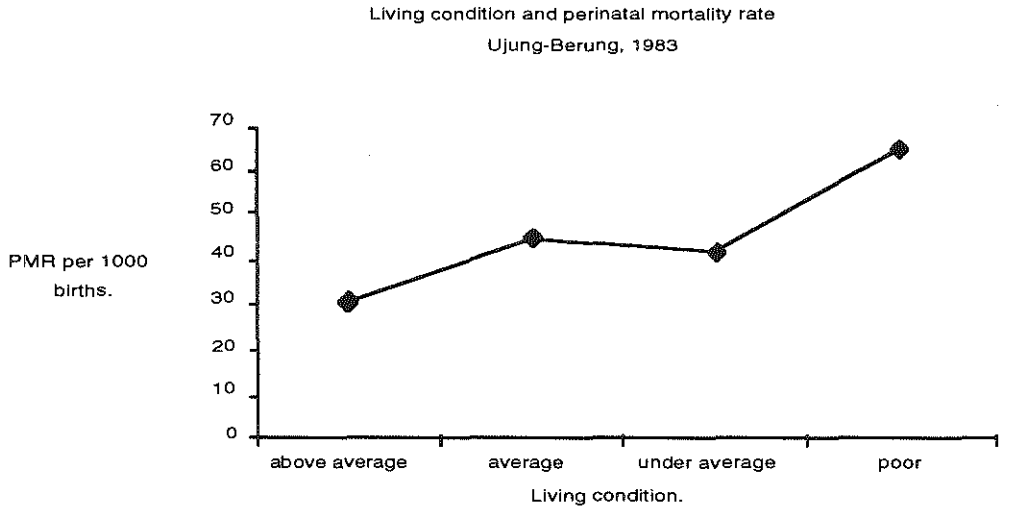
3.5.3. Income and economic status

Family income does not correctly reflect to the actual distribution of income within the family, e.g. the amount of money available to pregnant women themselves. In less developed countries or in male dominated societies income is not always shared equally

between couples, and the wife's share does not necessarily rise with an increase in total family salary (Young and Syson, 1974). It is possible that women and children live in poverty, while their men do not, a fact that points to an important distinction between two types of inequality: the so-called inequality in "economic class" and inequality in "gender class" (Bakketeig et al., 1984).

In the SEARO collaborative survey, data on income and economic status were found unreliable especially in urban areas, where people were reluctant to disclose their true income. Data on income is also hard to obtain and not relevant for rural areas where bartering or payment by farmproducts are a rule.

Figure 3.1.



The difficulty to measure social class in rural areas has motivated researchers to create other solutions. In the Ujung-Berung survey in West-Java Indonesia, a composite scoring system to overcome the above deficiencies using criteria such as building material, and ownership of radio and primus stoves makes it possible to categorize the population from rich to poor as can be seen in figure 3.1 (Alisjahbana et al., 1983).

3.6. Maternal biological factors

Maternal biological factors include age and parity but the association with perinatal mortality could also be behavioural and social which is until now not fully understood.

The younger the mother the more likely the birth is to be a first birth, the older the mother the more likely she is to have had previous children. In general the correlation between maternal age and parity is very strong and the effect of each in the presence of the other can be studied by cross-tabulating the two variables simultaneously.

Parity is generally expected to have an association with perinatal mortality. Most studies however are based on cross-sectional surveys. In such a study the mortality rates are calculated after combining all first, second and third births of the data set. The association that emerges is usually a U-shaped one, the mortality being higher in the lowest and higher parity group (Alisjahbana et al., 1983; Perera and Lwin,1984). For all first births there is a steady increase in perinatal mortality from maternal age <20 years to >35 years. After the third parity there is no change in mortality with increasing age. The result of analysis from Meirik et al. (1979) conclude that only 9 per cent of the decline in perinatal mortality rate was attributable to a shift toward a more favourable age and parity. Billewicz (1973) and Moris et al. (1975) from the USA, suggested a much higher proportion of the decline could be attributable to a shift toward a more favourable age and parity distributions, from 50 to 27 per cent, respectively.

Chamberlain (1975) reported that the lowest perinatal mortality for all singletons occurs among the second children, the rate being half that for the fifth child. Equally interesting is that women having a first child have a 1:700 chance of having an abortion between 24-28 weeks gestation, compared with a 1:900 chance for the mother having her second child and 1:600 for the mother having her fifth child. For age of mother the lowest perinatal mortality is found at 20-25 of age (WHO, 1978; Perera and Lwin, 1984).

Bakketeig et al. (1984) have shown that when the relationship between parity and perinatal mortality is examined within groups of women based on their attained size of sibship, a different pattern occurs. Within each sibship group the perinatal mortality decreases by increasing parity. This is contrary to cross sectional studies where mortality is generally higher among births of mothers with larger sibships. They concluded that in cross sectional studies births within larger sibships have a larger overall perinatal mortality rate but within each sibship group the perinatal mortality rate decreases with increasing parity. There is no evidence that the mortality increases with increasing parity for moderate size-sibship.

3.7. Birth interval

Many authors suggested that short and long intervals between pregnancies are associated with an increased risk of perinatal death and other adverse outcomes of pregnancy. The British mortality study in 1958 found that the most important factors influencing pregnancy spacing were outcomes of the preceding pregnancy, social class and maternal age (Fedrick and Adelstein, 1973). When these variables were taken into account they found that the length of interpregnancy interval was not associated with the stillbirth rate. Most countries showed the most optimal birth interval was from 18 months to three years and infants born at shorter or longer intervals were at greater risk. Those born within 12 months of the completion of a previous pregnancy were at 3.5 times greater risk than those born at the optimal interval. However they were able to show that short interpregnancy intervals (less than 12 months) were associated with higher neonatal mortality. On the other hand longer intervals were not shown to be associated with higher mortality rates. Erickson and Bjerkedal (1987) concluded that manipulation of the interval between pregnancies is unlikely to have any marked beneficial or detrimental effect on outcomes of pregnancy. However Roman and Alberman (1980) found that long intervals were more likely to precede miscarriage, but the effect was not large and could also be due to the fact that the women were older.

3.8. Nutrition in pregnant women

The importance of nutrition to successful pregnancy outcome relates not only to pregnancy itself, but to prepregnancy nutritional status, including the mother's own childhood. An indicator of these is the significance of both height and prepregnancy weight as predictor of pregnancy outcome. There is a close relation between height of mother and perinatal mortality, the shorter the mother the higher the mortality (Aitkin, 1986). Height is associated with both race and social class. The British Birth 1970, reported a perinatal mortality rate of 25.3 per thousand births when the mother was less than 62" (155 cm) compared to 19.9 per thousand births when maternal height is more than 62". Height is also an indication of the mother's nutritional status in her early childhood. Therefore cut-off points may be different for each community, for instance in the Ujung-Berung study in West-Java a cut-off point of <145 cm is associated with higher incidence of low birth weight infants and associated perinatal mortality rate

(Alisjahbana et al, 1983).

There is a concensus that poor maternal nutrition impairs fetal growth and indirectly survival in the perinatal and neonatal period. The energy deficit is the most important causal factor (NAS,1990). Intervention trials did however not give consistent results and if positive, the increase in birth weight is modest (Rush, 1983). The results of energy supplementation during pregnancy on birth weight conducted in three villages in Madura were in agreement with the literature: a modest positive effect (Kardjati et al, 1988). They found a 50 gram increase in mean birth weight per 10 000 kcal ingested from supplementary feeding. The study also reported a positive effect on perinatal mortality (Kusin et al.,1989). However it is not clear whether birth weight increments achieved via nutritional supplementation programmes are associated with decreased perinatal mortality and morbidity or improved long-term child development. There is also the methodologic problem of determining whether it is the dietary advice or dietary supplementation or the general supportive effect of inclusion in such a research programme that accounts for the improved outcome.

3.9. Previous perinatal death

The tendency to repeat perinatal death was discussed by Bakketeig et al. (1984). The risk of perinatal death in subsequent births by perinatal survival of previous birth(s) was analyzed based on 134,418 mothers with their first two or three singleton births in Norway (1967-76). They concluded that if the first birth survived the perinatal period, then only 11.8 per 1000 second births died perinatally. If however, the first birth died, then 52.7 per 1000 second births were perinatal deaths. Comparing the first birth with the following one, mothers with a perinatal death at first birth have a relative risk for a subsequent perinatal death of 4.5. They showed that the risk of a subsequent perinatal death was further increased if the mother had had two previous perinatal deaths, then the relative risk of these mothers increased to 7.3. For each mother with one previous perinatal death and one infant who survived, the risk of a perinatal death among their third births was higher if the previous death was the adjacent birth. However for each birth that survived the perinatal period the risk of a subsequent perinatal death decreased (Bakketeig et al., 1984).

3.10 Birth weight

Weight is an indicator of physical growth of the fetus which can be measured at birth whereas length of gestation is a measurement of maturity which can only be estimated. As a fetus matures it grows, factors affecting this relationship are important factors in the immediate and long term prognosis for the survival and well being of the baby (Chamberlain, 1975). The importance of birth weight as a factor determining levels of late fetal and early neonatal mortality has long been recognized. Birth weight distribution can be a useful indicator of the overall health conditions of a particular community. At the Siguna workshop a consensus was reached that the hypothesis of birth weight as an indicator of social development merits an urgent testing (Lechtig et al.,1978).

In the WHO collaborative study three countries, Hungary, Japan and New Zealand have data on perinatal mortality rate according to birth weight. In addition Austria and USA have birth weight data related to the early neonatal component only. In the SEARO study, all 4 countries reported data on birth weight and the corresponding mortality rates. In general, perinatal mortality is higher the lower the birth weight. The combined rate for all weights under 2500 grams contrasted with that for birth weights of 2500 grams and over.

The generally accepted cut-off point of 2500 g. in the definition of low birth weight may be too high for some populations. Ideally for each population the cut-off point should be determined in such a way that the incidence of low birth weight is as sensitive as possible to socio-economic changes (WHO, 1981).

The same information of birth weight specific mortality rate was collected from data in 4 participating countries in SEARO (table 3.3). The perinatal mortality rate was high in those with a birth weight of less than 2500 grams, e.g. Burma (rural group) had a perinatal mortality rate of 136.4 among the low birth weight group compared to 20.6 among those with normal birth weight. A similar five to six fold increase in perinatal mortality rate was seen in all areas. If further breakdown into smaller weightgroups were done then data shows a steep increase in perinatal mortality rate in those with a birth weight of less than 2000 gram, suggesting that the cut-off point for low birth weight babies in need for special care is 2000 gram. For the purpose of comparison in using birth weight as a social indicator, Karlberg (1978) concluded that the total distribution of birth weight and not only the rate of low birth weight should be utilized.

Tabel 3.3 Birth weight specific perinatal mortality rates in selected countries

Country		LBW (%)	Birth weight specific perinatal mortality rate <2500g	≥ 2500 g.
WHO,1974				
Austria		5.2	243.9	7.8
Cuba		10.7	170.0	11.5
Hungary		10.7	302.3	8.0
Japan		5.5	174.7	8.1
N. Zealand		4.8	201.9	7.0
Sweden		3.7	197.1	5.2
USA (part.)		6.0	141.9	4.6
WHO SEARO, 1984				
Burma	Rural	14.8	136.4	20.6
	Urban	25.8	114.8	10.1
	Hospital	23.8	151.1	19.2
India	Rural	19.4	121.1	18.3
Indonesia	Rural	14.0	181.1	27.1
	Hospital	17.5	356.4	71.1
Thailand	Rural	8.2	146.7	16.0

LBW= low birth weight

The association between social class, birth weight and length of gestation was discussed by Chamberlain (1975). The results of the British Births show that factors with an uniform effect throughout pregnancy were sex, parity and smoking. The first born of both sexes and the girls tended to be lighter in weight and longer in gestation. Thus the relative immaturity of the boys appears to be an important factor in their subsequent progress and survival. A simple comparison of birth weight specific perinatal mortality rates between US whites and blacks suggests that low weight black newborns fare much better than low weight white newborns. However the overall mortality rate for blacks is 75 per cent higher than that for whites. The problem is that, relatively speaking, there are many more low weight black births than low weight white births. These further adjustments of birth weight specific perinatal mortality rates are necessary whenever the underlying birth weight distributions of the two populations being compared are different (Bakketeig et al., 1984).

It is interesting to find that birth weight and duration of gestation had a determining effect not only upon levels of perinatal mortality but also upon the time death occurred. The proportions of first day deaths for instance decreased with increasing birth weight

and with increasing duration of gestation.

3.11. Health care and health services

When comparing difference in perinatal mortality in rural and urban areas, factors that have to be considered include not only those factors which have been examined so far but also issues such as maternal health and the availability and utilization of medical care and services. Difficulty of access to medical services including difficulty to reach the health facility, might contribute to relatively poor perinatal mortality rates among rural babies in vulnerable groups.
In developed countries health services are more equally distributed and the utilization of services is greater because of better information, communication and transportation. Other factors that play a role are the educational level of the mothers and the ability to make their own decision. In most countries there is a clear policy that mothers should be delivered in hospitals. Countries showing the lowest perinatal mortality rates are those with the highest proportion (99 per cent and more) of infants delivered in hospitals except in the Netherlands (Maandbericht Gezondheids Statistiek, 1989). Health insurance makes it also possible that deliveries take place in hospitals. Therefore, in the crude perinatal mortality rates in the western collaborating countries, urban and rural areas were not different. Urban rates were higher than rural in three countries, lower in three countries and about the same in the remaining two countries (WHO 1978). The British Births in 1970, showed 12.4 per cent of home deliveries, while the remainder were hospital and nursing home deliveries. There is a decrease in the number of home deliveries if compared to the survey in 1946 of about 42 per cent. The study shows that midwives were entirely responsible for at least 45-70 per cent of the infants born. Unfortunately there was no report concerning the mortality rates in relation to the shift from home deliveries to institutional delivery care.

The extend to which improvement of medical care can be achieved by antenatal, intrapartum and neonatal care in developed countries is difficult to establish, particularly since there have been changes in perinatal practice and services. New technologies have been introduced in obstetrics and neonatology. Obstetricians are becoming more active and there is a steady increase in induction of labour and intervention during delivery. Besides that other improvements were found such as

improvements of the total health status of the people and the change in the structure of the childbearing population itself. However Bjerkedal (1982) found that in Norway, where the use of induction has increased by 70 per cent from 1960-1970, the perinatal mortality rate among induced births did not decrease more rapidly than among spontaneous deliveries. He concluded that increase of induction has not contributed much to the overall decline in perinatal mortality (Bakketeig et al.,1984).

The beneficial effect of improved perinatal care on mortality rates is rather conflicting, especially in areas where improvements in health status take place simultaneously. Some authors claim that a considerable proportion of the decline in the perinatal mortality rates among low weight births is likely to be due to improved perinatal care, particularly the increased provision and use of neonatal intensive care as is the case in developed countries. In less developed countries the situation is very much different, the availability of health services usually favours the urban residents as can be seen in the impact on perinatal mortality. The disparity between mortality rates in urban and rural areas is related to the distance to health centers and to specialized hospitals. The choice of place of delivery is mainly on the basis of available services and probably the costs and distance. Lack of proper facilities and health services result in 90 per cent of deliveries taking place at home in Burma and Indonesia (Perera and Lwin, 1984).

Table 3.4 Perinatal mortality rate, by type of birth attendant (WHO-Searo,1984)

Country	Community	Birth attendant					
		MD	Midwife/ nurse	TBA trained	TBA untrained	Student	Others
Burma	rural	321.5	44.1	42.6		333.3	214.3
	urban	148.1	28.7	28.3		111.1	-
India	rural	74.4	58.1	44.9	46.6	-	-
Indonesia	rural	167.0	24.0	41.0	47.0	-	71.0
Thailand	rural	26.69*		21.18		-	74.15**

* Perinatal death rate of home deliveries by midwife is 6 per 1000 births

* * Self, relatives, neighbours, and no attendant.

Birth attendants were mostly traditional birth attendants. There is some evidence to indicate a difference in perinatal mortality by type of birth attendant, for example in rural deliveries in Indonesia and Thailand the perinatal mortality rates of deliveries attended by midwives are lower than those attended by traditional birth attendants. In

India and Indonesia, in the rural community there was no significant difference in perinatal mortality rate between deliveries attended by trained and untrained TBAs (table 3.4).

3.12. Causes of perinatal death

In the western WHO collaborative survey, the proportion of perinatal deaths assigned to non-specific categories (anoxic and hypoxic conditions, immaturity unqualified, maceration and "other fetal death of unknown causes") ranged between 11 per cent (New Zealand) and 60 per cent (Austria). Different registration and certification practices together with differences in the availability of data from perinatal death certificates and autopsy reports contributed to this.

Toxaemias were the assigned cause of 2 percent of perinatal deaths in the United States but of 9 percent in Sweden and 11 percent in New Zealand. Nearly 24 percent of perinatal deaths in Hungary were assigned to difficult labour with malposition or to birth injury without mention of cause, in contrast to the other five countries where from 4 to 8 per cent of perinatal deaths were assigned to these headings. The death rate from haemolytic disease in the newborn was very low in Japan where there is low prevalence of maternal Rh negative blood groups and was low in Sweden and the United States probably due to a more prevalent use of antiglobulin. Congenital anomalies of the central nervous system and eyes were reported two or three times more frequently in England & Wales and in New Zealand than in other countries. The ratio of congenital anomalies of the central nervous system and eye to all other congenital anomalies was 2:1 but for Sweden, United States and Japan the ratio was reversed, 1:2.

On the other hand there was similarity in the proportion of deaths assigned to placenta praevia or placenta separation ranging from 6 to 10 per cent. Approximately 15-20 per cent of perinatal deaths were caused by toxaemias and maternal hemorrhages.

In the British Births survey, stillbirth accounts for 54 per cent of the deaths. In 27 per cent this was associated with intrauterine asphyxia. Among the liveborn the most important causes of death are hyalin membrane disease (30 per cent), congenital malformation (23 per cent), anoxia (17 per cent) and gross immaturity (15 per cent). Infection accounted for only 2 per cent of the first week death. Birth trauma (3 per cent) was low and even lower in the stillbirths (1 per cent). Two-thirds of all deaths during

the first week occur in infants under 2500 gram (Chamberlain, 1975).

The cause of perinatal death in the South East Asian Region differs in pattern as well as in underlying cause of death (Table 3.5). Causes of death were assessed based on interview or autopsy. Only Burma reported an autopsy rate of 64.8 per cent, while in Thailand the autopsy rate for the hospital phase was 94 per cent. The difficulty in securing permission for autopsy in Indonesia and India is probably due to cultural and religious reasons.

Table 3.5 Causes of perinatal mortality in ranking order

Cause	Burma	India	Indonesia	Thailand
Prematurity/ low birthweight	1	2	3	5
Anoxia/asphyxia	2	1	1	3
Infection	3	-	2	1
Birth injury	4	5	-	4
Cerebral hemorrhage	5	-	-	-
Congenital malformation.	6	4	3	3
Feeding problem	-	3	-	-
Other respiratory conditions	-	-	3	2

Source : (WHO-SEARO,1984)

In table 3.5 it can be seen that there is some degree of similarity in ranking between Burma and India. Indonesia and Thailand reported more deaths associated with infection. A great majority of deaths in Burma were ascribed primarily to low birth weight and to anoxia/asphyxia. This was true also in India. In Indonesia however the majority of deaths due to anoxia and asphyxia had a birth weight of less than 2500 gram. One must conclude that the great majority of perinatal deaths must have had preventable factors. For instance, in Indonesia tetanus neonatorum is one of the main causes of death due to infection in the early neonatal period (Alisjahbana et al., 1983).

The primary factor in perinatal mortality is low birth weight. While this factor has important preventable obstetric implications, nevertheless special care and management of low birth weight infants either at home or in a special health or hospital facility are essential for their improved survival. Reported as infections are diarrhea, tetanus neonatorum, respiratory infections and skin infections, most of these infections are

preventable through immunization, better hygiene and postnatal care.

A review of obstetric history indicates that many serious or potentially serious complications of pregnancy, labour and delivery occurred in the women delivering stillbirths. These include cephalopelvic disproportion; type of labour (prolonged, precipitate and difficult); complications such as toxemia, antepartum hemorrhage, uterine inertia, malnutrition of mother; complications of the umbilical cord (cord around the neck, prolapse of the cord) and other complications such as intrauterine growth retardation. Little or no prenatal care was a constant finding in rural areas in the South East Asian Region.

3.13. Summary

In the regional surveys the two recurring themes have been the identification of high and low risk mothers. High risk mothers usually are located at either end of the distribution. Although the level of risk can be many times higher than that for mothers at the optimum level, the numbers of mothers involved is often too small and the contribution they make to overall perinatal mortality is correspondingly small also (WHO 1978).

The results of the two regional studies show some general characteristics that can be found in each country. For example, the pattern of maternal age was similar and did not differ in total levels of perinatal mortality. Less favourable changes of survival for infants of very young and older women constituted a definite risk in individual cases.

Parity and birth interval had clear implications for family planning programmes as well as for medical care. The risk of perinatal death is always smaller for the second born than first born infants. For the third, fourth and subsequent births, the risk of perinatal death progressively increased everywhere, while the risk of dying was usually twice as high for the fifth or subsequent child as for the second born.

Birth weight and duration of gestation are two variables which bear closely on perinatal mortality. Compared to duration of gestation, birth weight is a better and more objective measure. Although very dependent on duration of gestation, birth weight is not determined by it alone. Some studies showed that perinatal mortality was high when low birth weight was combined with high parity, and perinatal mortality is low for second and third births with mature birth weights. A common pattern emerged when birth weight and duration of gestation were examined together. Perinatal mortality declined

with increasing birth weight at each duration of gestation and declined with increasing duration of gestation less than 42 weeks at each level of birth weight.

The comparison of birth weight specific perinatal mortality rates among populations can be very misleading, if proper allowance has not been made for differing birth weight distributions. As a rule, in a population where low-birth-weight is common, the perinatal mortality rate among low-weight births will tend to be lower than for a population where low-birth weight is less common (Bakketeig et al, 1984)
Contrary to developed countries, most deliveries in South-East Asia are home deliveries assisted by traditional birth attendants (TBA) particularly for India and Indonesia (±80 per cent), while Burma and Thailand have more hospital deliveries. Maternal mortality remains high in rural areas of less developed countries, showing a lack of safe delivery and postpartum care. The broad variation in the analysis of perinatal deaths in both collaborative surveys underlined the need for more improved data.

Chapter 4. THE TRADITIONAL BIRTH ATTENDANT

The traditional birth attendant is usually an older woman, almost always past menopause, illiterate due to lack of formal education - although not necessarily illiterate for numbers - and practices midwifery as a part-time occupation (Williams and Yumkella 1986). She does not have formal training has no legal recognition, is unregistered and paid by the family or not at all and has other work for her livelihood. Her role includes everything connected with childbirth and her practices were reinforced by rituals.
At the local level there was no interference with her practices, her services are based on humanitarian principles. She is more than a source of physical help, a reassuring figure familiar to all, she learned by practice the proper approach to village people. Her strength is that she is an important person in the cultural and social life of the community in which she lives.Her weakness lies in her traditional practices, which may endanger her clients (Verderesse and Turnbull,1975; Leedam, 1983).

4.1. A review of the literature

Throughout the world health services are expanding, but in many less developed countries about 40-90% of deliveries still take place at home with the help of the traditional birth attendant (TBA). In contrast to modern health practitioners, traditional midwives are concentrated among the poor and in rural areas. For the great majority of mothers in the developing world, it is the local midwife or the traditional birth attendant who is the most important source of support during pregnancy and childbirth. Although the number of traditional birth attendants in the world is unknown, the Unicef (1985) estimated the number of TBAs in several Asian countries. For instance an estimated total of 600,000 "dais" attend 80% of all births in India, in Thailand about 17,000 "moh tam yae " attend 80% of births. In Nicaragua, the "parteras" deliver 68% of all babies, in the Philippines there are over 38,000 "hilots" living in the rural areas, while in Indonesia it is estimated that 70,000 to 80,000 "dukun bayis " attend over 80% of rural births to poor mothers. There is great variation in the number of TBAs, what is known however, is that TBAs deliver at least 60-90% of the infants born in the developing world. In many poor communities, they are therefore one of the greatest of all potential human resources for empowering mothers with knowledge and practical on-the-spot help in the task of protecting their childrens lives and health. Apart from considerations of tradition and

culture the easy availability of TBAs in the community make them the most suitable person for conducting deliveries in rural areas. In many countries TBAs play an important role not only providing assistance and guidance to rural women during childbirth, but they also play an important role as domestic help during prenatal, perinatal and postnatal period (Wallace, 1985).

A common problem found in less developed countries is that many countries are still far from making effective use of their TBAs. A review of trends over the 1970s found that although most countries had become more likely to acknowledge their existence and to institute training programs for them it was still rare for the development of TBAs to be an integral part of the national health system (Wallace, 1985; Unicef 1985).
During the last decade however, there has been a radical change - at the conceptual level at least, and in some cases also at the practical level - in the approach to health development. This approach since 1978 referred as primary health care concept is based on the following principles; universality, accessibility and equity as regards the delivery and receipt of health care; community participation; appropriate technology; coordinated intersectoral efforts; linkage with national development plans, programmess and projects and the re-orientation of the health system with emphasis on community services linked with a system of referral to more complex care (Primary Health Care, 1978). Many of the beliefs and practices of traditional medicine - which have been attacked by modern medicine - are also changing in response to modernization and education (hospital deliveries are increasing, but hospital services are still unavailable to many rural women in less developed countries).
In this context the World Health Organization has identified five activities requiring urgent attention (Mangay and Simons, 1986). Firstly, in the light of prospective trends in the proportion of births attended by health professionals and in the light of careful assessments of the cost of training and deploying TBAs it is vital for countries where TBAs exist to make realistic assessments of the need to train them. Secondly, there is a need for the more rapid transfer of experience from the countries that have made the most progress in training TBAs to those that have made the least. Thirdly, more emphasis should be given to evaluate training as a means of improving the contribution of experience to effectiveness. Fourthly, more attention should be given to the contribution TBAs could make to family planning programmes by recruiting acceptors and encouraging their clients not to abandon dependence on breast-feeding. Finally, efforts should be made

to develop strategies that will help the most effective use of traditional health services. It was suggested that each country will need to make basic decisions whether or not programmes for the training of TBAs should be intensified in terms of numbers, amplified in terms of content, and/or extended in terms of the duration of training. Naturally before arriving at such a decision there must be intensive discussion of the problems involved in both the training and use of TBAs from three major perspectives - namely: the TBAs themselves, the organized health care delivery system and the community in which the TBAs live and work.

4.2. Characteristics of the TBA

The typical TBA is usually a member of the local community who has a personal or family relationship with her client, speaks the same language and shares the same local health beliefs and behavior. They are also influential women in their respective communities. It is through bearing and rearing children that a woman in many primitive countries gains status and respect in her community. In Sudan, the TBAs are known as "midwives of the rope", because they normally help deliver children for women who give birth in squatting position, supporting themselves by holding on to a rope attached to the roof of the hut (Wallace, 1985). They may also have other occupations and work as domestics, farmers, rural manual workers or do some type of handicraft (Baquero, 1981; Cominsky, 1986). When TBAs stated their occupation as farmer many of them also identified themselves as herbalist with a specialization in maternal and child matters. While TBAs did not freely discuss their role in helping women to secure abortions, they knew and presumably used plants as abortifacients (West 1986).

Traditional practices of TBAs include such procedures as adjusting the position of the fetus, massaging the abdomen of the pregnant women, advising on diet and administering simple essential drugs. Their lack of knowledge of hygiene and lack of equipment is a danger. To cut the umbilical cord, the TBA uses everything from sharp stone, kitchen knife or tough grass to bamboo knife depending on what is available in her area. Neonatal tetanus killed one in every hundred babies born alive in Southern Sudan, and one in every 150 babies born alive in West-Java (Alisjahbana et al., 1983).

When Indian women were asked to state the reasons for satisfaction with the services of

TBAs, 63 per cent of mothers whose births were attended by trained TBA and 53 per cent of those attended by untrained TBAs gave reasons such as: the TBA looks after me properly and is very helpful, cooperative, affectionate and good natured and/or related to family, easily accessible etc. Women were also satisfied because of the care given at delivery and mentioned the TBAs execute delivery nicely/ easy/ smoothly and take good care of baby and mother. Many also reported that they had known the TBA for many years (Swaminathan et al., 1986). Rural women prefer the TBA because they are assured of privacy. This sense of modesty is an attitude in many countries in South East Asia and this is probably also one of the reasons why rural women do not like to deliver in the hospital. Other factors are financial reasons and inconvenience since it is difficult to find some one to look after the children in their absence (Recio, 1986). Because of similarity in educational background, which facilitates communication, long acquaintance and emotional support during the lying in period, the domestic services she provides as well as the belief in their kinship there is quite a close relationship between birth attendant and her client. In general the TBA enjoys high prestige and is respected for her skills which may be both obstetrical and ritual (Wallace,1985; Cominsky, 1986).

The TBAs usually inherit the occupation through inheritance (following the steps of older relatives), dream experiences or personal interest. Skills are learned through practice and informal instruction. The TBA learns by observation and assisting and sometimes watching her own experiences (Cosminsky, 1986). Both women or men can become TBAs, although women dominate the profession.

TBAs are not favoured by health professionals because of their alleged harmful practices. In Sierra Leone (Unicef, 1985; Lettermaier, 1988) an attempt was made to investigate the action by TBAs with regard to breech delivery and retained placenta, as the main causes of perinatal and maternal death. Fifty percent of TBAs claimed they refer all breech presentation to the hospital while 40 per cent said they would carry out the delivery at home. However, reports of direct referral and transportation to nearby clinics should be viewed with suspicion because of constraints such as lack of transportation and due to economic reasons.

Practices also vary regarding the afterbirth, for retained placenta in Sierra Leone some would refer the patient to the hospital immediately, some would rub the uterus while some of them felt they should put their hand into the uterus to withdraw the placenta. The same finding was found during an interview of TBAs in rural West-Java (Peeters et

al.,1986). In Sudan some TBAs gently squeeze the top of the womb to help expel the placenta. Others advice the mother to blow into a bottle, which contracts her diaphragm and puts abdominal pressure on the placenta, which helps to force it out. One described how she ties the cord to the mother's toes and gets her to move her feet gently to pull out the placenta (Wallace, 1985).

In Indonesia it was found that TBAs could identify a breech only during delivery and not before. Lack of knowledge about the anatomy of the women's body and the position of the child is one of the reasons that TBAs are not aware of the importance of identifying the position of the baby (Alisjahbana et al,1990).

TBAs are also giving treatment, this may vary from country to country and according to the accessibility to essential drugs. In general TBAs tend to give herbs or advice but in Sierra Leone 24 per cent gave some kind of medicine such as ergotamin, aspirin or other kinds of painkillers (Williams and Yumkella,1986).

Although the TBA is in principle a voluntary worker, it is customary for her to receive a gift or an amount of money after each delivery. The size depends on local circumstances and traditions. In some countries there are two categories of birth attendant. The first is a woman who takes a particular interest in midwifery and who therefore delivers not only her own relatives but also women unrelated to her. She characteristically receives payment, whether in kind or money, and she can be regarded as a professional. She is the woman generally understood by the term TBA. The other category is a woman who simply attends and cares for her own relatives, has no special interest and experience in the subject and is not paid. This category of woman may attend only a handful of births in her lifetime (Bullough, 1983).

4.3. Training of TBAs

Governments in many countries have organized training for the traditional birth attendants with the primary aim of reducing the risks for mother and infant. However, in spite of the fact that these programmes have been operational for many years they have not brought the expected impact on mortality. It was therefore essential to assess exactly what was being done by the traditional birth attendants in caring for rural women during pregnancy and during and after delivery.

A preliminary survey was conducted in India by Prathinindhi et al. (1986), 48 traditional birth attendants were interviewed and questioned about their knowledge, attitudes and delivery practices. The results showed that untrained TBAs had no concept of antenatal care or awareness of recognizable risk factors during pregnancy. Trained TBAs had some idea of the need for antenatal check-ups but their involvement was negligible. In Niracagua training TBAs was started in early 1976 and continued to 1980 but met with only limited success because the main emphasis was on contraception, thus radically reversing the function of the TBA. The community could not accept this transformation that deeply affected its traditions and religious beliefs. A totally new approach was started in 1981, the training courses dealt with the following: the physiology of pregnancy and the reproductive system, signs and symptoms of pregnancy and identification of risk, signs and symptoms of abnormal delivery and abnormal position, the importance of referring pregnant woman to the health center for immunization and complications (Morelli and Missoni, 1986).

A decision for or against a training program should be based on the current extend to which the countries obstetric and midwifery services reach the population and the length of time incomplete coverage is likely to persist. This will require some knowledge of factors such as birth rate, population growth and human resource statistics plus the possibility of change in the population's sociological characteristics. Governments trying to make such decisions will need to know a lot more of their own TBAs. Studies of the beliefs, values and practices of the TBAs are required, knowledge of their numbers and distribution. Sometimes it may even be necessary to prove that they exist (Bullough, 1983). The cost of TBA training programmes is clearly a factor to be considered. In Malawi, Bullough (1983) showed that to equip a state-enrolled midwife is 59 times more expensive as to train and equip the TBAs needed to manage the same number of deliveries. Running costs for the TBAs including the cost of supervision and refresher courses were 15 times smaller.

4.4. Evaluation of training of TBAs

With the shortage of medical facilities and the need to expand primary health care several countries have established midwifery training programmes for TBAs to "upgrade" their practices. The strongest arguments for training TBAs is that TBAs

occupy a strategic position in the delivery of health services and there is convincing evidence that improvements in their pre-service and service training can yield important benefits for a relatively modest and affordable investment (Ryan and Kim, 1986).

WHO's experience has demonstrated that most TBAs are not so wedded in superstitions and traditional practices and that they welcome the opportunity to learn new ways and practice new skills. Fifty two countries now offer some form of training programmes for TBAs and more and more countries recognize the importance of investment in their training, which should reflect the fact that the TBAs role is multidimensional (Lettermaier, 1988).

The Unicef reported that experience has shown that most traditional birth attendants welcome training in new techniques - when offered. Modern health services can provide that training but in the modern health establishment, there has been a pronounced tendency to look down on the traditional birth attendants as ignorant and superstitious practitioners of unscientific and unhygienic methods of dealing with pregnancy and childbirth. Commonly TBAs have been accused of performing dangerous abdominal massages during pregnancy, or of advising mothers to discard the colostrum which precedes the breast-milk or of advising mothers to eat less in pregnancy, or not knowing what to do in the 10- to 20 per cent of births when complications arise (Unicef,1985). In some cases, these accusations are well founded, some traditional birth attendants do promote and practice many dangerous and ill-founded ideas during pregnancy and delivery as mentioned earlier.

Although numerous countries have reported training programs for TBAs, only a few reported evaluation of the training programs (Verderesse and Turnbull, 1975). An extensive study to train TBAs was conducted in Ghana: the Danfa Comprehensive Rural Health and Family Planning Project which began in 1973 for a period of 9 years. Two hundred and thirty seven TBAs were trained and the result shows that the project had a formidable impact on midwifery care in rural Ghana. Encouraging were the findings that the vast majority of women seen by the TBA were referred to the local health center at least once during the prenatal period but the impact of training on maternal and perinatal mortality was not reported (Neuman et al., 1986). In Burma a pilot program of training TBAs in two townships in Rangoon was conducted to investigate the possibility of improving their contribution to maternal and child health care through simple

teaching and continuing supersivion (Tin Tin Hmun, 1982). One hundred and sixty seven TBAs attended the training program in Burma. The overall aim was to increase safety of TBAs practices, decrease the number of deliveries by TBAs, increase referral of pregnant women and babies at risk and to promote a new understanding of the relationship to other health workers. The result shows that there was indeed a change of behaviour observed in the TBAs daily practices. Unfortunately this study does not report on the impact of training on maternal and perinatal health. One evaluation of TBA training came from The Gambia (Greenwood et al., 1990), the study started as a primary health care program (PHC) in the Farafenni area of The Gambia. In PHC villages 65 per cent of women were assisted at delivery by trained TBAs during the post-implementation period and the proportion of women delivered in a hospital or health center increased. Both maternal and neonatal death rates fell in PHC villages during the postintervention period and declined to about half the levels recorded during pre-intervention surveys. It was concluded that TBAs probably played some part in improving the outcome of pregnancy in the Farafenni area, but other factors such as improvement of transportation may also have contributed. Lartson et al.(1987) evaluated the impact of training TBA in two cultures in Liberia and in the innovative health program in South India. There has been an improvement in coverage of antenatal care and immunization with tetanus toxoid associated with a fall in the incidence of low birth weight and neonatal tetanus. The researchers stressed the need for repeated refreshing courses, for effective back-up in case of emergencies and for close supervision to prevent risk. They conclude that training alone is not enough. Practices and routines which are deeply rooted in the local culture cannot be changed by a few weeks of lectures and demonstrations.

Neonatal tetanus does seem to be potentially a good indicator of effectiveness and was used in the Philippines (Mangay-Angara, 1981). They reported that in provinces where TBAs had been trained the incidence of death from neonatal tetanus declined over a period by 41 per cent, while in provinces where 40 per cent or more of the TBAs had been trained there was an overall decline of 85 percent. Ross (1986) stated that the evidence that training TBAs prevents neonatal tetanus is much weaker than that for vaccination of women with tetanus toxoid.

The problem with training TBAs is the difficulty in communication and understanding of the subjects given through training. Unfortunately many authors related this problems

more to the TBAs characteristics but less to the methods of communication and training. This problem may also become the reason why many countries try to change TBAs to nurse-midwifes because of the many problems related to their resistance in training. To overcome this problem some researchers developed training tools using pictorial forms, booklets etc. (Alisjahbana et al., 1986; Chabot and Eggens, 1986). The limitation conveyed during training through oral communication whether in the form of a lecture, a conservation or a discussion tends to be partially forgotten. Visual communication through drawings, diagrams, pictures presents its own problem. Visual literacy like conventional literacy is an acquired skill while pictorial or symbolic representation, abstraction and scale must be carefully taught. "Picture blindness" is caused by unfamiliarity with graphic conventions. The step by step teaching of these conventions is therefore an indispensable part of any training program which intends the use of pictures, diagrams and other visual representations (Ryan and Kim, 1986). It is questionable how much literacy of the TBA is needed for training. A whole range of intermediate states between literacy and complete illiteracy exists. It also implies the ability to read and write and frequently includes the notion of numeracy.

Supervision of TBAs is also frequently mentioned as an important factor for the success of TBA training, but reports on what kind of supervision that is needed are lacking. Supervision may purport to be supportive, but actually be controlling or vice versa. Current supervision methods for trained TBA fall into 4 main categories (Walt, 1986): supervision by the community, supervision by the TBA themself, supervision by the healthworkers, and lastly supervision through state licensing.

Alisjahbana et al. (1983) and Peeters et al. (1986) reported that lack of supervision resulted in lack of performance and lack of impact on the outcome of pregnancy. Why supervision fails maybe related to the fact that supervision is seldom incorporated in plans for training programmes for TBAs nor are resources adequately considered. Supervision is often not seen as part of an integrated system of health care or as part of the information system. Although considered important in practice, supervision is usually piecemeal and inadequate (Walt,1986). Other reasons are the poor planning, transport expenses for supervision which are frequently lacking and staff not adequately informed in supervision techniques. Health personnel tend to emphasize areas of training programmes with which they are familiar, by rechecking the retention of knowledge and supplies rather than reviewing the quality of services provided by TBAs (Heidy. 1981).

Picture 4.1 The typical traditional birth attendant of Tanjungsari

Picture 4.2 An untrained traditional birth attendant assisting a delivery

Picture 4.3
An untrained traditional birth attendant weighing a newborn infant

Picture 4.4 Cord dressing with leaves and ashes by an untrained TBA

Constraints in the supervision of TBAs can be identified as falling into 5 categories (Walt,1986).

- weak, technical and organizational and administrative support.
- disperse and isolated communities.
- lack of rapport between health services personnel and TBA.
- failure to involve communities in training programmes.
- limited financial support for training and supervision.

Some suggestions to improve supervision are the following: improvement of supervisory strategies, continuing education, support controlled by law/registration and lastly commitment of local health personnel to work with TBAs.

4.5. The traditional birth attendant in Indonesia

In Indonesia nearly 60-70 per cent of deliveries in the urban areas, and 90-95 per cent in rural areas are carried out by TBAs. Exact information on the number of TBAs in Indonesia is until now not available, estimation of the number of TBAs by Unicef in 1985 is reported to be about 70,000. This number is probably underestimated because a great number are untrained and thus unregistered. The government of Indonesia is fully aware of the situation, but lack of qualified midwives is one of the reasons why it is impossible to replace the TBAs. Special efforts have already been made to train TBAs, and since 1950 the Indonesian government with the assistance of Unicef has provided training programmes for TBAs which include prenatal, natal and postnatal care for both mother and child. By the end of the second five year plan (1975-1980) more than 40.000 TBAs were trained. The TBAs generally work in the field of childbirth although some studies in East-Java report their utilization as family planning motivators (Indonesian Planned Parenthood Association, 1971). Although intensive training is given to TBAs, there is evidence that training does not result in the expected outcome.

An observational survey in Ujung-Berung to study knowledge, attitudes and practice of TBAs was conducted in the survey area with the following result: no difference was found in the perinatal mortality rate of women who's deliveries were attended by untrained and trained TBA. The study was based on three methods; firstly by interviewing the TBA, secondly by observation during delivery and lastly by analyzing data from the Ujung-Berung survey. Although there was some difference between the way of cutting the

umbilical cord (trained TBAs were using boiled scissors compared to unsterilized bamboo by untrained TBAs), neonatal tetanus was the same in both groups. During an observational survey it was found that trained TBAs were using traditional methods and were not considering hygienic methods of cord care (Alisjahbana et al., 1983). Characteristics of TBAs were not much different with reports from other countries, with average age of 51.5 years, the youngest TBA was between 37-40 years and some were more than 65 years old. Average years of experiences reported were ± 13 years, training was 44.4 per cent from grandmother, 28.9 per cent from mothers and others like neighbours was 26.7 per cent. The number of deliveries are 2-3 per month. In the survey area the ratio of one TBA to total population was to be one for every 906 people or one for every 150 women in the reproductive age.
Another study in Tanjungsari in 1987 revealed that TBAs have great potential as primary health care workers. Their activities however may be handicapped by old age, illiteracy and lack of supervision resulting in trained TBAs going back to traditional methods of delivery, an area they feel more comfortable compared to the "modern way of delivery" (Peeters et al., 1986). The Unicef TBA kit was not utilized properly, TBAs were complaining because the size of the delivery kit makes it difficult to carry through dirty, steep, small and slippery roads.

Nearly all TBAs were consulted for illness. Health problems most frequently mentioned are fever, a related issue for which they are consulted is family planning. Their therapeutic actions are variable and consist of referral to the health center or hospital, or treatment, such as massage, administration of simple drugs, herbs or plants, cold or warm compresses, food advice and praying. In rural areas large families are almost mandatory, partly as an insurance against the high infant mortality rate. TBAs and the women who seek their services put their trust in God to ensure safe delivery - and usually accept a stillbirth or the death of the mother as God's will.

Care provided by TBAs can be divided into the particular periods of pregnancy:

1. **Antenatal care** ; women consult the TBA usually at the end of the first trimester of pregnancy for confirmation, usually no other antenatal consultation occurs before delivery. The TBA also palpates the uterus and abdomen to estimate gestational age, also movements of the fetus can give an indicator for gestational age, they usually give a

special name for each month of pregnancy. Most TBAs give some kind of advice, whether positive (things to be eaten) or negative (food to avoid). Given advice is often dependent on the availability and the financial condition of the woman which may explain the low rating of meat. TBAs mentioned they were aware of the nutritional value of meat but that it would be unrealistic to recommended it given the circumstances (meat is scarce and expensive).

Half of the TBAs did not have any idea of the structure of female anatomy, for them it was a "black box" (Peeters et al., 1986). The other half knew only the external organs and the "3 holes". Danger during pregnancy was mentioned by two third of TBAs. They mentioned 64 dangerous conditions: vaginal bleeding, transverse position of the fetus, breech position, extremities coming out the vulva, umbilical cord coming out the vulva, and others such as morbidity, bleeding before delivery etc. Some TBAs are convinced that nothing can be done when a malpresentation of the fetus is detected, others (6 out of 30) indicate that it may be possible to turn the fetus during pregnancy. The study shows that there seems no relation between the ability of TBAs identifying dangerous conditions during pregnancy and their training status.

2. Intrapartum care ; the most common place for delivery is the bedroom and second is the sittingroom, usually the choice is the mothers. Position during labour is not strictly prescribed: it can be lying down, sitting with squatted knees or any other position, even walking around.

There seems to be no agreement among the surveyed TBAs about the time of clamping the cord. Slightly more than half of them clamps and cuts the cord before the placenta is born. This is contrary to other ethnographic surveys who found that most TBAs cut the cord after the placenta is expelled (Alisjahbana et al, 1983; Laderman, 1991). Common delivery problems that endanger the life of both mother and newborn in delivery are shock, retention placentae and placenta praevia. About these three conditions, questions were asked whether the TBA knew these and what to do in case of emergency. About one third of TBAs never had seen a mother going into shock during delivery, the other two third usually refer them to the health center. Other actions applied by the TBA are massage, hot or cold compress, blew in other's ear and pray.

3. Postpartum care ; postpartum care was given by the TBA for a period of 7 days or

until the umbilical cord drops, during this time the TBA will visit the mother and her infant every day and check for complications or give advice. She also takes care of the newborn infant by washing and cleaning the child. Questions were asked what action TBAs take in case of bleeding because bleeding was the most frequently mentioned risk. The actions can be divided in two types of referral to a health center and traditional actions which can be distinguished as follows; external actions, using compresses on the abdomen of the mother; internal action by given mother coffee and or raw chicken egg to drink and physical intervention, putting the mother in a position with the legs up or knees squatted. More than half of TBAs does not know any prevention against postpartum hemorrhage. The other part mentions the use of herbs or rest.

When an infant does not cry right after delivery, this event is not always considered abnormal: some TBAs do not take any further action, while tactile stimulation in these instances is the most common intervention (slap on the buttocks, massage of the legs, thorax etc.) Other action was using hot/cold water or massaging the placenta (before the cord was cut). It is a common custom not to breastfeed the infant immediately after delivery. The child is put next to the mother but given water (sometimes with honey) on a linen cloth for its sucking reflex. The length of this period is variable from 6 hours to 7 days. One third of TBAs advice the mother not to give colostrum, dietary advice is given to the mother to stimulate lactation.
The most common follow-up period is 40 days, the 40 days also mark the end of intercourse abstinence. This relatively short period of abstinence makes West-Java probably one of the areas with the highest fertility rate on Java.
Because of above mentioned activities the TBA can be assigned a major role in the delivery of health care in rural areas and has the potential to be upgraded by further training to become a fully accepted primary health care worker.

4.6. Summary

For the majority of mothers in the developing world, it is the traditional birth attendant who is the most important source of support in pregnancy, childbirth and early child care. Unlike modern health practitioners, traditional birth attendants are concentrated among the poor and in the rural area. In Indonesia the number of TBAs is estimated to be about 70 000 to 80 000 who attend over 90 per cent of births to poor mothers.

In traditional societies, child bearing is firmly rooted in the cultural milieu and is surrounded with a variety of mystical beliefs and magico-religious practices. Hence the TBA from within the same culture is preferred to the skilled professional (Lartson, 1987; Laderman, 1987).

Experience has shown that most traditional birth attendants welcome training in new techniques - when it is offered. Modern health services can provide that training, but in the modern health establishment, there has been a pronounced tendency to look down on the TBAs as ignorant and superstitious and they have been accused of performing dangerous abdominal massages during pregnancy. The training programmes have been almost universally unidirectional with emphasis on improving indigenous practices or changing those considered harmful by the trainers. Reciprocal teaching and adaptation need also to be considered in order to promote an understanding of beneficial traditional patterns, such as local social support mechanisms, the advantages of vertical position, and in particular the importance of the preservation of modesty and ensure that these factors are given due emphasis in future programmes. This approach would stress the need to learn the viewpoint and problems of the traditional birth attendant and upgrade the "modern" obstetrical system rather than eradicate or change the traditional one. Cosminsky (1986) pointed out that in order to develop an appropriate, effective and acceptable program for the training of traditional birth attendants and improve maternal and child health programmes, it is necessary to understand the relationship between birth practices and beliefs and the role of the TBA to the indigenous health system and to the values and institutions of the particular culture or community.

Reports from many countries show that training programmes for TBAs were able to have a transformation in the knowledge and practice of most trainees. The result of the evaluation may justify a reconsideration of the plan to phase-out the TBA and replacing them with auxiliary midwives. The trained TBA appears to be at least as helpful as an auxiliary midwife and has much more experience. On the other hand the TBAs are older and it may be that the recruitment of newcomers to this occupation is declining in which case the TBA will disappear naturally. However there seems no good reason to expedite their appearance by recruiting auxiliary midwives at an unnecessary high rate.

Chapter 5. THE RISK APPROACH CONCEPT

Considerable efforts have been taken to expand health care services and yet in many populations the availability and accessibility to health care is limited. This is particularly so for pregnant mothers and their newborn infants. For instance, in Indonesia, a country with a population of almost 180 million scattered over 13 000 islands, the problem is then how to use most effectively the health resources available to reach a maximum effect.

In 1978, primary health care (PHC) was the approach which countries have agreed to use in health development. Health system research was considered an important tool in this development. In the declaration of Alma-Ata it is stated: "Primary Health Care is essential health care based on practical, scientifically sound and socially accepted methods and technology made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development based on self-reliance and self-determination. It forms an integral part both of the country's health system, of which it is the first level of contact of individuals, the family and community with the national health system bringing health care as close as possible to where people live and work and constitutes the first element of a continuing health care process" (Primary Health Care, 1978).

An important factor for the success of primary health care is the use of appropriate health technology. The word "technology" means the combination of methods, techniques and equipments, which when used together with the target population can contribute significantly to solving a health problem. "Appropriate" means that besides being scientifically sound the technology is also acceptable to those who apply it and to those for whom it is used. It implies that technology should be in line with the local culture. It must be capable of being adapted and further developed if necessary. In addition, it should preferably be easily understood and applied by community health workers, and in some instances even by individuals in the community. Although different forms of technology are appropriate at different stages of development, their simplicity is always desirable. The most productive approach for ensuring that appropriate technology is available is to start with the problem and then to seek, or if necessary develop, a technology which is relevant to local conditions and resources (WHO, 1981).

Bringing meaningful improvements in maternal and child health in the third world is an

immense and complex task. A strong epidemiological base of understanding about the health problem and a well designed and managed primary health care (PHC) system should ensure a substantial impact on the health of a population. But that may not be the case, when people live in poverty, without education, poor environment, under social fragmentation and political instability, the technologies and management alone are not enough (Bryant et al., 1990). The use of information derived from examination of risk can be used in health education to improve individual and family health care and involvement of the community in the knowledge of individual- and group risk factors. This may lead to increased awareness of health problems and community action programmes. Within the health care system, increased coverage should be followed by better referral practices (WHO, 1984).

5.1. Risk, outcome and definition

The definition of the word "**risk** " is hazard, danger, exposure to mischance or peril. It implies that the probability of adverse consequences is increased by the presence of some characteristic or factor. A risk factor is any ascertainable characteristic or circumstances of a person or group that is known to be associated with an abnormal risk of having, developing, or especially adversely affecting a morbid process (Workbook, WHO, 1984). Within each society and community, families and individuals can be identified who have special characteristics which increase their chances of disease and death. For example a young unmarried women is at increased risk for having a low birth weight infant and a difficult delivery. These risks can be measured and are indicators of the need for health care as a guide for action to reorganize health and other services to meet that need. Risk factors may also be called pre-disease states (Lilienfeld, 1980).

Risk factors are characteristics that have a significant association with a defined endpoint or outcome. Thus the importance of the risk factor depends on the degree of association ("weight") with the outcome (relative risk), as well as the frequency of the outcome in the community. Risk factors may be specific for a particular outcome, such as previous abortion leading to cervical incompetence. Another possibility is that one risk factor as age and parity may increase the risk of several complications of pregnancy and delivery such as transverse position, antenatal bleeding and precipitate birth. If for instance a certain risk factor has a high probability for fetal death, but this risk factor is uncommon in the community, the impact on total fetal mortality will be small.

There are three kinds of relationships between risk factors and their outcome (Davies et

al, 1991, Hayes ,1991):

1. Causative: triggering off pathological processes, such as maternal malnutrition and low birth weight.
2. Contributary: there is a clear connection between the risk factor and the outcome although the factor is not the immediate cause. For instance chronic malaria leading to pregnancy anemia, grand multiparity facilitating transverse position and prolapse of the cord.
3. Predictive: the characteristics that make up the risk factor are themselves associated with underlying causes, unidentified and ill-understood. A women with previous fetal or child loss is at greater risk of losing her next child.

The identification of risk factors began with the observation of certain characteristics with an undesired outcome. Early attempts to use this information were simple and ad hoc, designed to alert the physician, while patients were usually thought as falling into one or two groups under each "risk" heading. For example mothers are either poor or not, tall (good) or short(bad). Biochemical examinations were handled in much the same way. In spite of the fact that only the most limited interactions were considered, the resulting strategies were surprisingly effective (WHO, 1984).

It is probable that several risk factors which have so far been identified in a few countries are of universal importance such as maternal age, parity and socioeconomic status. But the findings based on the present knowledge cannot be extrapolated to all situations in all countries without further research. Therefore an approach has also been used to identify groups at risk for a certain outcome. e.g. high perinatal mortality rate characterized by poor housing, poor sanitation and poor water supply. In this example the conclusions were that in communities, hygiene and the social environment would have greater impact on the outcome than the provision of additional health care facilities.

5.2. Measures of risk

Risk is a measure of the probability or chance of a future unwanted health outcome. The risk approach to health interventions uses this measurement of risk as an indicator of the need for health care. Those risk factors that are causally related to the outcome can, if removed reduce the risk for the unwanted health outcome. Other factors may only be indicators of risk or are unable to be altered by interventions such as age and parity.

The risk measured by the epidemiologist is " the absolute risk " or the incidence of the unwanted outcome in a given period of time in the population. This measures the occurrence of the outcome in both those with and without the risk factors. Another measurement used is "the relative risk" which is the ratio of the incidence of the unwanted health outcome in the population with and without the risk factor. The relative risk can also be considered as the strength of the association between the risk factor and the outcome. It gives an indication of the excess risk for the outcome in the population . The relative risk is an important measure in deciding which risk factors should be used in an intervention to identify individuals or groups for treatment or for referral to other services. These are the vital components of the risk approach strategy (WHO, 1984).

5.2.1. Defining outcome and its frequency

Events that are uniformly fatal but excessively rare, although of great importance to the affected individual and the family, may require more resources than are available for early detection and prevention. Therefore, these conditions may have a low priority in intervention strategies. Thus a common minor disability might be of greater priority for prevention than a more serious disability that is rare. It is therefore essential, to define those outcomes (death, disability, etc.) requiring intervention, to measure their frequency and to rank them in some way, depending on their importance to the society and the possibilities of prevention and treatments. This will vary from culture to culture and the availability of health services (WHO,1984).

5.2.2. Identifying risk factors

Identifying the health problems of mothers and infants requires that the present national MCH strategy be reviewed with respect to existing policies and programs (WHO,1984). The next step in the risk approach will be the measurement of those characteristics of the mothers and children and the environment that are associated with defined events or outcomes. Here it is very important to apply epidemiological methods, to study their relationship and distribution of the risk factors in the community. It is not unlikely that 80-89 per cent of risk factors that have been identified so far are of biological significance and probably in need of universal application. These factors are not an immediate cause of the unwanted outcome, they may sometimes be classified as predictors

of an unwanted outcome.

5.2.3. Weight of the factors contributing to risk

One way of measuring the weight of a risk factor is to compute the incidence of mortality rates for the general population and compare these with the rates for those possessing the risk factor (relative risk). Development of a scoring system is one way to permit the classification of individuals or groups into different risk categories, those with the highest score being at greatest risk for a defined outcome. Many attempts have been made to develop an index of scoring for classifying high risk pregnancies. Risk scoring is mostly based on a compilation of several risk factors with a given weight, this may be useful for the healthcare provider with a certain level of education (Fortney and Whitehorn, 1982).

However in most developing countries, traditional birth attendants are illiterate and of old age. Therefore a screening method using risk scoring will be difficult to apply. To adapt the risk approach to local conditions in Indonesia some necessary modifications will have to be introduced such as the use of single variables easy to recognize and appropriate to the level of knowledge. Otherwise, it will be difficult to include traditional health providers into the health infrastructure in general (Alisjahbana, 1990).

5.3. The implementation of the risk approach

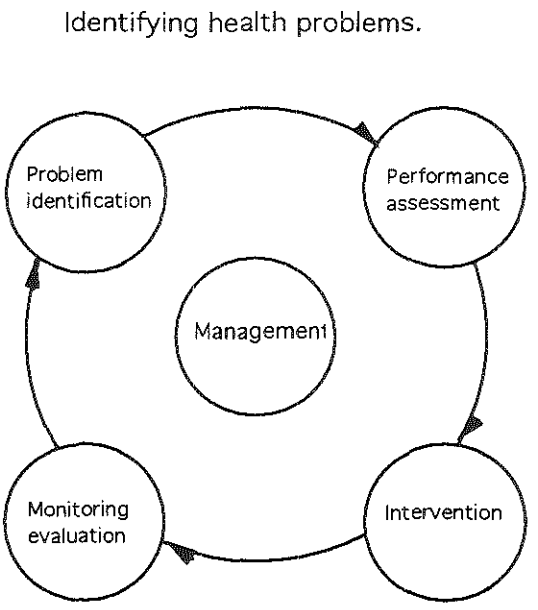
The risk approach is particularly suited to maternal and child health and family planning, where promotive and preventive activities and early health care action are so important (WHO, 1978; Wallace, 1990). "Something for all, but more for those in need - in proportion to that need" was the motto given by Backett et al. (1984).

The concept of risk is important in maternal and child health programmes. The ability to predict a birth of a jeopardized infant before its delivery means that decisions about optimal management of the pregnancy can be made and the chances of a favourable outcome can be increased. Neonatal morbidity is significantly reduced and the cost of hospitalization approximately halved, if patients are referred before delivery rather than after (Fortney and Whitehorn, 1982).

5.4 The Risk Approach Strategy

If progress toward the idea "Health for all "is to be achieved, evaluation of service innovation is a process which should be going on in all health care systems based on the primary health care approach. In its aim to improve health for all but give special attention to those individuals or groups with greater needs, the risk approach strategy is an ongoing process of; (1) identifying priority health problems and associated risk factors; (2) assessing performance in the health care delivery system; (3) planning strategies for modifying risk factors and decreasing health problems; and (4) evaluating the strategy effectiveness and application (Ren-Yin Yang et al,1989) (Figure 5.1).
To evaluate whether the risk approach is successful, one should evaluate the effect the study has on antenatal coverage, knowledge and use of risk factors data by the community, the referral pattern, relevant training programmes (Phuapradit et al, 1990).

Figure 5.1.



Therefore the main objective of the risk approach is to find the best match of the patient's needs using the appropriate and available health services and the skills required for that problem. So far the risk approach in health management relates to

groups of people, another approach was mentioned by Fassin (1990), who concentrates on areas of risk which is according to him more useful in decision making, with immunization as an example.

5.5. The Ujung-Berung survey. An epidemiological survey to collect perinatal baseline data in West-Java:

To be able to collect epidemiological baseline data needed for the implementation of the risk approach in Tanjungsari, the results of the survey on perinatal mortality and morbidity and low birth weight in Ujung-Berung, a sub-district in a rural area in West-Java (1978-1980) will be presented (Alisjahbana et al, 1990). One of the purposes of the survey is to validate and assess indicators in terms of its capacity to "predict" risk of perinatal outcome and low birth weight.

5.5.1 Identification of health problems

An epidemiological study in a rural district Ujung-Berung adjacent to the intervention area Tanjungsari provided the baseline data. A cohort of pregnant women was followed within a period of 18 months to study the natural history of pregnancy. During the survey period a total of 2235 infants were born. Based on the total population of 40787 people the birth rate was 3.8 per cent, the perinatal mortality was 45 per thousand births and the low birth weight incidence was 14.7 per cent (Alisjahbana et al., 1990). The result of this survey will provide the identification of health problems, while the relative risk and the attributable risks of the target population will permit prediction of who is at risk. These measures of risk will provide an indication of how much of a reduction in the unwanted outcome is possible by successfully implementing an intervention by reducing the risk factor.

Table 5.1 and 5.2 list some maternal risk factors for poor perinatal outcome (perinatal death or the delivery of a LBW infant) which may be individual characteristics or aspects of reproductive history. Some factors are based on physical examination and include abnormal fetal presentation, evidence of twins and nutritional factors such as maternal weight and height. Risk factors identified during pregnancy and its relative risk for perinatal outcome can be seen in table 5.1. It shows the number of perinatal deaths, the perinatal mortality rate and the number of births, the relative risk and the result of the X2-test. The perinatal mortality is highest in mothers under 20 years of age, then

decreases to rise again from 35 years on. The relative risk of mothers aged less than 20 years is 1.28 or the risk of a perinatal death is 28 per cent higher in mothers aged less than 20 compared to mothers of 20 years and over.

Table 5.1 Summary table of relative risk associated with perinatal deaths (Ujung-Berung 1978-1980)

Risk factors	Perinatal deaths	Number of births	Relative risk	X2-value
Age mother (≤20 vs 20+)	56	1.306	1.28	6.67*
Parity (≥6 vs 1-6)	56	1.306	1.17	0.27
Birth interval (<18 month vs 18 months+)	42	1.024	2.76	8.29*
Plurality (twins vs single-tons).	104	2.335**	4.14	18.34*
Sex (male vs female)	95	2.289**	0.91	0.20
Mothers occupation (yes vs. no)	58	1.306	0.97	0.002
Mothers education (no. vs yes)	56	1.306	0.72	0.39
Betel chewing of mother (yes vs. no)	103	2.310**	1.64	1.98
Smoking of mother (yes vs no)	103	2.312**	0.31	3.02
Antenatal care visits (none vs 1 or more)	56	1.303	0.84	0.39
Family planning (no vs.yes)	57	1.282	2.53	2.75
Birth attendant(untrained vs trained)	92	2.035**	1.15	0.38
Previous medical history (unstatisfactory physical/ satisfactory).	57	1.291	1.78	2.20
Weight of the mother (less than 50 kg. vs ≥50 kg)	56	1.06	1.08	0.09
Presentation of fetus (breech vs cephalic)	104	2.333**	5.70	48.35*

* Significant at p <0.05.

* * Total deliveries in survey area were 2335, but pregnant women who were followed from 28 weeks of pregnancy were only 1306.

The perinatal mortality increases also with increasing birth order with the highest PMR in parities 6 and over but the difference is not significant. Short birth interval (<18 months) increases the risk of perinatal mortality. Twins were found to have significantly higher perinatal mortality rates than singletons. The perinatal mortality rate for singleton males was lower than for singleton females. A risk factor which shows

a high relative risk is breech presentation, PMR is almost 6 times higher compared to vertex delivery. Surprisingly, risk factors such as occupation, education, socio-economic condition as well as daily habits such as smoking, betel chewing and previous breastfeeding were not significantly associated with the risk of having a perinatal death

Table 5.2 Risk factors and relative risk of pregnant women for low birth weight. (Ujung-Berung , 1978-1980)

Risk factor	Prevalence all births	LBW %	Total births	Relative risk	X2 value
Biological factors					
Sex (female vs male)	49.2	17.2	2.335	1.42	9.4*
Plurality (twins vs singleton)	1.9	76.1	2.335	5.65	141.1*
Age (< 20 vs.>20+)	18.8	22.2	2.335	1.69	23.7*
Parity (first vs. 2+)	22.4	24.5	2.339	2.06	52.1*
Socioeconomic factors					
Education (yes vs.no)	9.4	13.1	2.335	1.67	6.0*
Employment (yes vs.no)	7.4	22.4	2.335	1.58	8.8*
No.persons/HH (2 vs 3+)	5.8	21.5	2.335	1.49	5.1*
Sleeping area (1.5/m2/ person vs. more)	67.0	14.3	2.260	0.90	0.9
Medical history:					
Previous malaria (yes vs. no)	-	24.1	1.829	1.64	5.7*
Previous urine tract infection (yes vs. no)	-	28.3	1.829	1.77	3.1
Complication during labor and delivery					
Presentation (breech vs. vertex)	2.5	33.9	2.335	2.3	16.2*
Complications (all causes prior to delivery) (yes vs. no)	3.3	50.6	2.335	3.7	80.0*
Complications (all causes during labour)(yes vs. no)	5.9	15.1	2.335	1.04	0.04
Utilization of health services					
Antenatal care (none vs.yes)	52.5	15.4	2.316	1.09	0.84
Family planning (no vs.yes)	86.8	15.1	2.300	1.18	1.03
TBA (untr. vs trained)	58.9	16.2	2.035	1.35	6.01*
Birth attendant (trained TBA vs. midwife)	28.4	12.0	881	1.05	0.05

* Significant at $p<0.05$.

This relative lack of variability may point to the fact that within villages in the survey area, living conditions do not differ widely. In rural communities in Indonesia most deliveries are assisted by traditional birth attendants, either trained or untrained. The effect of training of TBAs can be seen in the number of neonatal tetanus cases during the survey. Neonatal tetanus can be found in both groups of infants whose delivery was

attended by trained and untrained TBAs. The result shows that trained TBAs have a slightly lower, though statistically not significant, perinatal mortality rate compared to untrained TBAs.

Risk factors related to low birth weight are shown in table 5.2. Risk factors such as biological factors and socioeconomic condition except sleeping area were significantly associated with the risk of having a low birth weight infant. Complication during labour and delivery, breech presentation and complications prior to delivery were significantly associated with low birth weight, while all causes of complications during delivery were not significantly associated with a low birth weight infant. Untrained TBAs had a significantly higher percentage of low birth weight infants compared to trained TBAs. This result has to be controlled for possible confounding factors such as socioeconomic condition, distance to health center and nutritional status of the women.

5.5.2. Assessment of the risk status in pregnant mothers

There are several ways to determine the overall risk of the pregnant mother for a poor perinatal outcome. One possibilty is to give a different score or weight depending on the different degrees of risk associated with the factors. Cut-off points for the total score can be used to determine whether the women should deliver at home or by a midwife or a doctor in the hospital.

Table 5.3 Anthropometric variables to identify women at risk for low birth weight (singletons), Ujung-Berung, 1978-1980

Variable	Risk criteria	Frequency %	PPV %	Sensivity %	Specificity %	FP %	FN %	RR
Weight (30 wks)	<45 Kg.	13.2	21.8	24.3	87.5	78.1	11.0	1.9*
Height	<145 cm	9.5	18.8	13.8	90.8	81.1	11.4	1.5*
MUAC	<22 cm	30.6	17.6	47.6	62.6	82.9	11.8	1.4*

* Significant p <0.05.
MUAC= mid-upper-arm-circumference.
PPV = positive predictive value.
FP. = false positive
FN. = false negative.
RR. = relative risk.

The next possibility is by using cut-off points for some risk variables easily detectable

by illiterate TBAs. In the latter, single variables will be used rather than combined scores for several variables. For each single variable the cut-off point for referral was calculated for its sensitivity and specificity for maternal nutritional variables as can be seen in table 5.3. Sensitivity is the ability of a test to identify a disease when it is really present - that is, the proportion positive of those who have the disease. Specificity is the ability of a test to identify the absence of the disease when the disease really is not present - that is, the proportion negative of those who do not have the disease (Gardner and Altman, 1989). The scoring system may misclassify women, if too many women are falsely classified as high risk, this may result in an unnecessary use of the already limited resources. On the other hand if not enough high risk women are identified, the intervention will have little impact on the unwanted health outcome. Compared to other anthropometric indicators, MUAC has the highest sensitivity.

Table 5.4. shows how cut-off points have been calculated based on continuous variables or on dichotomous variables. The results of the Ujung-Berung survey were divided in risk factors which were significantly associated with unwanted perinatal outcome e.g. perinatal death and low birth weight. The following table shows the relative risk and attributable risk for risk factors which show significant differences.

Table 5.4 Risk factor, relative risk and attributable risk for perinatal death. (Ujung-Berung, 1978-1980)

Risk factor	RR.	Frequency (%)	PAR (%)
1. Age mother(≤20yrs vs. ≥20 years)	1.3	4.3	1.2
2. Birth interval(≤18 mos vs.≥18mos)	2.8	4.1	6.7
3. TBA delivery vs. midwife	1.6	87.2	34.2
4. Twins vs. singleton	4.1	4.5	12.5
5. LBW vs. ≥2500 gram.	6.7	14.7	45.6
6. Breech vs, vertex	5.6	4.5	16.6
7. Complication before delivery vs. complication(-)	5.9	5.9	22.4
8. Complication during/after delivery vs. complication(-)	3.3	5.8	16.1

RR = relative risk.
PAR = population attributable risk.

All these variables are potentially important to decrease perinatal mortality. For breech and twins very little can be done at the village level except referral. The same can be said for low birth weight infants, that means that to prevent perinatal mortality for LBW

infants, the intervention should be directed to prevent LBW instead of preventing death. So the most potential variable that is shown in this table is most probably delivery by TBAs and complications before, during and after delivery. Therefore in setting priorities, more efforts had to be given to train TBAs in the management of risk cases and emergency cases.

Table 5.5. shows the relative risk and population attributable risk for low birth weight infants. The population attributable risk is the percentage of population risk that can be associated with (attributable to) exposure to the risk factors. It is often expressed in percentage (Campbell and Machin 1990). Risk factors with high population attributable risk are age <20 years and first parity. Age of mother is preventable, by delaying pregnancy until over 20 years of age. For first parity very little can be done. Maternal nutrition factors such as weight and MUAC showed a good predictable value and can be used for nutritional intervention studies. MUAC has also been used in nutritional intervention studies to improve maternal nutrition in pregnancy by Kusin et al. (1990) in Madura, East-Java.

Table 5.5 Risk factor, relative risk and attributable risk for low birth weight (Ujung-Berung, 1978-1980)

Risk factor	RR.	Frequency (%)	PAR (%)
1. Age mother (< 20 yrs vs. ≥ 20 yrs)	1.7	18.8	11.5
2. Parity (first vs. 2+)	2.1	22.4	19.2
3. Twins vs. singleton	5.7	1.9	4.8
4. Breech vs. vertex	2.3	2.5	3.1
5. Complication before delivery vs. complication (-)	3.7	3.3	8.2
6. Weight of mother (30-32 weeks) < 45 kg. vs. ≥ 45 kg.*	1.9	13.2	10.6
7. MUAC <22 cm vs. >22 cm*	1.4	30.6	10.9
8. Height of mother < 145 cm vs. ≥ 145 cm. *	1.5	9.5	8.8

*) singletons only
MUAC = mid-upper-arm circumference.
RR = relative risk.
PAR = population attributable risk.

5.5.3. Personnel for the identification of high risk pregnant mothers

The purpose of the risk approach is to provide minimal health care to all risk groups and to give special attention to those in greatest need. In the survey area more than 80 per cent of deliveries are attended by TBAs, who are old, illiterate and resistant to change. Therefore identification of single risk variables instead of a risk scoring system is more applicable and acceptable in this situation (table 5.4 and 5.5). Defining risk factors based on epidemiological studies alone is not enough. The risk factors have to be perceived by the health care provider as well as the pregnant woman herself, otherwise the pregnant woman will not go if the TBA refers her to a higher level of health care.
A pilot survey to study this behaviour found out that risk factors such as age and parity were not considered a risk by the community. On the other hand the results also show that more than 70 per cent of women in the survey area had at least one risk factor (Alisjahbana et al., 1986). To refer all these cases will certainly result in an overload to the health center. Therefore the risk factor has to be defined more specifically and more selective. Risk factors directly related to fatal outcome such as perinatal mortality and maternal mortality will have the first priority. Risk factors easy to identify such as the nutritional risk variables are on the second place, while biological and social risk factors may have lower priority.

When working with traditional birth attendants these risk factors may need to be presented in a pictorial form. Even though these action cards may seem very simple to those who work at more sophisticated levels of the health care system, they may make a big difference to the level of care for village women. In rural areas of Indonesia it is likely that the traditional birth attendants who attend 80-90% of deliveries will need to be trained to do preliminary screening with further risk assessments being done by the community health center midwives. Preliminary results show that the majority of pregnant women visit the health center for pregnancy confirmation at about 3-5 months of pregnancy (Peeters et al, 1986).

5.5.4. Action to be taken when high risk pregnancies are identified

The matching of resources to needs is a critical component of the risk approach, the goal is how well the health care delivery system should function in reducing the risk factors and outcomes. Another question is whether the informal health care providers (women

and TBA) and formal health care providers (health center and hospital) are able to diagnose and to response at each level of health services. The actions to be taken will be influenced by the health care resources available, the costs of the intervention and its acceptability to the women concerned. A definition of the tasks that are to be performed at each level of the health care system will also be needed. An example for the actions at each level from community to hospital based on the Ujung-Berung results can be seen in table 5.6. Risk factor of height <145 cm will give an expected load of 230 cases per year to the healthcenter. Mothers weight at 28-30 weeks gestation of <45 kg will give an expected load of 230 cases per year if all women are referred. Hospital referrals per year are expected for 48 cases of breech and 8 cases of antepartum bleeding. The calculated workload for the health center or hospital is only from one health center.

Table 5.6 Detection(D), management(M) and/or action(A) of some risk factors at each level to of health services. Calculated on a total number of 2000 pregnant women

Risk factor	Outcome of risk	Women/ community	TBA	HC/doctor (midwife)	Hospital Obstetrician	Expected workload
Height <145 cm	Prev: 11.5% LBW: 19% PMR: 40%o	D: + A: utilization of health-services	D: + A:ANC, refer if (+) complication	D: + A: pelvic ex. M: if normal back to TBA M: if abnormal refer to hospital.	D: + A: diagnosis/ management	± 230 cases
Weight <45 Kg	Prev:15.6% LBW: 23.7% PMR:49 %o	D: + A: health education + supple-mentation.	D: + A: health ed. Refer for diagnosis Follow-up ANC	D: + A: diagnosis & therapy, refer for cause. Follow-up ANC Delivery at HC.	D: + A: diagnosis primary/ secondary. M: therapy	± 310 cases
Breech	Prev: 2.4% LBW: 33.9% PMR: 228%o	D: - A: -	D: + A: refer for delivery.	D: + A: ANC & Delivery M: First parity, refer to hospital.	D: + A: delivery First parity. (C.section).	± 48 cases
Antenatal Bleeding	Prev: 0.4% LBW:12.5 % PMR: 875%o	D: + A: direct to HC/Hosp. Drink lot of fluids.	D: + A: refer mild to HC. M: severe to hospital	D: + A: diagnosis +treatment M: severe to hospital	D: + A: diagnosis, hosp.delivery M: C.section.	± 8 cases

ANC= antenatal care. Prev = prevalence PMR= perinatal mortality rate
HC = health center. LBW= low birth weight

5.5.5. The measurement of the effectiveness of the risk intervention

Components of the risk strategy have been monitored on an ongoing basis in terms of its feasibility, practicability, relative importance and whether it would produce the desired outcome. Frequent meetings were held at district level in order to solve local problems. Meetings were organized with the village heads and women groups to motivate them supporting the pregnant women and their family in case a referral was needed. Several discussions were held on how the neighbourhood could cooperate in collecting funds for hospitalization. At each level of the health care delivery system, changes in the proportion of high risk women seen should be measured, to evaluate whether the match between risk and skill level is appropriate.

5.6. A review of regional studies

Several countries have applied the risk approach strategy to improve perinatal health care such as Malaysia, the West Bank (Jordan), China, India, Thailand, Burma and East-Java. The results are as follows:

5.6.1. The risk approach in perinatal health in Shunyi County, People's Republic of China (Ren Ying Yan et al., 1989)

The project, which began in 1983 after an initial preparatory phase indicated that the risk approach would be a functional tool for China. In the initial phase the research team established a referral system based on the three levels of health care: the village health station, the township hospital, and the county hospital. Six primary tasks were emphasized, prenatal screening, registration, risk assessment, treatment of abnormal or high risk cases, referral to appropriate levels of care and postpartum follow-up of complications.

The project began officially in August 1983. Data was collected from October 1983 to September 1984, on a cohort of 1,914 pregnant women and their 1,928 infants. At the same time that the surveillance began, the performance of the health care delivery system was analyzed by reviewing 50 cases of perinatal mortality by the research team. The planning of the intervention strategies was focused on modifying risk factors and improving performance. A massive public education program was launched to teach

pregnant women and their families about prenatal care and when to seek help for potential complications. Village doctors and practitioners at each level of the health care delivery system learned how to assess risk, and were motivated to conduct prenatal examinations. The township hospital staff were trained in managing complications of pregnancy. The target of the study was to decrease perinatal mortality attributable to low birth weight from 5.4 to 4.25 per cent, birth defects from 1.6 to 1.3 per cent, asphyxia from 4.7 to 3.5 per cent, pre-eclampsia and eclampsia from 1.4 to 1 per cent, and breech presentation from 4 to 3 per cent as well as an overall decrease of perinatal mortality from 26/1,000 to 22/1,000. The result of the intervention in general exceeded the targeted objectives, as can be seen in table 5.7.

Table 5.7. Result of the risk intervention in Shunyi district

- Complete reduction of eclampsia	(0 cases)
- 84% reduction in asphyxia	(4.7% to 0.8%)
- 50% reduction in birth defects	(15.6% to 7.7%)
- 10% reduction in breech presentation	(4.1% to 3.6%)
- 10% reduction in low birth weight	(5.0% to 4.2%)

In addition the percentage of women who attended their first prenatal visit before 12 weeks gestation increased from 36 to 59 per cent. The percentage of infants with breech presentations who were delivered at home decreased from 14.3 to 5.7 per cent. The overall perinatal mortality rate reached the target of 22 deaths per 1,000 births by 1985. By 1986, it was substantially lower at 17/1,000 and represented a 34 per cent reduction over two years.

The conclusion of the Bejing study was that the risk approach strategy (RAS) is both functional and effective. The research team in Bejing plans to apply the RAS to the broader field of maternal and child health and eventually it will be applied to the management of all health resources and public health efforts in China (Ren-Ying Yan et al., 1989).

5.6.2 The implementation of the risk approach in maternal & child health in the refugees camp population in the West Bank of Jordan

The RA. concept was applied at the camp refugee population in the West Bank of Jordan.

Both individuals and communities at increased risk for infant and perinatal mortality were identified. The current services delivery system was assessed to identify areas that need improvement. The health care delivery system was re-organized, in the health service structure a new strategy was implemented to reduce excess mortality and to utilize available resources more effectively and efficiently. Excess of infant deaths particularly among those born with normal weights (≥2500 grams), excess mortality from preventable causes (gastroenteritis, respiratory diseases and other infections as well as malnutrition and accidents) was particularly evident during the early postneonatal period (1-6 months of age).
A review of maternal and infant deaths revealed that health services were not producing the desired results. There was a need for improving skills, knowledge, attitudes and resources at all levels of the health care delivery system. Improvement was particularly needed in applying data already collected regarding the overall management of high risk cases, the need for appropriate facilities and skilled staff to care for high-risk women during the intrapartum period and the continuity of care for simple, acute problems in the postneonatal period. The strategy emphasized interventions to influence the timing of pregnancies, the triage of high-risk pregnant women to a more appropriate level of care, follow-up of high risk newborn infants and the prevention and treatment of acute gastroenteritis.

The risk approach strategy was implemented in the West Bank in 1980, the achievements were monitored through statistical studies of vital events which have been carried out in the West Bank since early 1960s. In 1984 the rate for gastroenteritis had dropped to 5.6 per 1000 --> an 80 per cent reduction. Respiratory diseases became for a while the leading cause of infant mortality, but the infant death rate due to respiratory diseases declined from 24.5 per 1000 in 1975 to 6.4 per 1000 in 1982, a 74 per cent reduction. In 1984 prematurity became the leading cause of infant deaths with a rate of 7.5 per 1000.

5.6.3. Applications of the high risk approach as a primary health care strategy. The Krian experience in perinatal health care, Malaysia (Karim,1987)

One of the main problems encountered in the Krian District (state of Perak, Peninsular Malaysia) was the large number of TBAs, a high percentage of TBA deliveries and a high

maternal mortality. In 1978 TBAs were responsible for 38.7 per cent deliveries. Maternal deaths were relatively high. Two out of nine deaths were deliveries conducted by TBAs. Strategies were planned, developed and implemented in order to overcome these major problems. The risk approach strategy was implemented directly after the baseline data collection and modified if proved not feasible or applicable. The application of the risk approach strategy required strengthening at the level of the district hospital to provide the basis for referral and management at a higher level of specialized care. The overall improvement of health status in Krian has been attributed for a greater part to the intensive efforts by health personnel involved in the project. The maternal mortality rate was highest in Perak at the start of the project, and this was reduced to none in 1982. The percentage of deliveries by TBAs was 47.2 per cent in 1976 and has been reduced to 23.6 per cent in 1982.

5.6.4. Implementation of the risk approach in maternal health in Thailand (Phuapradit et al, 1990)

The study was conducted at Bang Pa-In, Ayuthaya Province. in Thailand. The population was 42.000 during 1981-1983. During the study period there were 1800 deliveries (Phuapradit et al, 1990). The overall objective was to see if application of the risk approach could reduce maternal, perinatal mortality and morbidity in the rural area within the national health system. The research team used community volunteers and village health volunteers as primary screeners and the auxiliaries of the health center and community hospital as secundary screeners. The risk screening was based on a risk scoring system, a simple method for detecting and classifying pregnant woman at risk.
Maternal and child health indicators were used to evaluate the results and compared before the project was implemented and during the project (1981-1983). The result showed that coverage of health care during the antenatal period had increased as did the number of total visits. The number of deliveries in the district and provincial hospital had increased while a noticeable reduction of deliveries by traditional birth attendants was observed. The perinatal mortality had declined especially in the early neonatal period but the stillbirth rate had not changed significantly. The maternal mortality had also reduced appreciably. The incidence of low birth weight decreased from 8.0 in the prestudy period to 7.2 during the study period.

5.6.5. Perinatal mortality and the risk approach in antenatal screening in a rural area in Kenya (Voorhoeve et al., 1983)

The study was conducted in a rural area in Kenya (Machakos district). The intervention consisted of antenatal screening of women who were at significant higher risk for perinatal death. Four groups were identified: 1. breech delivery, 2 twin delivery, 3 the primigravidae "at risk" either <16 years or ≥30 years and less than 151 cm height. Group 4 are multigravidae "at risk" composed of women who have experienced two or more previous perinatal deaths. Perinatal deaths which occurred amongst the population in rural Kenya during a four year period were analysed in relation to antenatally recognisable risk factors. A perinatal mortality rate of 46.4 per 1000 total births was found. By antenatal screening and isolating 13% of the pregnant owmen, the causes of perinatal death could have been identified in 41%. Timely obstetric intervention among these women might have lowered the perinatal mortality by about 10 per 1000 total births. Unfortunately from this study it was not clear about the type of intervention as well as the impact of intervention using the risk approach in antenatal screening on perinatal mortality.

5.6.6. The risk approach strategy for pregnant women involving women groups by using a prediction score in District Sidoarjo, East-Java, Indonesia (Poedji Rochyati, 1990)

A risk approach with a simple predictive scoring technique for the antepartum identification of the fetus at risk has been applied on 2944 pregnancies in area A and 1073 pregnancies in area B in district Sidoardjo in 1988-1989 (East-Java province). Area A is the research area where direct intervention or treatment using a training program was applied by the principle investigator (direct method). The program was focused on 297 of the village women group (Family welfare movement). In area B, 182 members were trained indirectly by the local midwives after receiving training by the principle investigator (indirect method), but using the same instruments and methods. Group C (2710 pregnancies) served as control group without any activities on identification of risk factors and with the standardized pattern of referral and planning for deliveries. The instruments used in the risk approach were a predictive scoring system consisting of a recording card, colour code and manuals of the terms used in perinatal care, criteria of risk factors and leaflets concerning risk factors.

The results of the study collected by means of a special evaluation, proved the effectiveness of the risk approach with the predictive scoring technique for improving the quality of antenatal care and improving the outcome of the identified high risk pregnancies as a means of reducing perinatal mortality. It was concluded that there was a high validity of the scoring system by women group members to predict the outcome of the process of delivery. The perinatal mortality rate among the intervened groups A and B combined was 23 per 1000 births which is lower than that of group C which was 38.7 per 1000 births and is lower than the perinatal death rate in general in Indonesia of 43.6 per 1000 births. Low birth weight infants among group A and B was 3.9 per cent while in group C it was 6.5 per cent.

5.7. Summary

Primary health care is the approach to the development of "Health for All" for all countries. Maternal and child health and family planning are the essential elements. Health system research is an instrument of change, it must be responsive to the needs of the community and realistic in terms of feasibility and application of its findings. The community as well as health- and health related workers must participate in the research. Risk is a measure of the probability of a future occurrence, usually an unwanted outcome. The risk approach is based on the measurement of the probability which is use as a proxy for the need for health care. A risk factor is a detectable characteristic or circumstance of individuals or groups which is associated with an increased chance (risk) of experiencing an unwanted outcome. Risk factors can be indicators or causes of outcome. If they are causes, intervention could avoid the outcome, if they are only indicators (markers) then they can only be compensated for by greater care. A risk factor only predicts the chances of an unwanted outcome. How good this prediction is can be measured by the number of false positives and false negatives. Studies on the risk approach in maternal and child health consist of a series of sequential steps including review of available data, epidemiological research, review of the structure and functioning of the health care system development and field testing of the new strategy and evaluation.

A review of 6 countries which have applied the risk approach concept shows that the risk approach is applicable in different programmes of the health care delivery system. The target groups differ in each country. The Shunyi study was directly concerned with

health infrastructure itself. The target groups were the health care providers. The objective of the West Bank study was to improve child survival and was directed to the primary health care providers in the refugee camps. The Malaysians applied the Krian experiment, they combined the informal (TBAs) and the formal sector. They succeeded in that TBAs had less deliveries after the trial. Thailand applied the risk approach in a rural area to improve maternal mortality, while the East-Java study applied risk identification and risk scoring to women volunteers, the latter did not evaluate the formal health care delivery system. Although some strengths and weaknesses were reported, in general all studies reported success and impact on perinatal mortality and morbidity.

Chapter 6. THE TANJUNGSARI INTERVENTION STUDY

6.1. The objectives of the study

The main purpose of the study was to collect ongoing data on pregnant, parturient and postpartum women in order to evaluate the effect and impact of TBA training on the outcome of pregnancy and the implementation of the risk approach. This evaluation can either be used directly to set realistic targets in policy making or serve as input for formal priority setting. From this purpose the following three main objectives of the project can be derived:

6.1.1 General objectives:

1. To study the improvement of knowledge, attitudes and skills of traditional birth attendants to be able to identify women at risk for unwanted pregnancy outcome using the risk approach.
2. To study the impact of training traditional birth attendants using the risk approach on pregnancy outcome.
3. To collect epidemiological data (e.g. birth, incidence, mortality and morbidity rates) on pregnancy and its outcome in a defined geographic area in West-Java.

6.1.2 Specific objectives

ad.1. To develop and implement an intervention based on the detection of risk factors by traditional birth attendants.

ad.2. To obtain in a defined population during a specific period of time :

1. reliable records of all births and birthweights.
2. the impact of training on perinatal mortality and morbidity.
3. to compare biological and social variables in those who die and those who stay alive.
4. to evaluate the intervention based on measurable processes and outcome, effect and impact variables.
5. data on maternal mortality and morbidity.
6. to determine and analyze coverage of the population for maternal and child

health care by type of health services.

ad.3. 1. to collect epidemiological data on birthweight, pattern of perinatal mortality and neonatal mortality.
2. to study causes of perinatal mortality
3. to study the inter-relationship between risk factors and unwanted pregnancy outcome.
4. To study maternal mortality

6.2. The study area

6.2.1. Location and geographical condition

The study area is located south of Bandung, the capital of West-Java. Geographically it is a mountainous and rice field area with an altitude of 800-1200 meters above sea level (picture 2.2). Tanjungsari is located between Bandung and Sumedang. The distance from Bandung to Tanjungsari is approximately 45 minutes by car and Tanjungsari is about 30 minutes from Sumedang. There are several side roads which connect the main road to the villages, but there are no connections between each side road (picture 2.3). Tanjungsari is a subdistrict (kecamatan), within the district of Sumedang. It has a population of about 87 000 and a birth rate of 2.2 per cent. Transportation is available only through the main road and partly through the side roads. Within the villages itself the roads are sandy and slippery, especially during the rainy season (pictures 2.4, 2.5, 2.6 and 2.7). The people in the village usually walk to reach the main road which may take 0.5 to 3 hours. Another possibility is the use of motorcycles by sitting behind the driver. The fare ranges between Rp.500- 3000 for one trip which is about twice the daily food expenses for an average family in Tanjungsari.

6.2.2. Village infrastructure

The subdistrict of Tanjungsari is divided into 27 villages, of which 17 villages are located at the northern part and 10 at the southern part of the main road. Each village has a head who is selected by the people in the village. Although he/she works voluntarily, his/her position is a prestigious one and recognized both by the people as well as by the district and government authorities. The village head is responsible to the

ministry of internal affairs for the village organization and security in the village. Decisions in the village such as priority setting and resource allocation are taken by the village council, consisting of the village head (as chairperson), the village secretary and members (the hamlet chiefs), formal and informal leaders (traditional & religious). Activities in the village are implemented by the village community resilience committee. This body is responsible for planning and development activities. In the field of maternal and child health, integrated health service post activities are coordinated through the women groups, whose representative is also a member of the village community resilience committee.

In each village all births and deaths are supposed to be recorded on special forms. This task is conducted by persons specially assigned for this purpose. However records are very unreliable because of the inefficient reporting and also because the people in the village do not consider birth and death registration important. This is shown in the following example: in 1984 the subdistrict reported 371 deaths and 663 births. Calculated on the total population of 87 000 these figures result in a crude death rate of 0.4 per cent and a crude birth rate of 0.7 per cent, a rate which is very unrealistically low.

In the village infrastructure are included the informal health services through the integrated health service post (IHSP=Posyandu). They are set-up and organized voluntarily by village women and particularly by the wife of the village head and the women groups in the village. The government is promoting this activity through the family welfare movement and it is organized voluntarily by the women groups (Country report of Indonesia, Minister of State for the Role of Women, 1989). Each integrated health service post should provide basic health services for children under five and mothers: nutritional improvement, immunization (expanded program on immunization), diarrhoeal disease control, mother and child care, family planning and distribution of iron tablets and vitamin A capsules to children under five. For historical reasons, child weighing, immunization and family planning are the most commonly available. Hence the IHSP is a promising, strongly community based, cost-efficient services structure. Each village may have more than one IHSP, depending upon the activity of the people and also on the scattered distribution of hamlets within each village. Thus in Tanjungsari the total number of IHSP is more than 100 posts.

6.2.3. Health service infrastructure

The health infrastructure in Indonesia is organized by the Ministry of Health. At district level is the district hospital within the vertical command line of the directorate general of health services. At the subdistrict level is the health center which is under the vertical command line of the directorate general for community health of the Ministry of Health.

The health center

At the beginning of the study, the subdistrict of Tanjungsari had one health center providing outpatient and inpatient care. Health personnel at the health center consists of one medical doctor, one dentist, one midwife, one nurse-midwife, 5 nurses, 2 vaccinators, 2 persons for malaria control, and about 15 administrative personnel, altogether about 28 people. There are 8 beds for inpatient care and a pharmacy. The health center has to carry out 13 program activities which can be divided into curative, preventive, promotive and rehabilitative care. Included in preventive care are family planning, nutrition rehabilition, immunization and antenatal care. Curative care includes outpatient, inpatient and emergency care. The average number of patients in the outpatient clinic is between 100-150 per day and about 50 admissions/month for inpatient care. Other programmes conducted at the health center are: family planning, maternal & child health services, water and sanitation, TBA training, diarrheal disease control and oral rehydration, nutritional education and monitoring, malaria surveillance etc.

Table 6.1 The ten common diseases reported in 1984 at the outpatient clinic (percent)

1. Common cold	29
2. Diarrhoea	12
3. Skin diseases	12
4. Disease of the musculo skeletal system	3
5. Gastro intestinal disorders	4
6. Anemia	3
7. Scabies	7
8. Acute bronchitis	2
9. Helminthiasis	1
10.Others	26

The ten common diseases reported at the Tanjungsari health center are listed in table 6.1. No data were available concerning the number of women who delivered at the health center or treated for postpartum conditions. Also no data were available for perinatal, infant and maternal mortality .For its program activities the health center is responsible to the regency health authority located in Sumedang, the district capital. Referral is also one of the programmes that is the responsibility of the health center.

The district hospital Sumedang

Every health center (27 in total) in the district of Sumedang is referring patients to the district hospital in Sumedang. This hospital is a secondary hospital with more than 100 beds and more than 4 specialists, a number required for a district hospital. Sumedang hospital is in fact in a state of development to be accepted for a higher rank hospital with more specialistic services. For maternal and child care, there is a specialist for obstetrics and gynecology and a pediatrician. The anesthetist is available only during some days per week, he has a part-time assignment and is for the rest of his working hours at the Hasan Sadikin general hospital in Bandung, he is not always available on call. Although most of the referral patients are coming from the health centers, there is in fact no direct link between the hospital and the health center, in the sense, that there is no feedback from hospital to health center about the condition of the patients who were referred. Lack of communication makes it difficult to judge and trace the obstacles patients experience in the process of referral and hospitalization.

6.3. The pilot studies

The first step to implement the risk approach in the training of traditional birth attendants, is to develop tools or instruments and to conduct pilot studies. This was decided because the research team was concerned with the capabilities of the traditional birth attendants. A study on the knowledge, attitudes and practices of the traditional birth attendants conducted in Ujung-berung in 1980 showed that conventionally trained traditional birth attendants were going back to traditional ways of delivery care, because the training methods were not suited to the TBAs level of knowledge and also due to lack of supervision by health personnel (Alisjahbana et al., 1984). This is described in some details in subchapter 4.5.

6.3.1. Description of the tools for TBAs

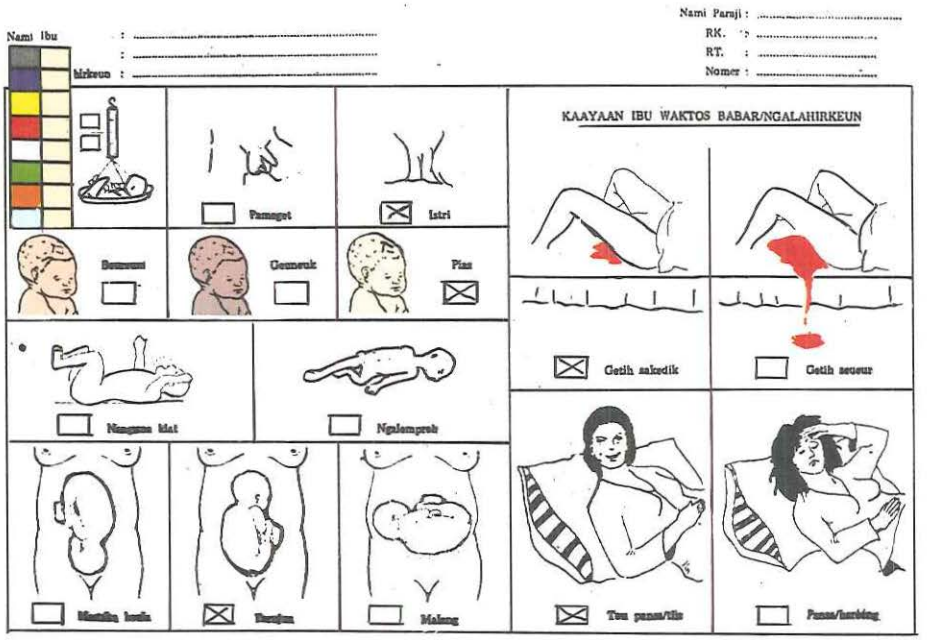
In many rural areas in Indonesia, a number of reporting and recording cards were developed dependent upon the interest of the provider. Nowadays several cards are emanating from the health center, the Ministry of Health, the National Family Planning Board, the Directorate of Nutrition etc. The availability of the many cards has created a lot of confusion particularly for the people in the village. The result is that no cards are filled in properly. This shows there is in fact a lack of coordination between intersectorial groups at the village level. Ideally one single circulating Mother & Child card is needed which could provide information for at least four ministries, the Ministry of Health, the Ministry of Population and Family Planning Board, the Ministry of Internal Affairs etc. Based on this concern the research team developed some tools that can be used by all health care providers including the informal sector and will also serve as a home based recording and action card kept at home by the mother. This card could serve as recording card for the Ministry of Health, the Ministry of Internal Affairs and the Directorate of Nutrition.

a. The coloured weighing scales and pictorial form for TBAs

The first prototype of a pictorial form was developed in 1978 for the Perinatal mortality and morbidity survey in Ujung-Berung (Alisjahbana,1983) which shows illustrations of the infants and mothers condition after delivery (picture 6.1).
The following risk factors were recorded :

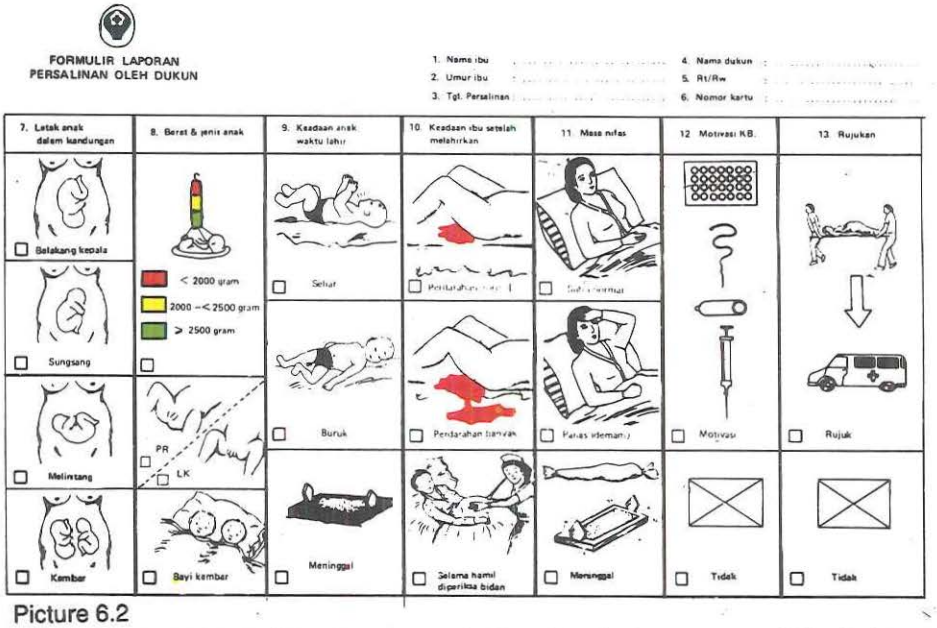
1. the weightscale for birth weight in coloured calibrations.
2. sex of the infant.
3. skin colour of the infant: pink, cyanose and pale.
4. activity: active crying and flaccid.
5. presentation: cephalic, breech and transverse position.
6. complications occurring in the mother: bleeding and fever.

In the pilot study no difference was found between the birth weight as reported by the TBA and the midwife, the same result was found for mother's risk factors directly after birth. The conclusion was that TBA's were able to report and identify high risk infants and mothers based on birth weight and condition after delivery (Alisjahbana et al.,



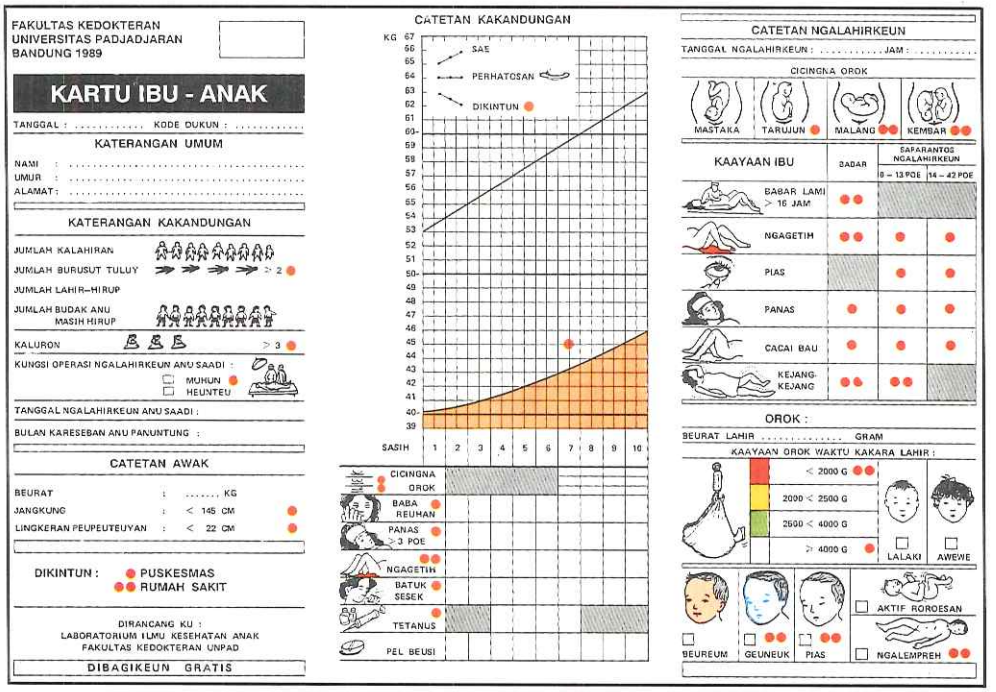
Picture 6.1

The first prototype of mother and child card used in the Ujung Berung survey

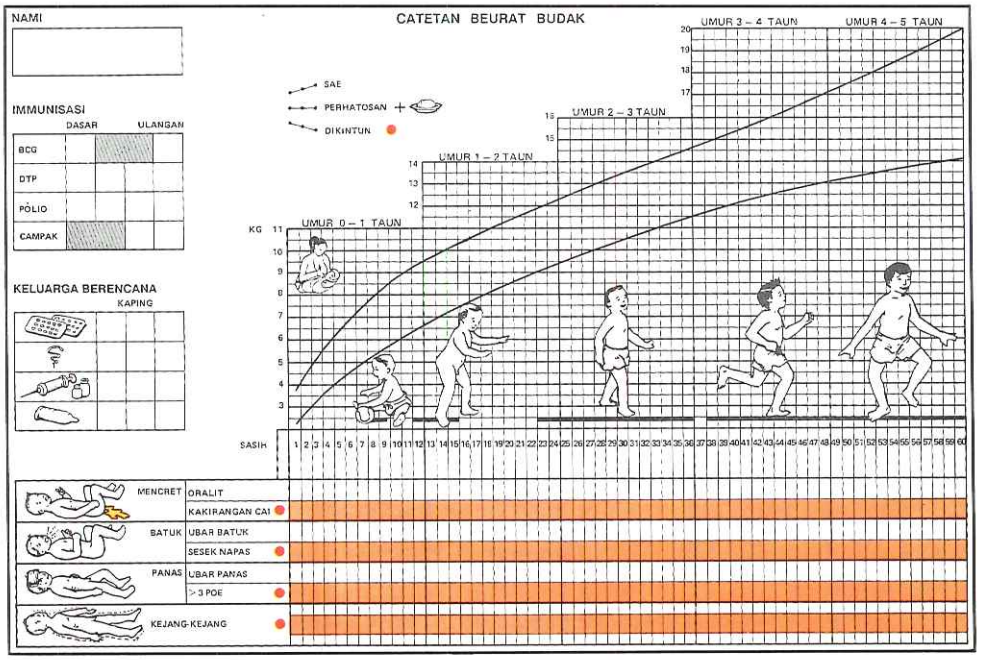


Picture 6.2

A further development of the mother and child card by the Department of Health for reporting birth and death and condition of mother and infant including family planning to be used by TBAs



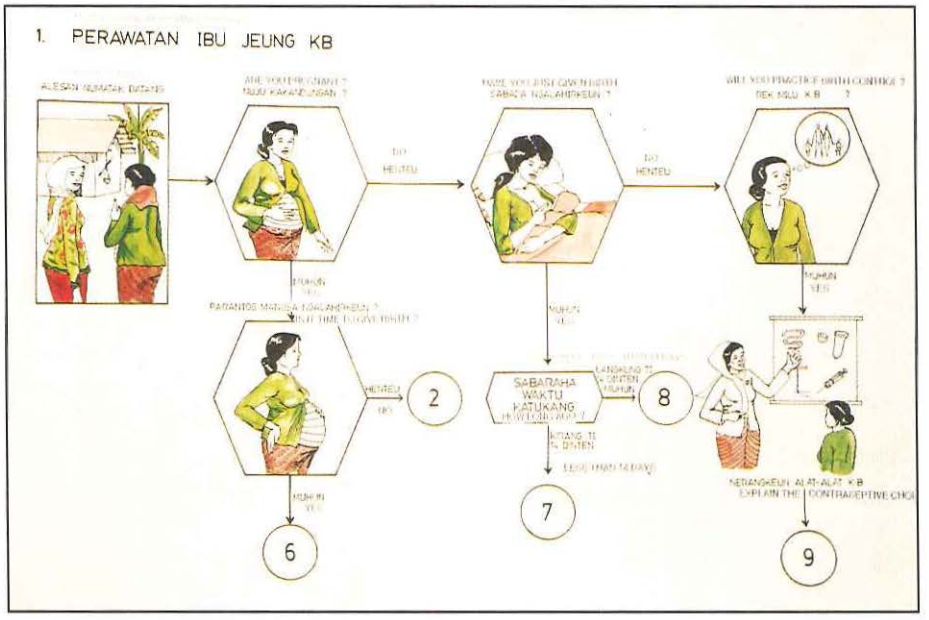
Picture 6.3 The Mother and Child card used in the Tanjungsari study. Note the three sections: the pregnancy history and mothers anthropometry. Action to be taken, referral to the health as one rod dot and to the hospital as two dots. Recording of conditions during pregnancy and the postpartum period including the immediate condition of the infant



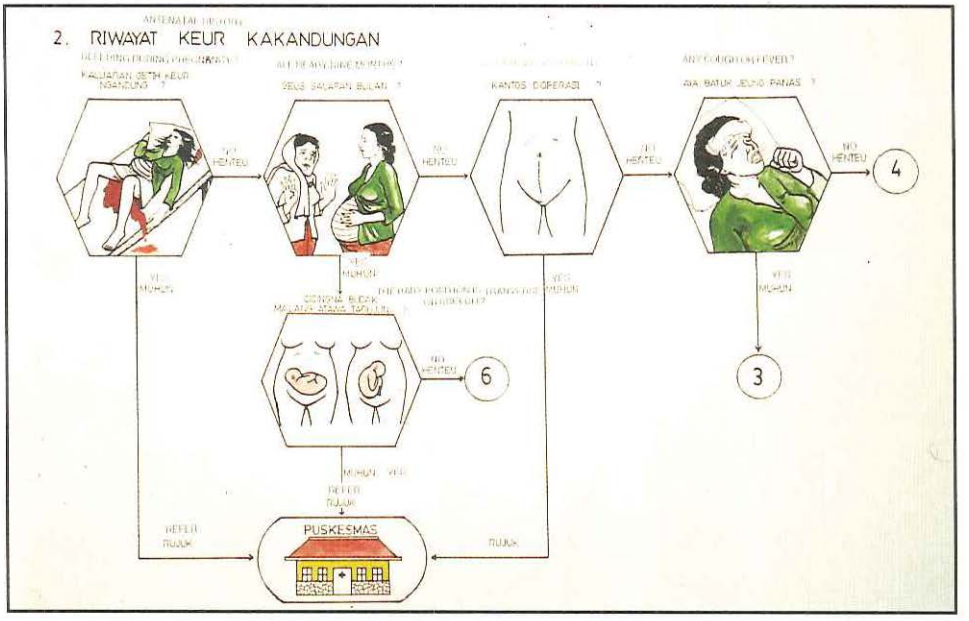
Picture 6.4 The infant side of the mother and child card. The growth curve and development of the infant. To be recorded are the four main causes of death diare, respiratory problems and convulsion

Picture 6.5

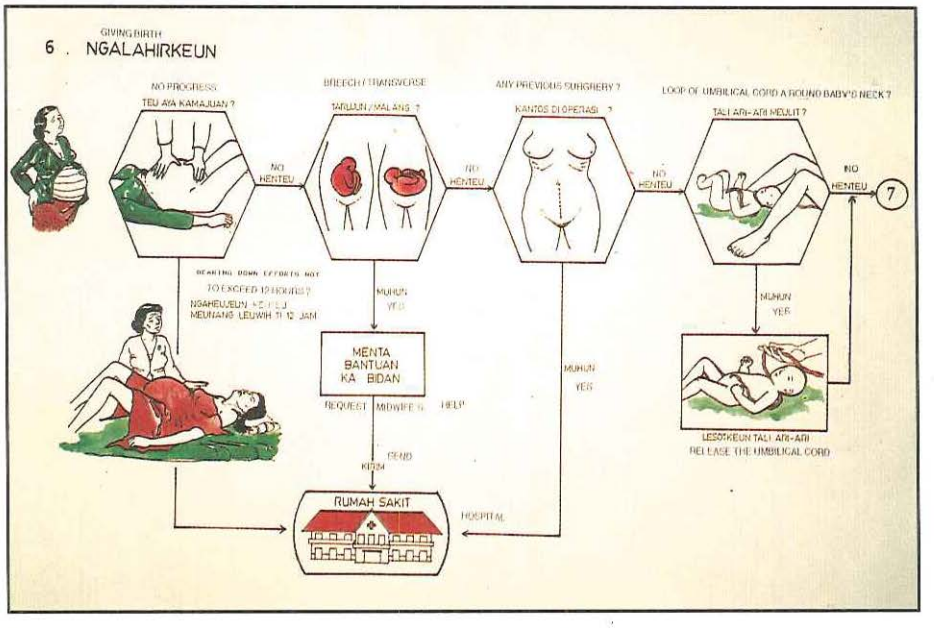
Coloured infant weighing scale, special developed for the Tanjungsari study



Picture 6.6 The Problem Action Guideline, a logical flowchart for traditional birth attendants. A woman consults a TBA for pregnancy, breastfeeding and family planning



Picture 6.7 The Problem Action Guideline; complications during pregnancy and action to go for referral



Picture 6.8 The Problem Action Guideline; complications during delivery and action to go for referral

1984). Birth weight is an important variable which has a high correlation with perinatal and infant mortality and morbidity. The measuring of birth weight is a problem for illiterate TBA's however. Therefore special weighing scales were designed in which calibration for each interval was marked in different colours (picture 6.5).The colours chosen were the same as used for mid-upper-arm circumference in nutritional services and are easily recognizable by the local people and TBAs (Alisjahbana et al, 1984). This baby scale which colours were adjusted for the purpose of referral and a modified reporting card are now used by TBAs through the whole of Indonesia by the Ministry of Health (picture 6.2).

b. The Mother and Child Recording and Action Card

A possible tool for screening high risk pregnant women and newborns and for the provision of maternal and child care is the "Mother and Child Recording and Action card " or simple the "M & C card". The M & C card is a more developed recording card than described in 6.3.1 a. The purpose of the card is to be able to identify low and high risk cases and conduct the appropriate action to minimize risk. The risk criteria in the card were the result of an epidemiological survey to study perinatal mortality and morbidity and low birthweight in Ujung-Berung, an area which is adjacent to the study area of Tanjungsari (subchapter 5.5).

The basic principles of the "recording and action card" were taken from Essec and Everett (1977), who designed an action-oriented recording card for the purpose of antenatal screening. In the Tanjungsari study, the card was modified and adapted to local conditions. The recording card covers data related to the antenatal, intrapartum and postpartum periods and is partly pictorial. The card is divided into four sections: pregnancy history, pregnancy, delivery and the postnatal condition of the infant until the age of 5 years. This last section gives special emphasis on the four main causes of infant death: diarrhea, fever, cough and convulsions (picture 6.3 and 6.4). The TBAs who are almost all illiterate were asked to fill in the card. Illiteracy of TBAs is one of the reasons why single variables - instead of risk scoring - were used to identify risk factors. In doing so the M&C card is designed and directed towards the weakest link in the health care delivery team. It was also hoped that the card solicitates the active participation of the mother and the family in promoting the concept of selfcare. Therefore the M&C card can also be considered as a home based mothers and infants recording and action card. As an

educational tool it is supposed to be kept by the woman.

c The problem action guidelines

To be able to provide health services to all pregnant women while using the M&C card, guidelines were designed for TBAs to identify risk factors and to carry out the appropriate action. This action may include treatment, health education or referral to higher levels of health care. Preventive measures such as the instruction to give iron tablets and tetanus toxoid could also be given by the TBA. The local policy in Indonesia is to give all pregnant women iron tablets but due to drug shortage at the health center, iron tablets are usually given only to those who are manifestly anemic. For this purpose "Problem Action Guidelines" were developed. The initial idea came from The John Snow Public Health group who developed a flowchart for the purpose of extending effective services through auxiliary health workers. The flowchart is based on a logical algorithm to assist health workers to improve the services they provide by helping to :

1. classify the problems patients bring to the health worker.
2. logically display important questions and examination steps to be followed by the health worker.
3. isolate the most appropriate actions and treatments for the problems, using a limited set of available drug supplies.
4. encourage referral of difficult problems to the appropriate workers or physician.
5. provide a basis for supportive supervision and inservice training.

Based on the typical West-Java TBA profile (Alisjahbana et al., 1984; Peeters et al.,1986) the initial John Snow Problem Action Guideline had to be changed and adapted to the level of knowledge and perception of the TBA in West-Java. The modified guidelines were described into a pictorial handbook for TBAs. This handbook used the same pictures as on the "M&C card". The second purpose of the pictorial booklet is to be used as a manual by TBAs for the identification of at risk cases and for taking appropriate action such as treatment, referral or health education as shown on the M&C card (pictures 6.6, 6.7 and 6.8).

d. The result of the pilot studies

A field testing was conducted during a period of 3 months. This was done in a subdistrict of a rural area at the southern part of district Sumedang. The purpose was to test out whether the M&C card and the problem action guidelines were accepted and applicable by TBAs. The total period of training in the pilot study was 10 days (2 weeks). During a period of 3 months, nine participating TBAs were selected according to literacy, motivation and workload. Records were obtained for 137 patients. In order to appraise the reliability of data reported by TBA, a check was made on a systematic sample of 34 cards. Data from two consecutive interviews were compared and reliability calculated. At comparison three types of errors could be identified:

1. Recording errors: the way in which the attendants filled in the results (missing data, wrong codes, forgotten codes, etc.)
2. Measurement errors: data composition, with reference to the results between two interviews. Consideration was given to the fact that there may have been some actual variation in data due to the time elapsing between subsequent observations.
3. Action/referral errors: failure to refer mothers with a risk factor. This error was detected by looking for referral cards at the level of referral (the health center). If no referral cards were found it was clear that the risk factor identified had not resulted in appropriate action or the mother did not go.

The results can be seen in the following table 6.2. It shows that several factors are particularly vulnerable to unreliable recording. Among these are the obstetric history and the plotting of the weight chart during pregnancy. Clearer definitions, a simpler layout of the card and better supervision and training were the main suggestions to improve the situation. It is often forgotten that for a study to yield sufficiently reliable information the data collection system should be adapted to the weakest link in the system. Supposedly simple indicators such as parity or gravidity can appear complicated to semiliterate or untrained people. Of the 137 women in the survey, 72 (52.2 per cent) were found to have one or more risk factors; there was an average of 1.73 risk factors for every woman at risk. These figures show that the traditional birth attendants were capable of identifying persons at risk. For detecting abnormal pregnancy and labor the criteria used should be more objective. Factors which were not perceived as risk were not included in the M&C card. These factors are mostly biological factors such as

mother's age, parity and birth interval.

Table 6. 2 Reliability of general and antenatal data, including obstetric history for 34 women in rural West-Java

Risk factor	Number of records in agreement	Reliability proportion
Age	26	.76
Parity	24	.70
Gravidity	25	.73
Birth spacing	25	.73
Stillbirths	23	.67
Infant deaths	23	.67
Abortions	26	.76
Weight	32	.94
Height	33	.97
Mid-arm-circumference	30	.88
Weight chart	22	.64

The reasons for not including these factors as risk factors were - besides differences in perception of the village women - also based on the facilities of the health center. During the pilot survey it was found that more than 50 per cent of women in the village had at least one of these risk factors. Therefore a balance between the number of referrals and the capacity of the health center needed to be achieved and risk factors which are not directly fatal to the women had to be reduced (Alisjahbana et al., 1986).

6.4. Study design

There are three types of study design which can be used for collecting data for intervention using the risk approach: the case-control trial, a prospective cohort study without control area using evaluation before and after the intervention and lastly a prospective cohort study with control area. In a prospective study new data are collected as they are generated. The method of data collection during the entire period of the study must be reliable and consistent so that valid baseline and follow-up information is obtained.

In a case-control study the unwanted outcome women are the "cases" and the wanted outcome ones are the "controls or comparison group". In a case-control study where cases and controls are specifically chosen according to outcome, the ratio between

unwanted and wanted outcomes becomes distorted and is not representative of the population. The advantage of a case-control study is its simplicity, rapidity and cheapness. One can initiate studies with relatively small samples of cases and controls, which is very often the case where the incidence of the unwanted outcome is very small. The disadvantage is that index cases may be the survivors and therefore as a group not representative of all people who have the unwanted outcome.

Cohort studies are based on the identification of a defined group or groups of individuals who -over time- may experience an unwanted outcome. The individuals who are to be studied must be identified early so that they form a representative group of all those who can experience an unwanted outcome. In the case of perinatal studies, this usually means all pregnant women. The cohort study design has the advantage to measure directly an unwanted outcome. It also provide a powerful direct method of testing hypotheses about the causal relationship between risk factors and outcomes. The disadvantage of a cohort study is the large numbers required, which makes the study also expensive. Loss of cases in the follow-up during the study is an important problem, because the characteristics of this group may be different from those who remain in the study. If those lost to follow-up include a large number of individuals of high risk, the rates of unwanted outcome as calculated in the study would be lower than the actual rates.

For the Tanjungsari study it was decided that for the implementation of the risk approach, the type of study should be the cohort design with a control area. Considerations in the choice of study type were the following:

1 The precision and relevance of the study type.
A cohort study design enables the research team to measure the incidence of the outcome and the prevalence of the risk factors as well as the inter-relationship between risk factors and outcome.
2. The feasibility of the study.
In Indonesia nearly 90 per cent of deliveries are home deliveries, lack of reliable records makes it impossible to collect data from health centers. Although there is no good access by road it is feasible to collect data through women interviewers who live in the same villages as the pregnant mothers and the traditional birth attendant.
3. Ethical consideration.

The project is an intervention study at the level of TBA and will not require human subject consent forms from each individual. In the intervention area, the population is expected to benefit from improved maternal, perinatal and neonatal care. After the project is completed and evaluated, the control area is expected to benefit from the experience and intervention methodologies developed during the project.

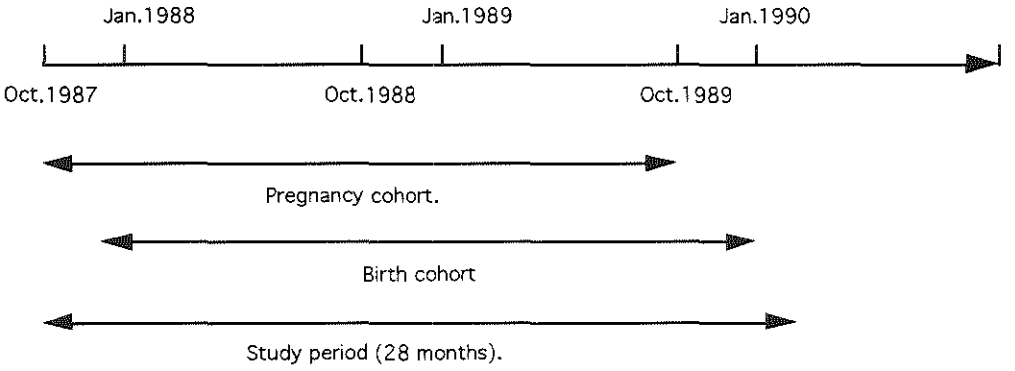
6.4.1. General design

The research area Tanjungsari is divided into two areas by the main road (see map). On the northern part of the road is the intervention area where the risk approach on TBA training would be implemented, the southern part of Tanjungsari would serve as a control area. Because of logistic and technical reasons it was difficult to select a control area which was further away from the intervention area.

6.4.2. Study period

The pregnancy and birth cohort would be collected simultaneously in the intervention and the control area during 28 months.

Figure 6.1



6.4.3. Sample size

The inclusion criteria applied in the Tanjungsari study were the following: all pregnant women, in both the control and intervention area, who were less than 28 weeks pregnant

were eligible to participate in the study. They had to be resident of the subdistrict Tanjungsari and should be able to show the proper papers. Based on a total population of ± 87 000 and calculated from an estimated crude birth rate of 2.5 per cent, a one year pregnancy cohort of about 2 000 was expected. On these assumptions it was decided to enroll a pregnancy cohort of 2 years to be able to identify small differences. On suggestion of the district health officials, it was decided to take the northern part of Tanjungsari as the intervention area and the southern part as control area. The reasons for this were the difficulty to reach the people because of geographic condition, mountainous area, lack of transportation and communication. There was also the problem of the community itself, it was told that they are fanatic moslems , difficult to change and not responsive to "modern" health developments.

6.4.4. Methods of intervention

The methods described above were an essential part of the planning of the intervention to be evaluated. They provided the basic material in order to set up and evaluate appropriate intervention(s). The intervention using the risk approach consistsed of the following ;

1. In the northern part of the study area the intervention was the implementation of the guidelines for villages health workers(focused on TBAs) aimed at the appropriate management of high risk pregnant women and infants. The problem-action-guidelines for training, the M&C card would be used in this part of Tanjungsari.
2. In the southern part of the study area no intervention was planned, the health center activities and monthly training meetings of TBAs using conventional methods were carried out as usual.

6.4.5. Preparatory phase

In this phase, the authorities as well as the community leaders were fully informed about the objectives of the study, the plan of action and full support was obtained. Available background data on the study area were reviewed, including demographic data, vital statistics, morbidity figures, data on health services utilization and distribution of health personnel including the number of traditional birth attendants.
A study on the knowledge, attitude and practice of TBAs in West-Java and in Tanjungsari

in particular was discussed elsewhere (chapter 4). In both areas an inventory was made of a random sample of TBAs to review their degree of retained knowledge of the training by the government (Unicef program in Indonesia). A sample of 32 TBAs were visited by a medical sociologist in August 1988 and data on knowledge, attitudes and practices of the TBAs were recorded. This information was judged essential for appropriate training of TBAs.

6.4.6 Government training of traditional birth attendants

Traditionally, the role of the traditional birth attendant (TBA) in West-Java is limited to assisting delivery, burying the placenta and giving the most elementary care to the mother and her child in the first week after delivery (Peeters et al., 1986). In the early fifties the government decided that the performance of traditional birth attendants should be improved by training them to become more active and effective before delivery. The TBA should apply high standards of care and hygiene to identify high risk mothers and infants. They should refer cases to the health center or the district hospital. The training was essentially practical and relates to all phases of prenatal, delivery and postnatal care. The main goal of the training is to promote and prevent unwanted outcome, currative care by TBAs was not permitted. The training objectives were to :

1. improve standards of hygiene during delivery.
2. educate the mother in better nutrition during pregnancy and weaning period.
3. motivate the mother on family planning.
4. keep records of births and perinatal deaths.

At the end of the course the knowlegde acquired was tested and they then received a basic Unicef midwifery kit. Monthly meetings were held at the health center between the TBAs and midwife in charge. A previous survey in Ujung-Berung (Alisjahbana et al,1983) had shown that despite the training of TBAs the perinatal mortality rate among infants born by trained and untrained TBAs was equally high (chapter 3). Section 7 will discuss the method of training and the evaluation of the TBA training in the risk approach.

6.4.7. Evaluation method of the Tanjungsari study

From the very beginning of the study an evaluation team was formed to collect evaluation data. This team was kept separate from those involved in the intervention. The purpose of the evaluation team was to register all pregnancies in the whole area of study, to collect data on follow-up and to prevent drop-outs. Therefore semi-annual sweepings to find unrecorded pregnancies were carried out. The team consisted of the head of the evaluation team, 5 male field supervisors and 47 female interviewers. For the purpose of editing and cleaning data in Bandung, 2 more nurses, one data operating person and one computer analyst were added to the evaluation team.
In the study area 47 female interviewers collected information during pregnancy, delivery and postpartum from all eligible women. One interviewer was appointed for each village. Only in remote villages covering a large area, two interviewers were appointed. The interviewers were not informed about whether or not they worked in the intervention or in the control area, although gradually they found out themselves. They were selected based on the following criteria:

1. living in the study area
2. able to read and write.
3. willing to conduct home visits.
4. selected by the village head.

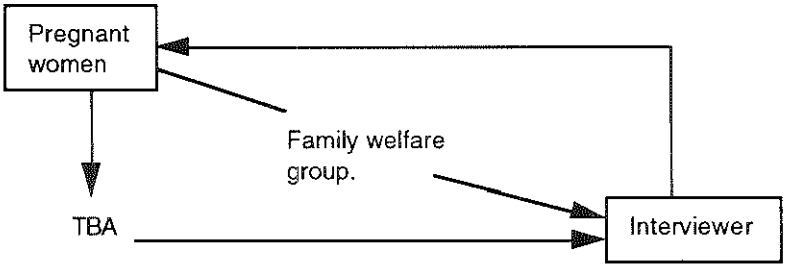
Before starting the survey, the interviewers received a 2 week training; evaluation meetings and quality assurance checks were held once every two weeks at the health center. The meetings for interviewers from the intervention and control area were held on different days. The field-interviewers were supervised by 5 supervisors, all males between 23-30 years old who were graduates from the Academy for Social Work. The supervisors stayed full-time in the village, each of them was appointed to supervise several villages and interviewers.

6.4.8. Registration and follow-up of the cohort

In both intervention and control area all new pregnancies were registered from the first contact with a TBA or health care provider. An interview survey of TBAs during the

preparatory phase revealed that most women contact a TBA during the 2nd or 3rd month of gestational age in order to have their pregnancy confirmed (Alisjahbana, 1976). As soon as a woman contacted a TBA, the TBA would inform the interviewer. Also the women family welfare group in every village was requested to play an important role in the identification of new pregnancies (figure 6.2).

Figure 6.2.



The interviewer collected (during 5 consecutive interviews) data on the antepartum, delivery and postpartum period. The time sequence of home visits was the following:
In the evaluation phase - on the basis of the expected number - 4500 women in the cohort had to be interviewed 6 times, so 22 500 interviews had to be done by 45 interviewers over a period of 2 years or 20 per interviewer per month on the average. This number was realistic.

6.4.9. Quality control of collected data

In the Tanjungsari study 9 precoded forms were used to collect information of pregnancy, delivery and infancy until the infants were two years old. This thesis will focus on the data collected during pregnancy and the neonatal period (interviews 1, 2, 3, and 4) while for the mother follow-up data until 42 days postpartum (interview 5) are used. The precoded forms used were the following:

Interview 1: during pregnancy
Interview 2: at birth
Interview 3: at 7 days postpartum
Interview 4: at 28 days postpartum
Interview 5: at 42 days postpartum

The forms were completed during the field survey by the trained interviewers and afterwards sent to the coordinating center in Bandung. They were entered into a registration system which enabled the research team to monitor the numbers of infants entered into the study and any lost to follow-up. A further quality check was done during coding and editing. After entering the data, data were rechecked for typing errors. These checks were done intermittently and major systematic mistakes were sent back to the supervisory meetings with the interviewers (figure 6.3) It was noticed that, due to the rigid system, the proportion of errors at all levels dropped considerably after each feedback period and eventually reached almost nil.

The task of the interviewer was as follows:

A. General conduct of the interview
    1. personal appearance of the interviewer
    2. explanation of survey to the household
    3. ability to obtain respondent cooperation
    4. care in following survey instruction

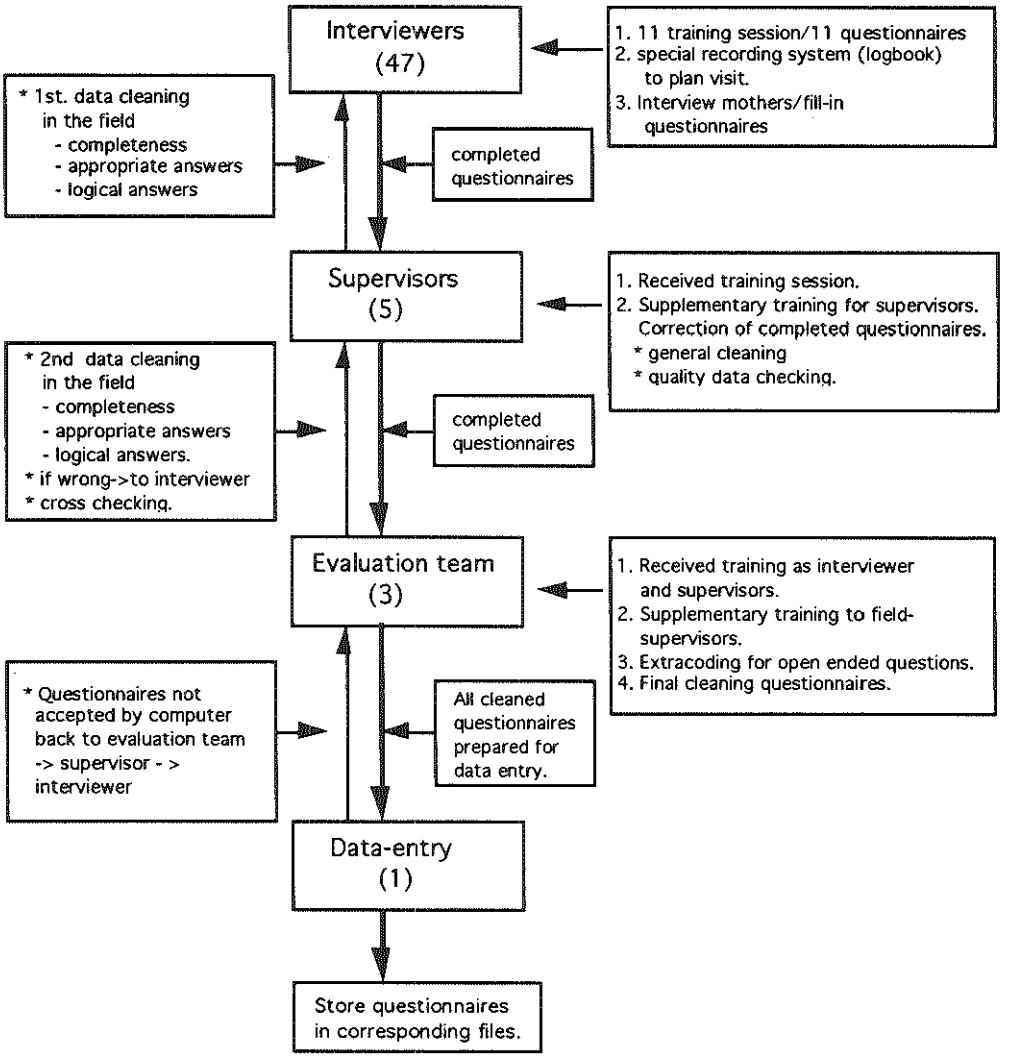
B. Preparation of the questionnaire forms:
    1. accuracy in listing the household and code number of mother
    2. completeness of forms
    3. approach in obtaining details of the event

C. Preparation of pregnant woman and child follow-up records:
    1. care in obtaining correct data of last menstrual period
    2. accuracy of pregnancy history
    3. correctness of ages for the woman and her husband
    4. care in obtaining symptoms of disease

The fact that the households were being revisited for subsequent interviews enabled many queries about quality of data to be followed-up and cross-checked (picture 6.20). It was hoped that by following up queries, the overall error rate would be reduced to an acceptable level. From this data collection strategy it is possible to get the necessary information to evaluate the intervention. The criteria for this evaluation, as mentioned, are in line with the general objective of this research proposal. During the survey, the usual evaluation variables, process, effect and impact variables were collected.

Figure 6.3

THE RISK APPROACH IN TANJUNGSARI
Evaluation flowchart



6.4.10. Statistical analysis

The Tanjungsari study is basically a population based health system research. Therefore a descriptive analysis was used to analyze the results of the study. The reason

for this is that many factors influence the final outcome of the study, e.g. factors that are not possible to be controlled such as change of behaviour of the TBA , the community itself as well as the top down health programmes. On the other hand it has to be recognized that change of behaviour may take some time to have some impact on outcome. A multiple regression analysis was done to separate risk factors which were likely to have some influence on the outcome.

The statistical analysis was done using the following software computer programmes:

1. The statistical package for social science (SPSS) version 3.10,1989 was used for table construction.
2. Epi Info software version 5.01, 1990 was used for the analysis of association through the calculation of the relative risk with 95% confidence interval and p-value using the Mantel Haenzel or Fisher exact test where appropriate.
3. Multivariate analysis or multiple logistic regression with or without interaction was done using advanced statistics of the SPSS 3.10 software.

a. Descriptive statistics

Frequencies and rates were computed pertaining to demographic data and events during pregnancy, delivery and the neonatal period. The study cohort was designed to comprise several risk categories simultaneously to study frequencies and rates more in depth. The total study population was divided into the following subpopulations:

1. characteristics of women covered by risk approach trained TBAs (Ra.TBAs), conventionally trained TBAs (Conv.TBAs) and other birth attendants (midwife,MD).
2. pregnant women characteristics, clients of Ra.TBAs, Conv.TBAs and others.
3. number of pregnancies, deliveries and postpartum complications by Ra.TBAs and Conv.TBAs
4. number of referrals by Ra.TBAs and Conv.TBAs.
5. perinatal mortality rates of infants less than 2500 g versus equal to or over 2500 g and more than 3500 g.
6. percentage of low birth weight infants of pregnant women who were clients of Ra.TBAs, Conv.TBAs and "Others".
7. causes of perinatal, neonatal and maternal mortality.

b. Inferential statistics

Descriptive statistics describe aspects such as how many, the most common, the average, or the range of values for groups of cases. In inferential statistics one attempts to infer whether differences between groups or relationships between variables represent persistent and reproducible trends. Inferential statistics is not always required for example if the health care survey is conducted in a particular community, using a full population. If however the investigators still argue that certain differences between groups or that certain correlations between variables can be generalized than inferential statistics is necessary (Polgar and Thomad, 1988).

To find an association between the number of perinatal factors related to risk approach trained TBAs and certain measures of outcome, the method applied was to evaluate separately the relationship between each perinatal factor and outcome. Usually the student t-test or chi-squares test statistics (univariate analysis) were used. Power is the ability of a statistical test to detect a difference of a specified magnitude (known as a clinically important difference), given that this difference exists in the populations being compared. That is, it is the probability that a statistical test will reject Ho (nul hypothesis) given that Ho is false. Determining statistical significance is dependent on the sample size. Any difference however small may be found statistically significant if the sample size "n" is sufficiently large, since as "n" increases power also increases, even when a small effect size can be detectable. The p-value is an expression of the statistical difference. A small p-value indicates that the observed sample result is unlikely to occur by random in a population for which Ho is true. While a small p-value provides evidence that some difference between two populations exists, it does not necessarily imply that this difference is large. The p-value is also a function of the sample size and standard deviation. For sample size it is known that p-value decreases when sample size increases, while for standard deviation the p-value increases when standard deviation increases. The desired level in this thesis to reject Ho is when $p \leq \alpha = .05$.

6.4.11. Process variables

a. Knowledge of risk factors by TBA

In the intervention area the TBA should identify mothers and infants at risk according to the problem-action guidelines and using the Mother & Child Card. Their ability to do this has been tested during a pilot-survey (chapter 5). Indirectly their ability to refer is an assessment of the teaching-learning activities.

b. Referral behavior of TBA

Besides identifying risk-cases, the TBAs were trained to take action (referral to higher level of care, give simple treatment or health motivation and education). Therefore the process of risk-management can be evaluated as follows: it pertains to the performance (quality) of all health workers and to the general feasibility of the system. These data would be collected by TBAs using referral cards and at health center level, also ad hoc investigations will yield additional information. More specifically 2 types of process-data were collected:

1. number and reasons for risk-management (referral by TBA)
2. the outcome of the referrals to higher levels of health care.

6.4.12. Effect and outcome variables

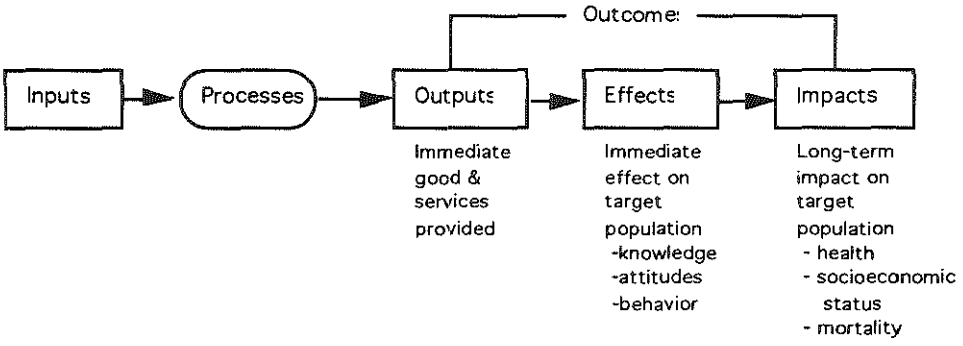
Effectiveness means to produce the desired result, to accomplish the correct end or to secure the relevant outcome (Hare, 1967). Effectiveness may also be defined as the achievement of desired outcome. The process itself actually involves two substeps:

1. deciding which outcome criteria to use
2. developing specific measures to meet those criteria

A criterion is defined as a characteristic, rule or test by which an object or event is judged. A measure is a numerical assigned according to rules to an object or event. A measure has to be quantitative. In general analysts usually simplify things by saying they measure an object or event but in fact they measure indicators of the properties of objects such as they do not measure infant mortality; they measure the number of

reported infant deaths. The definition used for effectiveness is as recommended by Reynolds and Gaspari (1985) and includes the achievements of immediate outputs as well as effects and impacts. A simplified diagram of the continuum can be seen in the following figure 6.4:

Figure 6.4. Classification of outcomes on cause-effect chain



Adapted from Reynolds and Gaspari
Cost effectiveness analysis, Pricor,1985

Outcome indicators can be divided into outputs, effects and impacts. This way of analyzing outcomes has the following advantages:

1. It provides a framework for organizing outcomes into relatively comparable classes, which can make selection more systematic and simpler
2. It allows the decision-maker and analyst to see whether a particular outcome is on the cause-effect chain
3. It can point out to the decision maker and the analyst what they have decided not to measure

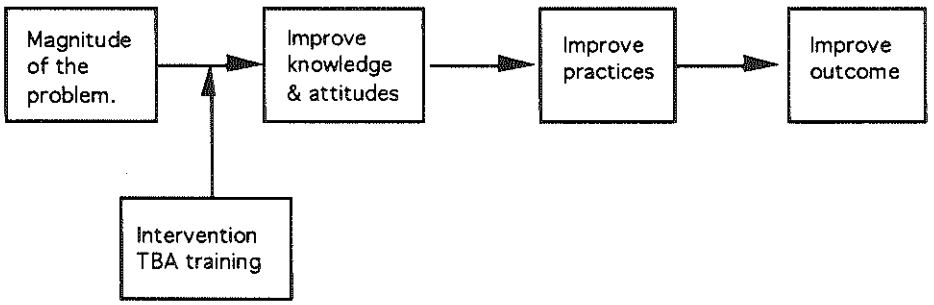
Besides the desired outcome of interest the way of analyzing results may give other possible outcomes such as the undesired outcomes (side effects). Effect outcome is then the immediate effects on target population which concerns knowledge, attitudes and behaviour, while impact outcome is the long-term impact on a target population expressed in health status or mortality rates (low birth weight, perinatal mortality).

6.5. Training and evaluation of traditional birth attendants in the risk approach

The main objective of the Tanjungsari study was to train TBAs how to recognize risk factors before, during and after delivery in order to identify difficult and potentially life-threatening events and refer these cases to an appropriate facility for further treatment. Within the intervention area, a training programme was implemented including basic health care and a primary emphasis on risk factor identification.

figure 6.5.

The evaluation process of TBA training



This chapter is an evaluation of the training and the assessment of the comprehension and retention of the knowledge and ability to accurately recognize risk factors of pregnancies, deliveries and postpartum care. Special emphasis will be given on TBA training in the risk approach in Tanjungsari and its evaluation and supervisory procedures. The process will be analysed following the model as shown in figure 6.5.
The magnitude of the problem was already discussed extensively in the chapters 3 and 4, in particular the relationship between perinatal mortality and health care provider, in this case the traditional birth attendants.

6.5.1. TBA training in the risk approach

Following extensive discussions with village leaders, a survey on a sample of TBAs was carried out in 1987. The pilot survey elicited information about their knowledge, attitudes and practices (KAP) toward pregnancy and childbirth. The result of this survey

was discussed in chapter 4 (section 4.5). On the basis of information obtained in the knowledge, attitude and practice (KAP) survey of TBAs in the pilot survey, a training programme was started in the intervention area. The training was essentially practical and related to all phases of prenatal, delivery and postpartum care(picture 6.9 -6.14). The training objectives were to:

1. improve standards of care and hygiene during delivery (basic health care)
2. emphasize risk factor identification and to conduct appropriate action such as referral in case of prenatal, delivery and postnatal complications
3. promote health, in particular tetanus immunization and care for the newborn
4. keep records of births and perinatal- as well as maternal deaths

The training modules for TBAs consist of problem action guidelines and the Mother & Child card. It was planned that in the intervention area only one card should be available to be used by informal as well as formal health care providers. This decision was made because too many cards of different institutions were circulating in the village. There is a felt need for more efficient and effective recording which certainly will also decrease the cost for printing material. The training of TBAs in the risk approach followed the same program as developed for health centers by the Ministry of Health. The main difference was the identification of risk factors and conducting appropriate action to minimize risk. During the training emphasis was given to emergency care and to involve TBAs in problem solving skills using mortality and morbidity cases for group discussion.

Traditional birth attendants eligible for training in the risk approach were TBAs living in the intervention area who already had received the governmental training at the health center. A total of 71 TBAs who were previously trained by the government were registered, except for one male TBA who refused training but continued to practice illegally not approved by the village head. The number of TBAs eligible for training were 71 women, they covered 17 villages. The attendance rate of TBAs during the training course was almost 100 per cent, two did not come regularly because of old age and sickness.

From the age distribution (table 6.3) it can be seen that more than 80 per cent of TBAs included in the training programme were over 45 years (around the postmenopausal

period). The results of the knowledge, attitudes and practice (KAP) survey on TBAs as well as the impression of the midwife trainers suggested that these elderly largely illiterate birth attendants would have limited capacity for assimilating "modern midwifery practices". Therefore limited objectives were set for the training programme and training techniques used were those that require active participation by the trainees. To achieve above mentioned training objectives, training modules e.g. "the problem action guideline", the "referral card" and the mother and child card were used (section 6.3.1).

Table 6.3 Age distribution of the Ra.TBA.

Age distribution (years)	TBA n	(%)
55+	29	42.0
45-<55	28	40.6
<45	12	17.4
Total	69	100.0

n = number

The research team included the principal investigator, 6 trained midwives (4 of them were recruited from a nearby health center because Tanjungsari had only two midwives, one private and one health center midwife). The training of the midwives emphasized the identification of risk factors and the appropriate action, referral. They were also informed of the methods of motivating a TBA to become more interested in new developments and appropriate technology in pregnancy care. The initial TBA course consisted of 3 hours session daily for a period of 12 days. Lectures, demonstration and practicing were the main teaching methods employed. The training was conducted in the intervention area at five places simultaneously. This decision was made to enable the TBAs to attend the training courses so they could not complain about distance or lack of transportation. At the end of the training period, the TBAs visited the General Hospital Hasan Sadikin (the teaching hospital) to see women and infants with complications.

Upon completion of the training course birth attendants were expected to:

1. recognize early pregnancy, advise and monitor women during the prenatal period.
2. perform safe delivery and practice proper care of the umbilical cord.
3. recognize and refer high risk women or those with serious complications of

pregnancy and delivery to the health center or hospital.

4. treat simple ailments and prepare women in emergency conditions before transportation to the hospital.
5. promote breastfeeding and family planning after delivery.

During the intervention study TBAs gave performances on special events such as the national independence day which was attended by the whole community. The performances also served as a kind of examination and included a simulation of prenatal examination, labour and delivery and referral of high risk cases. There was a lot of enthusiasm in the preparation as well as during the performance. There were also yearly contest between TBAs to select the best TBA based on her knowledge and skills of attending deliveries. These events became major village events in Tanjungsari.

Because many TBAs were old and had problems with eye-sight, a sponsor (Lions club, Belgium) donated reading spectacles to TBAs who were in need of reading glasses. Reading glasses were also provided to the conventional TBAs in the control area.

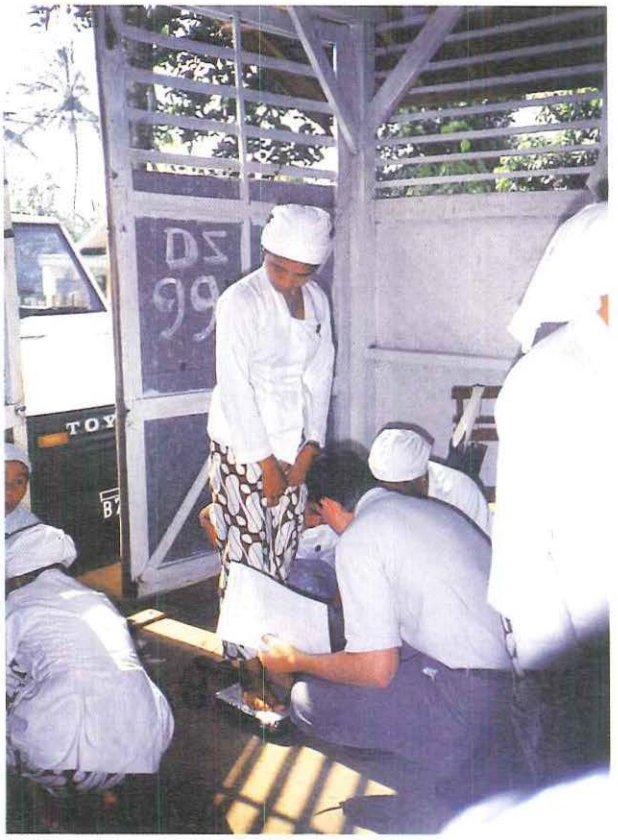
Through the village leaders, the community in the intervention area was informed that the traditional birth attendants were trained in order to upgrade their ability to serve the community. The content of the course was described in general terms so that the community was well informed. A community information programme on the risk approach was carried out during the TBA course through the women family welfare group covering aspects of health and events around the delivery. The advantages to the community of improving the skills of the TBAs was also discussed with the village leaders (pictures 6.15 - 6.19).

6.5.2. Methods of supervision and evaluation

Considering the limited capacity of the traditional birth attendants and their need for supervision, evaluation and refresher courses were planned from the onset of the training programme. The result of the KAP on TBAs in Ujung-Berung showed that without follow-up of training programmes and supervision, abilities may diminish over time and TBAs will revert to pre-training attitudes. Accordingly supervision and evaluation were given priority in planning the training programme. Evaluation of the learning process during the training period was carried out in a simple way. The following criteria were

Picture 6.9 Training TBA in the risk approach. Role playing measuring the mid upper arm circumference

Picture 6.10 Training TBAs : Palpation of the infant parts



Picture 6.11 Training TBAs : weighing the mother and adjustment of the weighing scale

Picture 6.12 Training TBAs : administration of sliver nitrate drops for prevention of gonorrhea conjunctivitis

Picture 6.13 Training TBAs : weighing the baby scales and adjustment of the scales

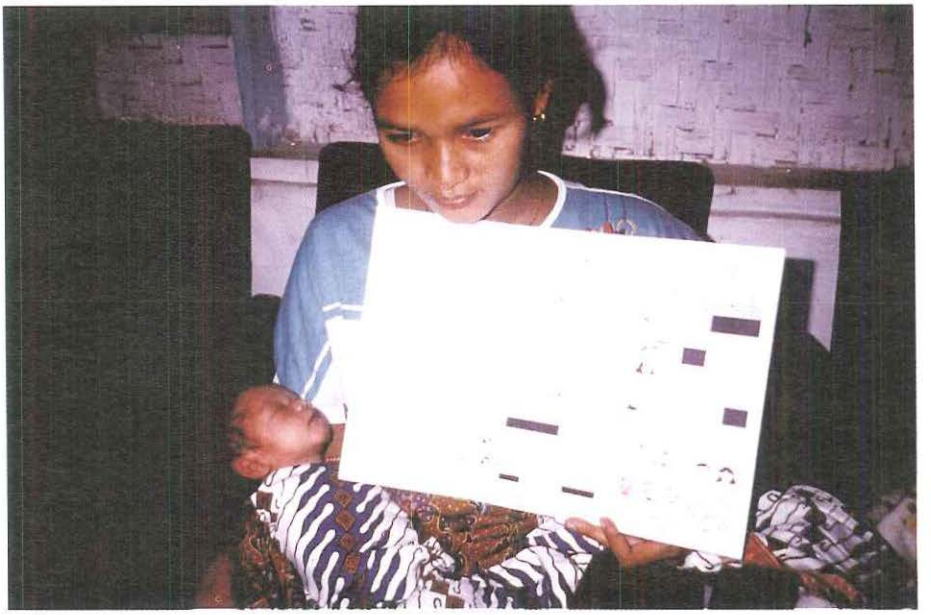
Picture 6.14 Last day of the training course: a visit to the hospital demonstrating mothers and infants with complications

Picture 6.15
Pregnant women group meeting organized by the health center midwife explaining and discussing risk factors during pregnancy and delivery using the mother and child card and what to do about it

Picture 6.16
Pregnant women meeting with the trained traditional birth attendant discussing risk factors and referrals while using the mother and child card

Picture 6.17
Explaining the purpose of the Mother and Child Card to the women members of the community

Picture 6.18 A meeting with the village head to discuss the problem of maternal and child health



Picture 6.19

A young teenage mother and her low birth weight infant. Note the small increase in weight during pregnancy

Picture 6.20

The field doctor examined and measuring a low birth weight infant

used to evaluate learning during training:

1. attendance rate during the training sessions and monthly meetings
2. participation in case discussions
3. recall during informal quiz of material presented at previous sessions
4. performance in simulation excercises

The application of these criteria also helped the trainers to identify those TBAs in need for additional training by supervisory personnel. Refresher sessions and follow-up support during the monthly meetings was given to all Ra.TBAs.

a. Monthly supervision and refresher sessions

During the monthly meetings with the supervisors (midwives assisted by the field doctor), cases were discussed and previous training sessions were reviewed, including filling in the M&C card. The problem action guideline booklet was used as handbook as well as the M&C card for the purpose of reporting and recording. Referral records using the same pictures as the M&C card and the problem action guidelines were used for evaluation of referral cases. The purpose was to serve as an additional aid in evaluating the TBAs and help to determine which TBA had been referring cases. However since it was the habit of the TBAs in this area to join the patients to the referral facility, and since many TBAs forgot to give the cards to the patients, this system of evalution was not very valuable. However, during the home visits by the research interviewer the information concerning referral was also collected from each TBA in the evaluation questionnaires.

b. Post-training evaluation

The first post-training evaluation was organised directly after the training course and was based on the above mentioned criteria. The results can be seen in table 6.4.
Although evaluation was more or less based on the midwife's subjective evaluation, it gives a general impression that only 24 percent of TBAs over 55 years had high scores compared to 50 percent of TBAs less than 45 years. Surprisingly there were 3 old TBAs with high scores, one was 70 years old and two were more than 60 years of age. The youngest TBA was 28 years and had a high score in the evaluation. In the Ra. trained

group the oldest TBA was 80 years and had a low score as was expected. Of the younger TBAs almost all had average and high scores.

Table 6.4 Post training evaluation of TBA by age of TBA

Age distribution (years)	TBA n	(%)	Score high		average		low	
55+	29	(42.0)	7	(24.1)	11	(39.9)	11	(39.9)
45-<55	28	(40.6)	3	(10.7)	15	(53.6)	10	(35.7)
<45	12	(17.4)	6	(50.0)	6	(50.0)	-	(0.0)
Total	69	(100.0)	16	(23.2)	32	(46.4)	21	(30.4)

n = number.
( )= per cent.

In 1988, during the first year of the Tanjungsari intervention study, a survey on health beliefs of traditional birth attendants was conducted on a sample of 21 Ra.TBAs from 17 villages in the intervention area and 18 Conv.TBAs from 10 villages in the control area.

Table 6.5 A comparison of TBAs knowledge of risk factors (1988). Percent of TBAs citing this factor an important problem that can happen

Risk factor	Ra.TBA n=21	Conv.TBA n=18	Chi-square	p-value
Edema	81	39	7.06	0.008*
Bleeding	81	33	8.85	0.003*
Paleness	76	28	7.20	0.007*
Not enough blood	38	39	0.00	0.960
Hypertension	5	11	0.03	1.000
Convulsion	43	11	4.70	0.030*
Fever	43	11	4.70	0.030*
Undernutrition	24	17	0.30	0.702
Cough with dyspnea	33	17	1.38	0.241
Height<145 cm	9	17	0.04	1.000
Age < 20 - > 35 years	5	11	0.03	1.000
Weakness/dizziness	48	28	1.57	0.210
Foul smelling discharge	19	9	0.46	0.667
Full bladder	14	0	2.71	0.235
Doing forbidden behaviour	10	11	0.03	1.000

Over 38% of Ra.TBAs mentioned other problems 11 times out of 15 different categories; 33% of conventional TBAs, mentioned other problem 11 times out of 15 categories.
* = significant using the α level of 0.05.

They were selected at random from the TBAs master list. The aim of the study was to evaluate the effect of the training programme on the TBAs health beliefs. For this study, comprehension and retention of the training was assessed in intervention and control TBAs in terms of knowledge of maternal anatomy and physiology and in terms of the ability to accurately recognize risk factors of pregnancies, deliveries and of postpartum maternal and postnatal child health. The hypothesis was that due to training, Ra.TBA had a better ability to recognize risk factors, a greater understanding of reproductive anatomy and physiology and had higher overall referral rates compared with the Conv. TBAs.

Table 6.6. TBAs perception of the risk factors included in the RA. training. (Percentage of TBAs saying it is dangerous).

Risk factors	Ra.TBA n=21	Conv.TBA n=18	Chi-square	p-value
Before delivery				
Bleeding	100	72	6.52	0.011*
Fever	86	67	1.93	0.255
Edema	86	78	0.40	0.682
Cough	90	72	2.14	0.216
Previous miscarriage	95	50	10.14	0.002*
Height <145 cm	45	72	3.31	0.069
MUAC	66	56	0.49	0.483
Position of the baby	95	94	0.01	1.000
Weight decrease	86	83	0.04	1.000
Weight at 28 weeks	76	44	4.02	0.045*
Not vaccinated	86	72	1.05	0.432
Previous stillbirth	76	56	1.81	0.179
Cesearean section	86	67	1.93	0.255
During delivery				
Duration of labour	100	99	1.19	0.462
Bleeding	90	94	0.21	1.000
Fever	95	50	10.14	0.002*
Foul smelling discharge	86	83	0.04	1.000
Convulsion	95	94	0.01	1.000
Position of baby	100	84	3.69	0.089
Twins	72	22	9.15	0.003*
Newborn infant				
Newborn is blue	95	94	0.01	1.000
Newborn is pale	100	83	3.69	0.089
Newborn is floppy	95	89	0.54	0.586
Weight <2000 g.	100	83	3.69	0.089

MUAC = Mid-upper arm circumference
* significant.

This study was conducted by A Lane (1988), a medical student from the University of Connecticut as part of his graduate training. A questionnaire consisting of both open ended and closed questions and covering the topics of anatomy, physiology and risk factors was developed. Several additional TBAs were randomly selected for pretesting and for a small pilot survey, to determine the suitability of the questionnaire. Data collection was carried out periodically over a five week period, averaging about 3 interviews per day. The one hour long interview was conducted by an anthropologist using the local language.The results can be seen in table 6.5. The table gives the response of TBAs to one of four open questions asked about risk factors (probing): "What things or conditions can be wrong with a mother while she is still pregnant?". Out of 15 risk factors that they considered a problem, more than 70 percent of Ra.TBA mentioned edema, bleeding and paleness, while more than 40 percent mentioned convulsion, fever and weakness. These factors were not recognized as risk in the control TBAs. Questions were also asked whether a certain risk factor is dangerous. Here, the selected risk factors were the same as on the M&C card and the problem action guidelines. For every risk factor except height and mid-upper-arm circumference, over 70 % of Ra.TBAs considered the risk factors as dangerous. The difference was especially large with respect to bleeding before delivery, previous miscarriage, weight at 28 weeks, fever during delivery and a mother delivering twins. This may be a measure of success of the RA training (Table 6.6)

6.5.3. Evaluation of TBAs practices

Experience seems to be valued by the TBAs more than classroom teaching. This was the impression of their response to the questions "why they think it is dangerous and how to cope with it? "A number of TBAs said that the people from the hospital told them about factors (or conditions) that were dangerous, some felt they could treat the problem themselves. Others would say "I've never had this experience but I think it might be dangerous". One male Ra.TBA mentioned that the position of the baby was dangerous, but everything depends on Allah, so there is no point in making a referral. One important factor of assessment is whether the TBA can identify a pregnant woman in need for referral.

After the first year (1988) an evaluation was done on the number of cases referred and the reasons for referral to the health center. This information was collected from the health center Tanjungsari (table 6.7). Because TBAs who had received additional training

in the risk approach were all coming from the northern part of the study area, table 6.7 differentiates referrals coming from the intervention and control area. The result shows that TBAs from the intervention area are referring 7 times more cases compared to TBAs from the control area. Although there was some improvement, it shows that breech delivery was not referred.

Table 6.7 Number and reason for referral by TBA to healthcenter by area (1988)

Reasons	Intervention Area		Control Area	
Pregnancy				
Height < 145 cm	2		-	
Not increased weight	5		1	
Edema	3		-	
Fever > 3 days	10		-	
Bleeding	8		3	
Total		28		4
Delivery/Postpartum				
Cough + dyspnoe	1		1	
Prolonged labor >12 hrs	8		-	
Bleeding	8		2	
Retained placenta	8		-	
Anemia	1		-	
Postpartum fever	1		-	
Foul smelling discharge	-		1	
Total		27		4
Infant				
Birth weight <2000 g	4		-	
Birth weight >2500 g.+illness	18		4	
Diarrhoea	2		1	
Dehydration	13		-	
Total		37		5
Grand total		92		13

During the first year there were 1846 deliveries and the incidence of breech delivery was about 3 percent. It was expected that 55 cases of breech should be referred. In this study the number of live born infants less than 2000 grams is about 2.5 percent thus 46 infants with a birthweight less than 2000 grams were in need of referral but only 4 infants were referred (1.8 per cent). The result shows that in a sample of Ra.TBAs and Conv.TBAs in the first year of the study, from the point of view of recognizing risk factors and the number of referrals, the performance of Ra.TBAs was better compared to

Conv.TBAs. A discrepancy was found between recognition of risk factors and referral. The number of referrals is still too low to have some impact. Several other factors may also play a role. Answers to follow-up questions revealed that for many of the risk factors, though the TBAs considered a factor dangerous, there are widely varying opinions among both groups as to what exactly constitutes "dangerous". There is also a great probability that the pregnant woman herself has a different perception than the TBA. On the other hand the fatalistic attitude as was given by a male TBA shows that recognition and action may be two different things.

6.5.4. Post intervention evaluation

A second evaluation on TBAs knowledge, attitudes and practices was conducted in 1990 at the end of the intervention period. The purpose was to evaluate whether knowledge was retained and whether or not improved knowledge and practices of Ra.TBAs had influenced the practices of Conv.TBAs. This KAP survey was slightly different from the survey in 1988. In 1990 emphasis was more on the practices of the TBA.

Table 6.8 Characteristics of traditional birth attendants in the sample (1990)

Variables (Mean)	Ra.TBA n =33	Conv.TBA n = 18	t.test	p-value
Age(years)	59.5(11.52)	55.0 (14.72)	1.13	0.267
No. children	5.5(2.15)	4.7 (2.76)	1.06	0.300
No. stillbirths	0.3(0.81)	0.4 (0.78)	0.61	0.547
Years of experience	17.8(13.34)	19.8 (15.84)	0.48	0.636
No. deliveries last year	18.6(17.88)	16.8 (13.47)	0.39	0.696

( ) = standard deviation.

For this purpose a sample of 25 percent of both groups of TBAs were randomly selected from the TBAs master list in 1990, after the operational part of the Tanjungsari intervention study was finalized.

A set of questionnaires was applied to the TBAs showing the following result. About 5 per cent of the sample could not be visited and 2 Ra.TBAs died in the previous year. From table 6.8. it can be seen that no difference was found in the characteristics of TBAs in both groups. Ra.TBAs were older and had less years of experience although they had more

deliveries in the last year.

Table.6.9 Knowledge of TBAs in 1990 (percentage correct answer, able to mention signs of danger after probing)

Risk factors or dangerous condition	Ra.TBA n=33	Conv.TBA n=18	Chi-square	p-value
of pregnancy	100.0	100.0	0.0	0.0
during pregnancy	97.1	100.0	0.16	1.000
during delivery	100.0	100.0	0.0	0.0
directly postpartum	93.9	100.0	1.11	0.534
postpartum period	77.5	82.4	0.15	1.000
of newborn	94.1	88.2	0.40	0.607

n = number of TBAs

A questionnaire with open and closed ended questions was used in the TBAs sample in the second KAP survey (table 6.9 and 6.10). The questions were mainly related to risk factors and dangerous signs as shown on the M&C card and the problem action guidelines. The questionnaires were probing questions asked to the TBAs and were directed at signs of the mother and the newborn the TBA considered dangerous.

Table 6.10 TBAs knowledge of risk factors perceived as dangerous signs in 1990 (percentage of correct answers)

Risk condition	Ra.TBA n=33	Conv.TBA n=18	Chi-square	p value.
Postpartum fever	66.7	66.7	0.00	1.000
Convulsion	88.2	88.2	0.00	1.000
Bleeding	94.1	88.2	0.40	0.607
Retained placenta	100.0	94.1	1.83	0.353
Breech	85.3	94.3	1.01	0.405
Perineal tear	73.5	82.4	0.71	0.398
Baby not crying	75.8	72.2	0.08	1.000

n = number of TBAs

From table 6.9 and table 6.10 it can be seen that there was no difference in the knowledge and perception of both the Ra.TBA and the Conv.TBA in 1990 compared to the situation in 1988 (see also table 6.6). It shows that Ra.TBAs performance was not much different compared to the evaluation in the first year of the intervention study. Two

possibilities may have occurred. Firstly the Ra.TBA performed less well because of lack of supervision. The next possibility is that Conv. TBAs improved their knowledge and skills in the second year of the intervention study. The first explanation is possible, because in the design of the study no additional health personnel was added to the supervisory team and the supervision of Ra.TBAs was conducted by the midwife at the health center.

Questions were asked concerning TBAs knowledge about measures and practices (correct action) especially in relation to pregnancy and delivery (table 6.11 and table 6.12).There was no significant difference in TBAs knowledge of measures and practices.

Table 6.11 TBAs knowledge of measures in 1990 (percentage of correct answer)

Risk condition	Ra.TBA n = 33	Conv.TBA n = 18	Chi-square	p-value.
Heavy bleeding	90.0	83.3	0.20	0.686
Duration of normal delivery	91	95	0.20	1.000
Duration to wait for placenta not delivered	42.4	33.3	0.40	0.529
Duration of observation mother and infant postpartum.	88.2	70.6	1.15	0.296
How long is fever dangerous	67	67	0.00	1.000
Dangerous position of baby	85	88	0.16	1.000

n = number of TBAs

Table 6.12 Practice of TBAs in 1990 (percentage correct action)

Practices of TBAs	Ra.TBA n=33	Conv.TBA n=18	Chi-square	p-value
Umbilical care				
Cutting cord	90.9	100.0	2.32	0.284
Cord care	97.0	100.0	0.55	1.000
Referral fever	26.5	47.1	1.52	0.218
Referral convulsions	69.7	55.6	1.00	0.317
Referral bleeding	63.6	43.5	1.71	0.190
Referral retained placenta	79.4	94.1	2.12	0.233
Referral breech	63.3	76.3	1.06	0.303
Referral perineal tear	52.9	41.4	0.73	0.393
Referral baby + danger signs	67.7	62.5	0.15	0.694

Another explanation for the lack of difference between the two groups is that personnel of the health center has influenced the Conv.TBA by applying the same supervision as

was done for Ra.TBAs. The supervision of the Conv.TBAs was done by an assistant midwife at the same health center. The second explanation is also relevant considering the fact that both study areas where Ra.TBAs and Conv.TBAs work are very close. Conv.TBAs were also younger and more eager to learn, therefore contamination is likely to occur.

6.6. Summary

The intervention study was implemented in a rural area Tanjungsari in West Java. The total population based on the 1990 census was ± 87,000 people. District Tanjungsari is divided into two areas by the main road. On suggestion of the district health officials, it was decided to take the northern part of Tanjungsari as the intervention area and the southern part as control area. The study is a longitudinal cohort study using two areas, an intervention and a control area and was continued for a period of 28 months of observation. In the intervention area a training module was developed for TBAs to enable them to identify high risk pregnant women and conduct appropriate action (simple treatment and referral).

Instruments to be used in the intervention area by risk approach trained TBAs were: the colored baby weighing scale, the mother and child card to monitor the condition of the mother and the child which is in fact a reporting and action card. The card is also a home based recording card kept by the mother. Other tools the research team used were the problem action booklet and the referral cards.

As a result from the pilot surveys conducted in 1986, it was found that TBAs could recognize and record the most important signs and signals in the identification of risk factors and take appropriate action when risk factors were detected. Problems arose when the TBA had to plot weight by drawing a line between two observations. The mother and child card was developed based on the result of the pilot survey. The evaluation of the study was carried out simultaneously in both the intervention and the control areas. For this purpose 45 female interviewers and 5 field supervisors continuously monitored the progress of the study. Semi annual sweeping of the research area was conducted to get a minimal number of drop outs of pregnant women.

To assess the result of the training of Ra.TBAs a posttraining evaluation showed good results. A KAP survey on TBAs was conducted at the beginning of the study and compared to the second KAP survey in 1990. In the second KAP study there was no difference in

knowledge, attitudes and practices of both Ra.TBAs and Conv.TBAs. It is likely that there was contamination of knowledge and skills from the intervention area - where most of the RA.TBAs live - to the control area. It has to be seen how contamination of knowledge and practices may have influenced the impact of the study.

Chapter 7. RESULTS OF THE TANJUNGSARI INTERVENTION STUDY

The results of the Tanjungsari study are divided in several sections. The first section discusses the characteristics of traditional birth attendants, then follows the populations statistics followed by the characteristics of pregnant women in both areas. The fourth section discusses measurements of the effect of training of TBAs, effect measurement is divided into the specific periods of pregnancy e.g. prenatal, delivery, postpartum and neonatal period. Descriptive analysis is the most used statistical method in these sections. The fifth section will analyze confounders as well as interaction between selective variables on pregnancy outcome. The sixth section will answer the question whether women's perception of risk has changed during the study period. Section number seven is a task analysis of health center personnel followed by a brief summary of case reviews of perinatal and maternal deaths. Section eight is the general overview of the results, section nine as a summary will finalize this chapter.

The data was collected on an ongoing basis on a cohort of pregnant women for a period of 2 years. The birth cohort was followed until the child was 2 years old. For the purpose of comparison all pregnant women were grouped according to the person who attended the delivery. Traditional birth attendants who received additional training in the risk approach and risk identification (Ra.TBAs) and pregnant women whose delivery was attended by conventional trained TBAs (Conv.TBAs) were the two major groups. Among the Conv.TBAs, 6 untrained TBAs (± 7%) were included. They were included because previous studies had shown that there was no significant difference in the knowledge, attitudes and practice of untrained and conventionally trained TBAs (Alisjahbana et al.,1984; Peeters et al., 1986). Moreover their number of deliveries were small and would not influence the results of the comparison. The third group consists of pregnant women whose delivery was attended by health personnel e.g. midwives, nurses and medical doctors. This group also includes pregnant women who were referred by the TBAs. The subject of the study refers to all pregnant women who had delivered a single baby during the time of observation.

7.1. Traditional birth attendants in the study area

7.1.1. Characteristics of traditional birth attendants

At the beginning of the study period 80 risk approach trained TBAs (Ra.TBA) and 74 conventional trained TBAs (Conv.TBA) were registered. From the data available there was no significant difference in the characteristics of both groups except in the mean age of birth attendant and time interval since the TBAs last training by health center programmes (table 7.1). In fact the Ra.TBAs were older and the interval since their last training was longer.

Table 7.1 Characteristics of traditional birth attendants in Tanjungsari

Characteristic	Ra.TBA n = 80	Conv.TBA n = 74	Statistical test	p.value
Mean age	55.7 (12.6)	48.8(12.7)	t. test	0.005*
Marital status (per cent)	72.8	75.0	Chi-square	0.950
Per cent literate	76.5	64.6	Chi-square	0.788
Number of children	5.0 (2.8)	4.9 (3.0)	t. test	0.791
Mean duration of experience (years)	15.7 (11.8)	12.3(11.1)	t. test	0.140
Mean interval since last training by government (years)	12.9 (12.7)	7.2 (6.8)	t. test	0.008*

n = number
( ) = standard deviation
* significant .

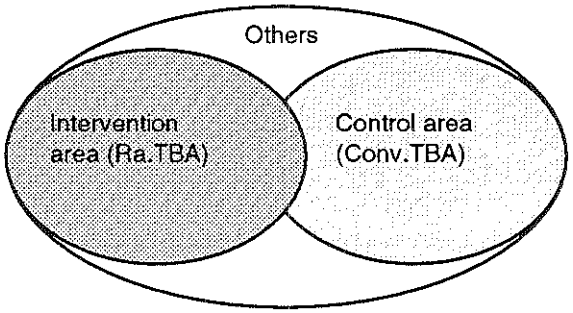
During the first year, more TBAs were added in both groups, because the training done by the government continued. In the intervention area, TBAs received additional training in the risk approach strategy after they finished the conventional governmental training programme. By the end of the first year, a total of 80 Ra.TBAs and 74 Conv.TBAs were registered. In the second year the number of Conv.TBAs was 85.

7.1.2. Geographic distribution of pregnant women covered by birth attendants

A schematic overview of the pregnant women covered by type of birth attendant can be

seen in figure 7.1. Because intervention area and control area were very close to each other a certain overlapping of service areas provided by Ra.TBA and Conv.TBA is to be expected. This is the more so because TBAs are not confined to a place. When a TBA is popular she will travel outside her own village (area) or people may ask her to assist in a delivery irrespective of geographic area. One of the reasons to have the control area close to the intervention area, was to have a similar community with comparative health behaviour and attitudes apart from logistical problems.

Figure 7.1. Geographic distribution of subjects based on services of birth attendants



7.1.3. Distribution of deliveries by traditional birth attendant

During the study period an increase of births occurred in the second year compared to the first year. However, the percentage of deliveries by types of birth attendants remained almost the same (table 7.2).

Table 7.2 Number of deliveries by type of birth attendant (singletons only)

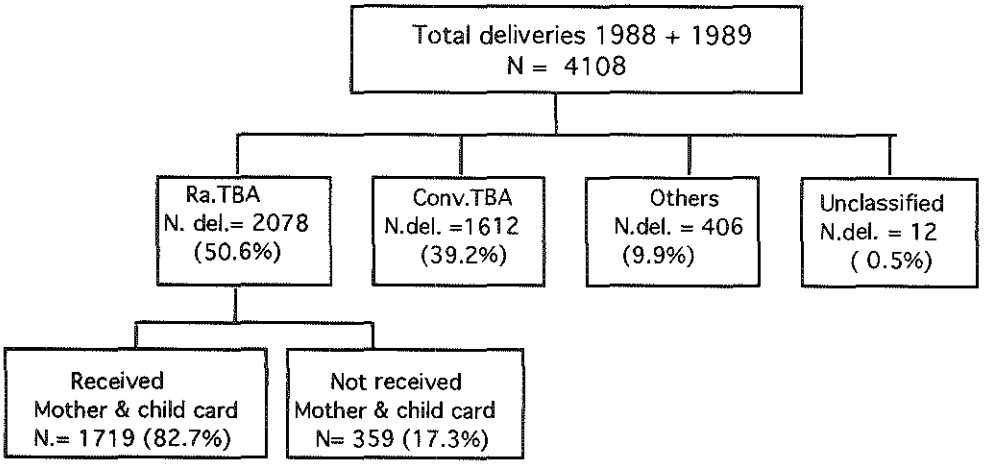
Birth attendant	1988		1989		Total	
	n	%	n	%	n	%
Ra.TBA	933	50.5	1138	50.3	2071	50.4
Conv. TBA	705	38.2	907	40.1	1612	39.2
Others (health personnel)	196	10.6	210	9.3	406	9.9
Unrecorded	8	0.5	2	0.1	11	0.3
Total	1842	100.0	2257	100.0	4099	100.0

Note: Unknown birth attendant: 9 cases (0.2 %).

From the percentage of deliveries conducted by TBAs, it can be seen that there is nearly no difference in the percentage of deliveries by TBAs in both years, except that the percentage of deliveries by Conv.TBAs in the second year increased 1.9 per cent compared to the first year. A drop of 1.3 percent was found in the group of "Others". An overview of all pregnant women who delivered in the study area can be seen in figure 7.2. The number of reported deliveries attended by Ra.TBAs was higher compared to the Conv.TBA. If the number of deliveries was calculated by type of TBA, the RA.TBAs had more deliveries in both years (50.6 per cent) compared to Conv.TBAs (39.2 per cent). This is related to the population size, in this area each village has approximately 3000-4000 people. Ra.TBAs were serving 17 villages compared to only 10 villages by Conv.TBAs.

The mother and child card (M&C card) was used to monitor Ra.TBAs performance and their ability to record conditions during pregnancy, delivery and the immediate postpartum period. However, not all pregnant women who were delivered by Ra. TBA. received a M&C card. Several factors were responsible for this. Firstly, the TBA may forget to give a M & C card to the pregnant women, and secondly the health center was not providing the TBAs with enough cards. Altogether a total number of 1719 pregnant women of Ra.TBAs were given a M & C card, while 359 mothers (17.3 per cent) did not receive any card from the Ra.TBA.

Figure 7.2 Diagram of women covered in the Tanjungsari study



N.del = number of deliveries.

7.1.4. Number of deliveries by traditional birth attendant

TBAs were classified based on their workload as was proposed by Neuman et al. (1986) in the Danfa Comprehensive Rural Health and Family Planning project. In 1988 the World Health Organization (Bullough, 1986) recommended to classify TBAs based on the number of deliveries they attended per year. On this basis,3 groups can be distinguished: high load TBAs with 40 or more deliveries per year, medium load with 5-40 deliveries per year and low load with less than 5 deliveries per year.

The Tanjungsari study used a different classification, as can be seen in table 7.3. Low-load TBAs were TBAs with less than 12 deliveries per year, medium-load with a number of 12-35 deliveries per year and high-load TBAs with 36 and more deliveries per year. For this purpose only the two groups of birth attendants, the Ra.TBAs and the Conv.TBAs will be compared. It is interesting to note that the highest number of deliveries per year in the high-load TBAs was 60 deliveries. Three TBAs with this high number of deliveries were in the RA.TBA group and 2 in the Conv.TBAs. The number of high load TBAs increased to 7 in the Ra.TBA and 7 in the Conv.TBA.

Table 7.3 TBA classification based on number of deliveries per year

Classification	Ra.TBA				Conv.TBA			
TBA	1988		1989		1988		1989	
N.del/yr.	n	(%)	n	(%)	n	(%)	n	(%)
1-11	58	73.2	53	68.4	54	73.0	62	72.9
12-35	19	23.7	18	23.2	16	21.6	16	18.9
≥36	3	3.1	7	8.4	4	5.4	7	8.2
Total	80	100.0	78	100.0	74	100.0	85	100.0

N.del /yr= number deliveries/year.
n = number of TBAs

In the Ra.TBA group, 2 TBAs died because of old age and in the Conv.TBA eleven more TBAs were added as result of the annual governmental training. The increase in the number was mainly in the low-load Conv.TBAs although the percentage remains the same because of an increase in the percentage of high-load TBAs. The total number of deliveries attended by TBAs based on their classification can be seen in table 7.4. In the first year of the study, 13.5 per cent of deliveries were attendant by 3 high load Ra.TBAs, and only 36.4 per cent by 58 low load Ra.TBAs. It was interesting to find a shift in the percentage of deliveries of low-load to higher-load Ra.TBAs. In 1988, 36.4 per

cent of deliveries were attended by low load TBAs and 13.5 per cent by high load TBAs. In 1989 there was a decrease in the number of deliveries by low load Ra.TBAs, while the mean number of Ra.TBAs remained almost the same (5.8 and 6.0 deliveries per Ra.TBA in 1988 and 1989 respectively) The increase was highest in the high load Ra.TBA group (20.6 per cent) compared to the high load Conv.TBA group with an increase of 7.7 per cent. The number of deliveries in 1988 and 1989 were almost the same for low load Conv.TBAs (mean number of deliveries is 3.2 and 3.5 per Conv.TBA in 1988 and 1989 respectively). Medium-load Conv.TBAs attended the highest percentage (44.7) of deliveries in the Conv.TBA category, but this decreased in the second year. Four high load Conv.TBAs attended 30.8 per cent of deliveries in 1988, and this increased to 38.5 per cent in the second year.

Table 7.4 Number of deliveries by TBA classification

TBA classification	Ra.TBA				Conv.TBA			
	1988		1989		1988		1989	
	n	(%)	n	(%)	n	(%)	n	(%)
Low load	342	36.4	317	27.9	173	24.5	214	23.6
Medium load	471	50.1	433	38.0	315	44.7	344	37.9
High load	127	13.5	388	34.1	217	30.8	349	38.5
Total	940	100.0	1138	100.0	705	100.0	907	100.0

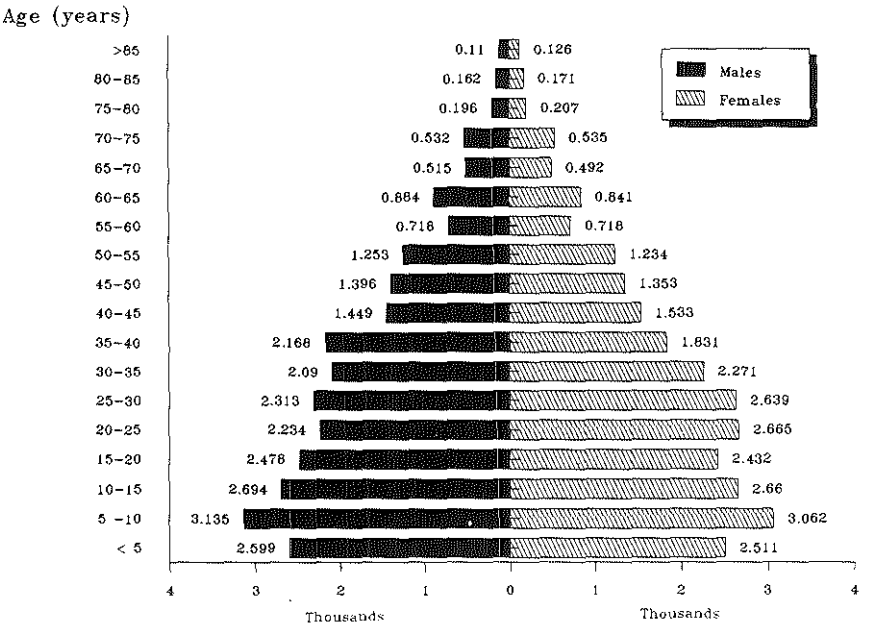
n. = number of deliveries.

7.2. Population statistics

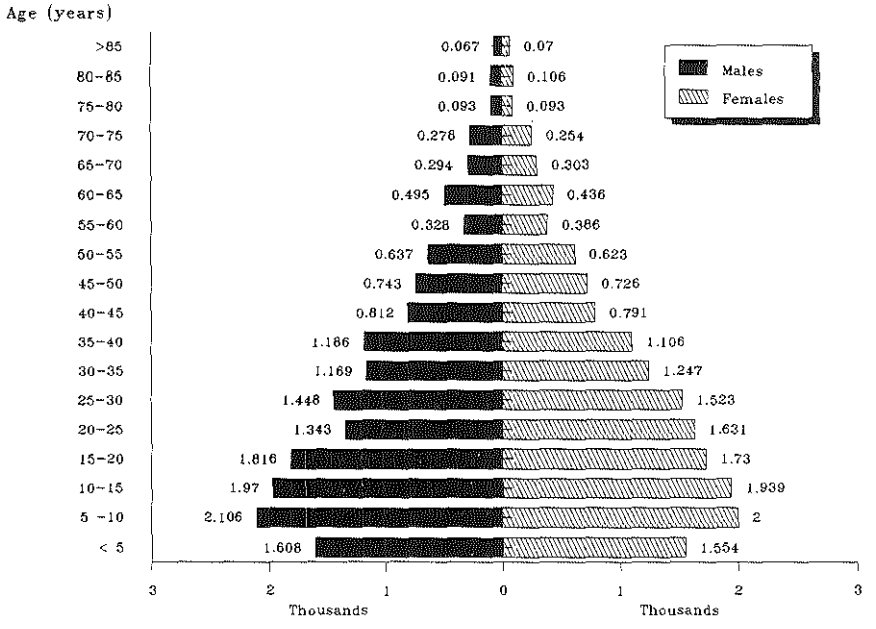
7.2.1. Demographic characteristics

The demographic data of the population in Tanjungsari are summarized in the population pyramid, taken from the 1990 census. The study area is divided in the intervention and control area. From the demographic pyramid it is shown that the control area has a smaller base compared to the intervention area (figure 7.3). Geographically the control area is in some aspects better compared to the intervention area. Villages are easily accessible from the main road and there is better transportation and communication, electricity is available in almost all villages.

FIGURE 7.3. DEMOGRAPHIC TREE FOR INTERVENTION AREA
CENSUS DATA (1990)



DEMOGRAPHIC TREE FOR CONTROL AREA
CENSUS DATA (1990)



7.2.2. Overview of the pregnant women cohort

During the study period 4400 pregnancies (less than 28 weeks of gestation) were registered. All infants born between the first of January 1988 until 31 December 1989 were included in the study. One hundred and one pregnancies terminated in an abortion (2.3 per cent), 40 cases were lost pregnancies (0.9 per cent) and lost to follow-up were 113 pregnancies or 2.6 per cent. The overview of the pregnant women cohort and its outcome can be seen in table 7.5. Lost pregnancies were cases reported as being pregnant, but not resulting in a pregnancy outcome. These "false" pregnancy cases occurred in women who suffered from imagination of being pregnant. In some cases an ultrasonography examination was carried out to exclude the possibility of an ectopic pregnancy without any positive result.

Table.7.5 Overview of pregnancy outcome of all registered women during study period

Pregnancy outcome	n	%
Miscarriage	101	2.3
Lost pregnancies	40	0.9
Deliveries (singletons)	4108	93.4
Twins (pairs)	38	0.9
Lost to follow-up	113	2.6
Total registered	4400	100.0

Out of 4108 pregnant women, 2766 women (67.3 per cent) had a previous pregnancy outcome of which 152 women (5.5 percent) reported a miscarriage. For the purpose of descriptive as well as inferential analysis in this thesis, emphasis will only be given to singleton infants.

7.2.3. Place of delivery

The proportion of home deliveries was not much different compared to the distribution of home deliveries of the previous child. Almost 90 % of all women delivered at home. The expected outcome of the effect of risk identification, that more women will deliver at the health center or the hospital is not shown in this study. This result is almost the same for Ra.TBAs as well as for Conv.TBAs.

7.3. Characteristics of pregnant women in the cohort

7.3.1. Characteristics of pregnant women

Table 7.6 A summary of risk factors (per cent) of pregnant women by TBA (singletons only, both years combined)

Risk factors		Ra.TBA	Conv.TBA	Chi-square	p-value	Others
Biological		n = 2071	n = 1612			n = 404
Mothers age	<20	14.1	16.6	4.48	0.034*	11.3
	≥35	9.5	10.7	1.35	0.245	9.2
Parity	≥5	9.0	8.7	0.10	0.753	7.0
Mother education	≤6 yrs	9.4	9.0	0.19	0.662	6.2
Birth interval	<18 mos	3.9	3.7	0.06	0.814	4.5
Socioeconomic						
Mothers occupation						
	housewife	72.7	71.3	0.87	0.350	66.1
	working	27.3	28.9	1.19	0.275	33.9
Fathers occupation						
	farmer	51.9	43.0	28.8	<0.001*	28.0
House ownership		79.2	75.4	7.6	0.006*	63.1
Unsafe water supply		48.2	38.0	38.0	<0.001*	35.6
Poor sanitation		58.4	48.2	37.7	<0.001*	31.7
Previous pregnancy.		n = 1440	n = 1079			n = 404
Abortion		4.9	5.8	1.18	0.277	7.9
Stillbirth		2.1	2.1	0.01	0.933	2.1
Early neonatal death		2.1	2.1	0.16	0.691	2.1
Cesarian section		1.3	1.3	0.00	0.950	3.8
Massive bleeding		11.7	8.9	5.04	0.024*	12.1
Breech		1.5	1.2	0.47	0.493	1.7
No tetanus vaccination		32.9	28.3	6.06	0.014*	23.8
Antenatal care						
	-midwife	72.7	83.3	132.8	<0.001*	83.0
	-TBA	21.0	14.2	28.9	<0.001*	11.3
	- no ANC	6.3	3.5	9.9	0.002*	6.7

X2 and p-values are for Ra.TBAs and Conv.TBAs only.
n = number of pregnant women
Note: see also figure 7.2.
* significant.

The purpose of a descriptive analysis is to study whether or not subjects of the three groups are different from each other. The three groups are women clients of Ra.TBAs, Conv.TBAs and of "Other" birth attendants. This section will discuss the independent variables related to outcome. The chi-square and p-values in table 7.6 is the result of

comparison of the two groups (Ra.TBAs and Conv.TBAs) only. Included in the independent variables are: maternal biological factors and mothers reproductive behaviour including the outcome of previous child, educational status, occupation, household condition and the availability of safe water and sanitation. There was in general no statistically significant difference in biological risk factors of both the Ra.TBA and Conv.TBA group except for mothers age <20 years. There were more women <20 years in the Conv.TBAs category, the difference is significant. Risk factors of previous pregnancy showed a difference in the percentage of previous massive bleeding of clients of Ra.TBAs. For antenatal care, Ra.clients had less ANC visits by midwives, they prefer more traditional birth attendants, the difference was significant. It is interesting to find significant differences of socioeconomic factors between the two groups. There were more farmers in Ra.TBAs clients and they have more unsafe watersupply and low sanitation compared to clients of Conv.TBAs. Birth attendants included in "Others" had more women of higher education and more previous cesarian sections. Their socioeconomic conditions are also better.

7.3.2. The previous pregnancy

The perinatal history of the previous child (or pregnancy) is important from two points of view. Firstly, to investigate whether previous pregnancy outcome increases the risk of an unfavourable outcome of current pregnancy and secondly, as a comparison for the outcome of the current pregnancy.

Table 7.7 Outcome of previous pregnancy (n = 2766)

Outcome	n	%
1. Miscarriage	152	5.5
2. Stillbirth	64	2.3
3. Early neonatal death	65	2.3
4. Died 7-28 days	40	1.4
5. Survive neonatal period	2445	88.5
Total	2766	100.0

Numerous reports have shown a close relationship between the number of previous miscarriages and stillbirths on the outcome of current pregnancy. There is also a general agreement that frequent miscarriages increase the risk for perinatal death and low birthweight. For the analysis of the mothers reproductive history, 2766 women were included who had at least one pregnancy with defined outcome. Miscarriage was reported

nearly twice as high (5.5%) compared to stillbirths and early neonatal death. The percentages for stillbirths and early neonatal death were the same, both were about two times higher compared to late neonatal death. This result is showing a high pregnancy wastage in this area.

Use of health services includes birth place of the child as well as the number of antenatal visits during previous pregnancy. During the interview, the question was directed to the place of delivery rather than the birth attendant, with the assumption that almost all deliveries that take place at home were either attended by a traditional birth attendant or by the family. The reliability of the answer to the question is also one factor that needs consideration. In rural communities it is sometimes difficult to find the actual birth attendant for a previous pregnancy as it may be the grandmother or a neighbour who is also a traditional birth attendant. Home delivery was reported in almost 90 per cent of the cases, grandmother's house was in second place (9.3 per cent). A very small number of TBAs also provide a place for delivery (0.2 per cent). The health center and the midwives clinic were not very popular as a delivery place in only 3.7 per cent of the cases.

It was interesting to find that - although most of antenatal care visits were provided by the midwives - still 21.0 -14.2 percent of rural women went to the TBA for antenatal care. This means that there is already a change of behaviour in the services provided by TBAs and by Ra.TBAs in particular (the difference compared to Conv.TBAs is significant). The conventional services provided by a TBA is mostly at 28 weeks pregnancy or during delivery. In many traditional societies, TBAs were not providing antenatal care at all (Peeters et al., 1986). As was found in previous studies in Indonesia, the midwife is the most preferred health care provider for antenatal care but not for delivery care. For the latter, TBAs are more preferred by rural people.
In the study area, already 67.1 percent of pregnant women, clients of Ra.TBAs and 72.7 percent of clients of Conv.TBAs had received tetanus immunization. This figure is high compared to the provincial health reports of West-Java, where less than 40 per cent were immunized against tetanus (Provincial health reports of West-Java, 1985).

Based on information from their socioeconomic conditions and previous pregnancy, clients of Ra.TBAs were showing significantly more risk factors compared to clients of Conv.TBAs.

7.4. Measurements of the effect of TBA training in the implementation of the risk approach

The fundamental principle of the risk approach is :

"Something for all, but more for those in need, and in proportion to that need."

As stated the primary concern of the risk aproach is coverage, irrespective of the level of risk. The phrase "but more for those in need" implies (1) a method for establishing priorities based on the needs of individuals and communities and (2) a tool for improving the use of health care resources to meet those needs. In this respect the risk approach is particularly suited for developing local intervention strategies (McCarthy,1991). Through the approach, it is possible to determine the appropriate content of maternal and child health and family planning interventions, where promotive and preventive activities and early health care are so important. In the field of maternal and child health, some minimal care has to be available for the majority of the population. This will make it also possible to conduct early detection of risk conditions in pregnancy, during delivery and in the immediate postnatal and postpartum care for the purpose of early referrals.

The implementation of the risk strategy in Tanjungsari is using the basic model for individual risk assessment with three levels of resource allocation. Here the primary health care provider (the traditional birth attendant) sees all members of the vulnerable group (the pregnant women) in order to be able to detect high risk cases at the grassroot level and according to a method developed for local needs. The Tanjungsari study was designed to assess the effectiveness of the implementation of the risk approach at grassroot level by traditional birth attendants. Health impact is usually difficult to measure. Such studies often require long term controlled experiments. As mentioned in chapter 6, figure 6.3, this study will use the cause-effect chain proposed by Reynolds and Gaspari (1985).

7.4.1. The effectiveness of TBA training at antenatal level

Outputs are defined as the immediate result of a program. Outputs are expected to have an effect on the target population. Effects are the immediate effects on the target population and impacts are the long term impact on the population. For this purpose the assessment will be applied at four levels, the prenatal, delivery, postnatal and the level

of the newborn. At each level the expected output is discussed, as well as the effect and the impact of the intervention. To be able to measure effectiveness of TBA training at antenatal level, three criteria will be used: the expected output, the effect and the impact of training at each level (table 7.8).

Table 7.8 Summary of effectiveness measures at antenatal level

	Criteria	Measures	(percentages)
Outputs	Pregnant women at risk	Number of pregnant women at risk identified.	Percentage of all pregnant women with a risk factor.
	Referrals of pregnant women made by TBA to healthcenter/hospital.	Number of pregnant women referred.	Pregnant women referred as percentage of all pregnant women. Pregnant women referred as percentage of all women at risk.
	Compliance with referral.	Number of women referred by Ra.TBA and other type of health care.	Complying women as a percentage of all referred.
Effects	Women using Mother & Child health card.	Number of women using a Mother & Child card.	Percentage of women keeping the card.
	Pregnant women receiving antenatal care by Ra.TBA and other type of health care.	Number of women receiving antenatal care from Ra.TBA and other type of health care.	Percentage of women receiving antenatal care from Ra.TBA and other type of health care.
	Pregnant women vaccinated against tetanus.	Number of pregnant women vaccinated against tetanus before delivery	Percentage of all pregnant women having received tetanus toxoid before delivery.
Impacts	Crude birth rate.	Number of births	Number of births per 1000 population per year.
	Birth weight of infants.	Birth weight distribution and number of low birth weight infants.	Birth weight distribution as percentage of all births. Low birth weight as percentage of all births referred.

For expected output the following criteria will be used: the number of pregnant women identified at risk per risk factor and the number of referrals made by TBA to a higher level. The effect of the TBAs training programme on the community was also evaluated

from the point of view of the pregnant woman as health care consumer, how the mother accepts a referral and her compliance with referral.

7.4.1.1. Number of pregnant women identified at risk per risk factor

As was discussed in chapter 6 (research methodology), risk factors used in this study were factors which had the highest relative risk in the previous survey in Ujung-Berung. The purpose of the intervention study was that TBAs could identify risk factors and that women would respond to the advice of the TBA, e.g. referral. Risk factors will be divided in "risk factors or risk markers" which could predict unwanted outcome (pregnancy history risk factors) and "risk conditions" or "pregnancy complications" which may have immediate effect on mortality. Previous studies have shown that the TBA as well as the pregnant woman do not consider biological and socio-economical factors as a risk. To be able to have some response to accept risk factors the women may need some time. Because of this difficulty it was decided that the intervention of the Tanjungsari study was directed to decrease risk conditions through early and promptly referral. Distribution of risk factors based on previous pregnancy history is shown in table 7.9. Included are all pregnant women with a history of previous pregnancy.

Table 7.9 Risk factors based on previous pregnancy history (years combined)

Risk factors	Birth attendant: RaTBA n	RaTBA (%*)	Conv.TBA n	Conv.TBA (%*)	Others n	Others (%*)	Total n	Total (%*)
Abortion	70	4.9	63	5.8	19	7.9	152	5.5
Stillbirth	30	2.1	23	2.1	11	4.6	64	2.3
Early neonatal death	30	2.1	25	2.1	10	4.2	65	2.4
Massive bleeding	168	11.7	96	8.9	29	12.1	293	10.6
Previous cesarean section	13	0.9	10	0.9	6	2.5	29	1.1
Breech delivery	22	1.5	13	1.2	4	1.7	39	1.4
Total reported	333		230		79		642	
Total women	1440		1079		239		2758	

* calculated to total women in each group
n = number of women
Some women may have more than one risk factor(e.g. cesarean section and bleeding)

There were 333 cases reported by Ra.TBA, 230 and 79 cases by Conv.TBA and "Others" respectively. This table shows the prevalence of each risk factor in the study population.

Previous massive bleeding was reported in 10.6 per cent of total pregnant women. Massive bleeding was also highest in all three groups. Early neonatal death and stillbirth show the same prevalence. Previous abortion was twice as high and previous cesarean section ranges from 0.9-2.5 per cent with "Others" showing the highest prevalence. Contrary to expectation breech delivery was lower than the expected percentage of about 3 per cent (Alisjahbana et al., 1983), this may be due to under reporting.

Because one woman may have more than one risk factor, table 7.10 will give a better picture of the health status of pregnant women in the study area .

Table 7.10 Number of women with risk factors based on previous history (years combined)

Risk factors	Birth attendant							
	Ra.TBA		Conv.TBA		Others		Total	
	n	(%)	n	(%)	n	(%)	n	(%)
(-)	1157	80.3	876	81.2	180	75.3	2213	80.2
1	225	15.6	174	16.1	40	16.7	439	15.9
2	53	3.7	22	2.0	14	5.9	89	3.2
3+	5	0.3	7	0.6	5	2.1	17	0.7
Total women	1440		1079		239		2758	
Need referral	283	19.7	203	18.8	59	24.7	545	19.8

Clients of Ra.TBAs have a higher percentage of risk factors based on previous history. The difference in the number of women clients of Ra.TBAs and Conv.TBAs who were in need for referral was not significant (X2 = 0.28, p= 0.597).

During the follow-up some pregnant women may develop a pregnancy complications that may result in an unwanted outcome. The interviewers questioned the women concerning this matter, the result of the questionnaire can be seen in table 7.11 and 7.12. Risk condition of current pregnancy gives a picture of the morbidity pattern in the prenatal period, except for tetanus vaccination. The latter was included because without tetanus vaccination the women and infants are at risk developing tetanus known to result in a high perinatal and maternal mortality. Table 7.11 shows that in general "no weight increase" had the highest incidence in the prenatal period. This information has to be to taken with caution because it is based on a layman report. It also depends on the time difference as can be seen from the questionnaire: " Did you gain weight since the last

interview". Second highest is edema and fever lasting more than 3 days. There was not much difference in the morbidity pattern between clients of Ra.TBAs and Conv.TBAs, except that no weight-increase and edema were higher in clients of Conv.TBAs.

Table 7.11 Antepartum risk condition of women by birth attendant (years combined)

Risk condition as reported by women.	Birth attendant Ra.TBA n =2078	Conv.TBA n =1612	Others n =406	Total n = 4096
No weight increase	216 (10.4)	214 (13.3)	37 (9.1)	512 (12.6)
Vaginal bleeding	52 (2.5)	5 (0.3)	33 (8.1)	136 (3.3)
Fever >3 days	127 (6.1)	117 (7.3)	27 (6.7)	271 (6.6)
Cough & dyspnoe	90 (4.3)	70 (4.3)	23 (5.7)	183 (4.5)
Edema	169 (8.1)	174 (10.8)	74 (18.2)	417 (10.2)
No tetanus immunization	187 (8.9)	106 (6.6)	17 (4.2)	310 (7.6)
Total reported	841	723	211	1784

n= number of women, one woman may have more than one risk factor
( ) specific antepartum morbidity in per cent from total women in the same group.

Number of risk conditions per woman in the antenatal period is better presented in table 7.12. More than 27 per cent of pregnant women in the Ra.TBA group had one and more risk conditions during pregnancy while in the Conv.TBA and " Others" it is 32.7 percent and 39.2 percent respectively. Less women clients of Ra.TBAs were in need for referral compared to clients of Conv.TBAs, the difference is significant. ($X2=7.70$, $p<0.0001$).

Table 7.12 Antepartum morbidity by number of risk condition per woman

Risk condition	Ra.TBA n	Ra.TBA %	Conv.TBA n	Conv.TBA %	Others. n	Others. %	Total n	Total %
(-)	1516	73.0	1085	67.2	247	60.9	2848	69.5
1	459	22.0	432	26.8	129	31.8	1020	24.9
2	91	4.4	79	4.9	22	5.4	192	4.7
3 +	12	0.6	16	1.1	8	1.9	36	0.9
Total	2078	100.0	1612	100.0	406	100.0	4096	100.0
Need referral	562	27.1	527	32.7	159	39.2	1248	30.5

n = number of deliveries.

7.4.1.2. Referrals by traditional birth attendants

Referrals by TBAs are the most important process variable in the risk approach study. The analysis of the data will be described by type of birth attendant, according to the stage of pregnancy and by year of observation where appropriate. During the training period Ra.TBAs were taught to identify and refer pregnant women with one or more risk conditions to an appropriate level of health care.

Table 7.13 Number of women in need for referral based on previous history and risk condition during the antepartum period and referred

	Birth attendant							
	Ra.TBA		Conv.TBA		Others		Total	
	n	(%)	n	(%)	n	(%)	n	(%)
Pregnancy history								
Need referral	283		302		59		644	
Referred	151	53.4	97	47.7	25	42.4	273	42.4
Antepartum risk condition								
Need referral	562		527		159		1248	
Referred	421	75.1	237	44.9	61	38.4	719	57.6

n = number of deliveries.

Referrals made by TBAs based on previous history and on risk conditions found during current pregnancy can be seen in table 7.13 .

Table 7.14 Number and reasons for referral based on previous history

Reason	Birth attendant							
	RaTBA		Conv.TBA		Others		Total	
	n	(%)	n	(%)	n	(%)	n	(%)
Previous stillbirth	3	(2.0)	2	(2.1)	-	(0.0)	5	(1.8)
Previous miscarriage	3	(2.0)	4	(4.1)	1	(4.0)	8	(2.9)
Previous cesarean section	-	(0.0)	1	(1.0)	-	(0.0)	1	(0.4)
More than 2 reasons	10	(6.6)	17	(17.5)	4	(16.0)	31	(11.4)
Other reason	5	(3.3)	4	(4.1)	1	(4.0)	10	(3.7)
Tetanus immunization	130	(86.1)	69	(71.2)	19	(76.0)	218	(79.9)
Total referred	151	(100.0)	97	(100.0)	25	(100.0)	273	(100.0)

n =number of deliveries.

Ra.TBAs were referring more cases than the Conv.TBAs and "Others. Table 7.14 shows

the reasons for referral because of poor pregnancy history such as previous stillbirth, miscarriage and previous cesarean section. It can be seen that Ra.TBAs were referring more mothers to the health center. Table 7.15 shows the reasons for antepartum referral. As expected referrals for tetanus immunization are high in both the TBAs groups. Why health personnel still refer clients for immnunization is probably due to the fact that they do not have vaccine available in their private praxis.

Table 7.15 Number and reasons for antepartum referral

Reason	Birth attendant RaTBA n	(%)	Conv.TBA n	(%)	Others n	(%)	Total n	(%)
Too short	5	1.2	1	0.4	2	3.3	8	1.2
Weight too low	10	2.4	-	-	4	6.4	14	1.9
Arm too thin	1	0.2	1	0.4	-	-	2	0.3
Accident	5	1.2	7	3.0	2	3.3	14	1.9
Edema	13	3.1	10	4.3	8	13.2	31	4.3
Vaginal bleeding	5	1.2	3	1.3	4	6.6	12	1.7
Fever > 3days	8	1.8	8	3.4	3	4.9	19	2.6
Cough and dyspnoea	14	3.3	6	2.5	2	3.3	22	3.1
No weight increase	2	0.4	2	0.8	1	1.6	5	0.7
Tetanus immunization	358	85.0	199	83.9	35	57.4	592	82.3
Total referred	421	100.0	237	100.0	61	100.0	719	100.0

7.4.1.3. Compliance to referral

The term compliance in this thesis is generally defined as following the instructions of the health care provider, in this study the TBA. Compliance can be total, partial, nil or erratic. Patients seek medical opinions about their problems and appropriate therapy, but once the patients are alone and conscious, individual patients may use all, part or none of the treatment. Factors that may play a role in the decision to follow the advice of the TBA in case of referral during pregnancy and delivery are the following :

1. extended family, in particular the husband and parents.
2. previous experiences with health facilities.
3. financial burden.
4. transportation.

The easiest strategy to assess compliance is to ask the patient (Cramer, 1991). Compliance will also give a picture of the skills of a Ra.TBA to motivate her client to go

for referral. This approach was also applied in this study. The following questions were asked to all women who were considered at risk and referred by the TBA .

Table 7.16 shows that more women clients of Ra.TBAs comply to referral compared to Conv.TBAs clients, the difference is significant (X2=17.78, p=<0.001). The same result is found for antepartum referrals (table 7.17), if women in "Others" are excluded, then more women of Ra.TBA comply to referral compared to Conv.TBA (X2= 4.66, p= 0.031).

Table 7. 16 Did you go for referral based on previous pregnancy history by birth attendant ?

Agree	Ra.TBA	Conv.TBA	Others	Total
yes	107 (64.1)	37 (37.4)	23 (76.7)	167 (56.0)
No	60 (35.9)	62 (63.6)	7 (23.3)	129 (44.0)
Total	167 (100.0)	99 (100.0)	30 (100.0)	298 (100.0)

Table 7. 17 Did you go for antepartum referral by birth attendant ?

Agree	Ra.TBA	Conv.TBA	Others	Total
yes	385 (91.4)	204 (86.1)	57 (93.4)	646 (89.8)
No	36 (8.6)	33 (13.9)	4 (6.6)	73 (10.2)
Total	421(100.0)	237(100.0)	61 (100.0)	719 (100.0)

Table 7.18 Non-compliance to referral based on pregnancy history by birth attendant

Reasons	Ra. TBA		Conv TBA		Others		Total	
	n	(%)	n	(%)	n	(%)	n	(%)
Not necessary	7	(11.7)	7	(11.5)	1	(14.3)	15	(11.7)
Too far/no transport.	3	(5.0)	3	(4.9)	-	(0.0)	6	(4.7)
Too expensive	5	(8.3)	10	(16.4)	1	(14.3)	16	(12.5)
Husband not agree	2	(3.3)	2	(3.3)	-	(0.0)	4	(3.1)
No care for children	7	(11.7)	4	(6.6)	-	(0.0)	1	(8.6)
No time	23	(38.3)	14	(23.0)	2	(28.5)	39	(30.5)
Others	13	(21.7)	21	(34.3)	3	(42.9)	37	(28.9)
Total	60	(100.0)	62	(100.0)	7	(100.0)	129	(100.0)

n = number of women

Table 7. 18 and table 7.19 give an overview of the reasons of women who were "non-compliers" to TBAs advice. The main reasons for non-compliance were "not necessary" and "no care for children". Included in "others" is a combination of reasons listed in the table and tetanus immunization. It is interesting to look at the differences of reasons for non-compliers based on previous history and the antepartum period. While in the first group "no time" has the highest prevalence, followed by "too expensive" and "not necessary". In the antepartum period the main reasons for non-compliers are "too far/no transport", "not necessary" and "too expensive". "no care for children" and "mothers condition" were among other reasons for non-complying to TBAs advice.

Table 7.19 Non-compliance to antepartum referral by birth attendant

Reasons	Ra. TBA		Conv TBA		Others		Total	
	n	(%)	n	(%)	n	(%)	n	(%)
Not necessary	9	25.0	2	6.1	-	0.0	11	15.2
Too far/no transport.	8	22.2	4	12.1	-	0.0	12	16.4
Too expensive	6	16.7	2	6.1	1	25.0	9	12.4
Husband not agree	2	5.6	-	0.0	-	0.0	2	2.7
No care for children	4	11.1	1	3.0	1	25.0	6	8.2
No time	-	0.0	3	9.1	-	0.0	3	4.1
Health personnel came	1	2.8	2	6.1	-	0.0	3	4.1
Condition of mother	2	5.6	4	12.1	-	0.0	6	8.2
Psychological factor	1	2.8	3	9.1	-	0.0	4	5.5
Health facility closed	-	0.0	2	6.1	1	25.0	3	4.1
Others	3	8.3	10	30.3	1	25.0	14	19.1
Total	36	100.0	33	100.0	4	100.0	73	100.0

n = number of women

7.4.1.4. Antenatal care

In health services, health components for intermediate outcome variables may also be used for demonstrating success. These include for example, the proportion of women seen at the first signs of pregnancy and women covered by antenatal care (ANC) services. Coverage by ANC is an important component for the effectiveness of a training program and so far it has always been considered as a tool for monitoring pregnancy (Sastrawinata, 1987; Viega et al, 1987). However some authors still question the impact of ANC on pregnancy outcome (Maine, 1991).

In the analysis the cut-off point of 3 ANC visits was taken, as recommended by the Department of Health. The result shows that the proportion of women reporting 4 and

more ANC visits was high in all groups (table 7.20). It was highest in the group "Others" followed by the Conv.TBAs. By using this cut-off point of ≤ 4 it can be seen that in 1988 the Ra.TBA group had the lowest percentage of women with 4 and more ANC visits (64.3 per cent) but this increased in the second year to 70.0 per cent showing a significant increase in ANC coverage (X2=7.45, p=0.006). In the Conv.TBA group there was no significant increase in both years (X2=0.25, p=0.618). The group "Others" had almost 100 % coverage by ANC visits. This shows that in the whole Tanjungsari area pregnant women already had a high coverage by antenatal visits. The mean number of antenatal visits of clients of Ra.TBAs and Conv.TBAs has decreased in the second year of the study and the standard deviation has also decreased, showing a smaller deviation from the mean. The mean number of ANC visits of all pregnant women in Tanjungsari during the whole study period is 6.2 (SD = 9.2).

Table 7. 20 Number of antenatal visits by birth attendant

N.visits	Ra.TBA				Conv.TBA				Others			
	1988		1989		1988		1989		1988		1989	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
0	102	10.9	53	4.8	32	7.1	39	4.3	14	7.1	1	0.5
1-3	231	24.8	281	25.2	178	10.2	242	26.7	20	10.2	35	14.6
4-8	507	54.3	669	60.1	413	48.5	495	54.6	95	48.5	109	45.4
9+	93	10.0	110	9.9	81	34.2	131	14.4	67	34.2	95	39.5
Total	933	100.0	1113	100.0	704	100.0	907	100.0	196	100.0	240	100.0
X visits		7.1		5.8		5.9		5.5		7.8		7.8
SD		13.9		7.9		8.6		5.0		9.3		4.1

In the Tanjungsari study 80.8 per cent of all pregnant women had at least one visit to a midwife during pregnancy (77.7 per cent at the health center, and 19.1 per cent to a private midwife). Although it was not clear at what stage of pregnancy, this opportunity was not used by the midwife to screen for risk factors.

In developing countries, because of shortage of medical manpower, traditional birth attendants have a crucial role to play in midwifery services. To study whether number of antenatal visits will decrease the percentage of women with pregnancy complications, the number of visits was cross tabulated to risk conditions (table 7.21). It is expected that the more ANC visits the more likely a woman with complications will be identified. For this purpose all women with reported risk conditions were asked whether her risk condition was identified by the birth attendant or midwife and whether she was referred

accordingly. The results show that there is no association between the number of ANC visits and the number of risk conditions identified and referred, although there is a tendency to identify more risk conditions the higher the number of visits.

Table 7.21 Number of pregnant women with risk condition identified and missed

	No. of ANC visit.							
	0		1-3		4-6		6+	
	n	%	n	%	n	%	n	%
No. (-) risk condition	138	70.1	686	69.6	1622	70.7	370	64.1
No. (+) risk condition identified	-	-	37	3.7	148	6.5	50	8.7
No. (+) risk condition missed	59	29.9	261	26.4	524	22.8	157	27.2
Total	197	100.0	994	100.0	2294	100.0	577	100.0

n = number of women

7.4.1.5. Tetanus Immunization

Tetanus immunization through expanded programs of immunization (EPI) was considered an indicator of process variables at the beginning of the study, because the Ra.TBAs were trained to motivate and refer a pregnant woman to the health center to receive two shots of tetanus toxoid. After 6 months of study the district health official decided to conduct a mass campaign in both areas of Tanjungsari. Therefore the result of this programme was that tetanus immunization could not be used as a process variable. Table 7.22 still gives the picture of the number of vaccinated women in the study area. It shows that there is no difference in the percentage of pregnant women immunized for tetanus. The percentages ranges from 82.5 per cent (Conv.TBA) to 89.1 per cent ("Others"). Some mothers were even vaccinated three times.

Table 7.22 Number of tetanus vaccinations by birth attendant

Number of vaccination	Ra.TBA		Conv.TBA		Others		Total	
	n	%	n	%	n	%	n	%
0	185	8.9	106	6.6	16	4.1	307	7.5
1	171	8.2	176	10.9	27	6.8	374	9.2
2-3	1717	82.8	1329	82.5	359	89.1	3405	82.3
Total	2073	100.0	1611	100.0	403	100.0	4087	100.0

Unknown 21 (0.5%)
n = number of women

7.4.1.6. The Mother & Child card

The mother & child recording and action card (M&C card) was discussed in chapter 6.4. Cases which were considered as medium risk and high risk are to be referred to either a health center or the district hospital. The availability of the card shows how much the mother values the card, whether she perceives the card as important or not. This information was collected from women whose delivery was attended by RA.TBAs only.

The M&C card was assessed using the following criteria: by the availability of the card, evaluation during the second home visit (delivery) by the interviewer and by the third visit after the 7th day postpartum. This report will evaluate only the availability of the card at delivery (table 7.23). The purpose of distributing the card was to use it as a home based recording card.

1. Can the women still show the M&C card on every interview ?

Table. 7.23 Number of women who could show a M&C card (child still alive)

Card available	at delivery	(%)
Yes	1689	81.4
No, never got one	357	17.2
Lost	30	1.4
Total	2076	100.0

The success of providing a M&C card was dependent on two factors: firstly, whether or not the mother could show any understanding of the importance of the card and secondly whether or not the card was used as a tool for monitoring risk condition, this being demonstrated by TBAs completing the card correctly. From the beginning it was hoped that the M&C card would act as an educative tool for the TBA as well as for the mother. The expected action would be a response to minimize risk factors. In general it was found that one fifth of the respondents never received a M&C card. This is probably due to the TBAs who were so old that they forgot to give a M&C card to their client. The health center was also responsible for distributing the cards to the TBAs, lack of supply at the health center may be another reason for not receiving a M&C card. Of those women who received a M&C card - at every homevisit - between 1.5 and 2 per cent of women lost

their card. This percentage is surprisingly low but further assessment is still needed, to determine whether the women are keeping the card until the child is much older. For further analysis it is necessary to know whether the characteristics of women with and without card were different. The following tables will discuss women characteristics using an not using the M&C card.

a. Characteristics of women using the mother and child card

To know whether the characteristics of pregnant women in the three categories are the same the following analysis was done (table 7.24).
The student-t test was applied to differentiate the characteristics of pregnant women, those who had a M&C card and those who did not have or had lost the card. Mothers who had a M&C card were younger compared to mothers who did not have or had lost the card, the difference is significant (t=2.54, p=0.009). For maternal education there was no significant difference between both groups (t= 1.20, p=0.231).

Table 7.24 Characteristics of mothers who were able to show a M&C card

Characteristic	M&C card (+)	M&C card (-)	lost
Total number (%)	1689 (81.3)	357 (17.2)	30 (1.4)
Mean age (SD)	25.15 (5.7)	25.81 (6.0)	28.27 (5.5)
Mean education (SD)	5.74 (2.0)	6.32 (6.6)	6.17 (2.4)

SD = standard deviation
n = number of women

b. The number of women receiving antenatal care visits

Mothers with M&C cards had more antenatal visits than mothers who did not have or lost their M&C cards (table 7.25). The difference is significant (X2=90.243, p<0.0001) also between "no" and "lost" (X2=8.972, p=0.0113). No difference in number of antenatal visits were found between "yes" and "lost" (X2=1.415, p=0.4929). The mean number of ANC visits of all pregnant women who were clients of Ra.TBAs is 6.4 (SD=11.1)

Table 7.25 Antenatal care of women with M&C card and without card*)

No. ANC visits	Yes		No		Lost	
	n	%	n	%	n	%
0-2	236	14.2	124	34.6	2	8.0
3-6	977	58.7	156	44.8	14	56.0
>6	451	27.1	68	19.6	9	36.0
Total	1664	100.0	348	100.0	25	100.0
Mean ANC visits	6.4		6.1		7.9	
SD	10.4		13.6		15.5	

*) Unknown : 37 (1.7%)
n = number of women.

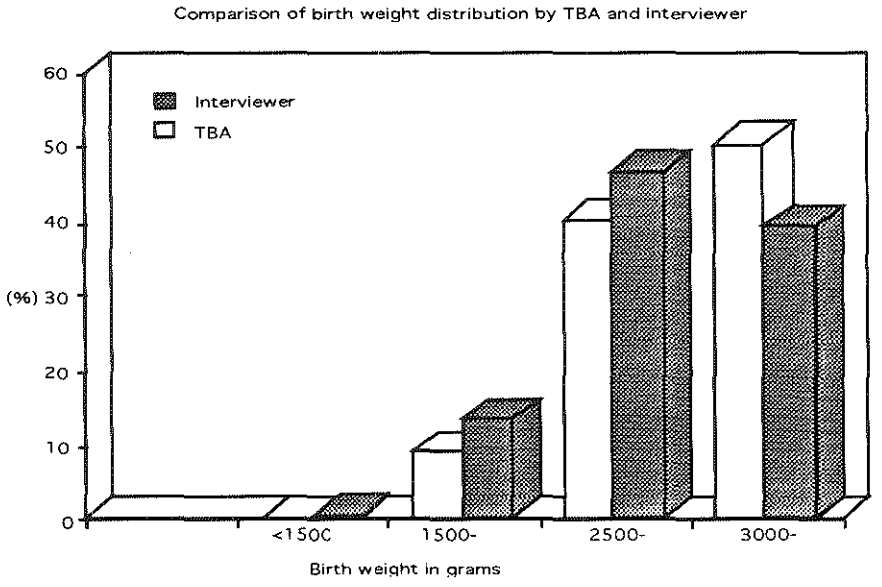
2. Are the TBAs filling in the birth weight correctly ?

The best way to find out whether the TBA is filling in the card correctly is by evaluating birth weight. In the pilot study the difficulty in measuring birth weight was already mentioned. But people in the village were becoming more aware of the importance of birth weight and parents were helping the TBAs to record birth weight on each M&C card. To study the validity of recording birth weight on the M&C card the following analysis was done. Out of 1689 mothers who could show the M&C card after delivery, only 1219 could measure and record the birth weight of liveborn infants on the card (72.2 per cent).

A comparison between both measurements, by the interviewer and by the TBA shows that the mean birth weight measured by the interviewers was 2839.4 grams (SD. 413.1) and the mean birth weight measured by the TBA was 2912.0 grams (SD. 433.8), a difference of 73.4 grams. The difference is statistically significant ($t=13.43$, $p<0.001$). The percentage of low birth weight infants were 13.9 per cent by interviewers and 9.4 per cent by TBAs which is statistically different ($X2 = 12.5$, $p< 0.001$). This means that TBAs were recording higher birth weights compared to the interviewers. One explanation may be the time of weighing and recording by the interviewer. If it is more than 24 hours after birth then the difference may be in fact due to the physiological weight lost during the first 48 hours of life. But the results show that more than 90 per cent of the interviewers measured the newborn infant within 24 hours after birth. Because weighing the newborn infants by the TBAs was unreliable, it was decided that in the following tables, birth weight recorded by interviewers will further be used in the

analysis. A birth weight distribution graph measured by interviewer and by TBA can be seen in figure 7.4.

Figure 7.4



7.4.1.7. The impact of TBA training at antepartum level

a. Birth weight distribution and low birth weight.

Birth weight is the weight of the infant measured within 48 hours after birth and is expressed in grams (Lechtig et al., 1978). Distribution of birth weight is presented for total singleton births and total singleton live births, both study years combined. The purpose for separating total and live born infants is that the latter is more useful for programme evaluation as was suggested in volume 2 of the World Health Organization publication on perinatal mortality. Official country statistics provide data for all live births, and infant mortality and maternal mortality ratios are also calculated on the basis of all live births (Puffer and Serrano, 1987). In most of the cases in the study area, birth weight was measured directly after birth, however in some cases infants weighing by research interviewers was postponed, because of difficulties to reach the infant's house. Birth weight within 48 hours after birth was not available in less than 5 % of liveborn infants. For stillbirths, birth weight was collected from the TBA who

attended the delivery and had weighed the infant. Another source of information was from the field doctor who visited a deceased infant or a low birth weight infant immediatly after receiving this information from the interviewer or from the TBA. Birth weights reported here were the result of interviewers recording. This was done because birth weight recording by Ra.TBAs was unreliable (see subsection 7.5.1.6. the Mother & child card). To evaluate the accuracy of data collection, it is important to know the time at which the interviewer took the measurement. The closer it is to the time of delivery the more accurate is the result. Several cross checks during weighing were done by the principal investigator and the research team. Special attention was given to the way the weighing scale was held at eyelevel and read by the interviewer.

Tabel 7.26 The difference in time after birth at which the birth weight was measured by the interviewer (all liveborn infants)

Hours after birth	Number	per cent
< 24	3323	90.6
24 - <48	179	4.9
48 - <72	40	1.1
≥ 72	126	3.4
Total	3668	100.0

From table 7.26 it can be seen that more than 95 per cent of infants were weighed within 48 hours after birth. The mean birth weight of the entire infant population measured within 24 hours after birth was 2854 grams, and a low birth weight rate of 13.2 per cent, while all infants irrespective of time of weighing showed a mean birthweight of 2852.0 grams and a low birth weight rate of 13.5 per cent (no significant difference).

The mean birth weight and percentage of LBW during two consecutive years by birth attendant can be seen in table 7.27. In both years, mean birth weight was lower in infants of Ra.TBAs compared to Conv.TBAs infants. There was a higher mean birth weight of almost 80 gram in the group "Others", but that decreased in the second year of study. Infants of Conv.TBAs showed a decrease in the percentage of low birth weight infants. This is not shown in infants of Ra.TBA and "Others".

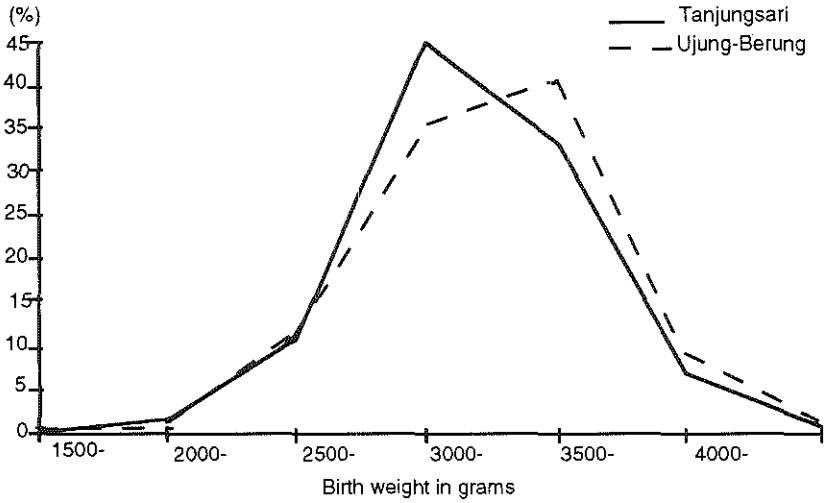
Table 7.27 Mean birth weight (grams) and percentage of LBW of liveborn singleton infants by birth attendant measured within the first 24 hours of life

	1988				1989			
	n	Mean	(SD)	LBW(%)	n	Mean	(SD)	LBW(%)
Ra.TBA	860	2850.4	408.7	13.6	970	2845.3	411.1	13.9
Conv.TBA	635	2859.3	444.5	14.7	793	2854.4	397.2	12.0
Others	145	2937.5	412.1	8.3	126	2846.4	463.7	14.3
Unclassified	6	2716.7	549.2	25.0	2	-	-	-

SD. = standard deviation.
n = number of liveborn infants

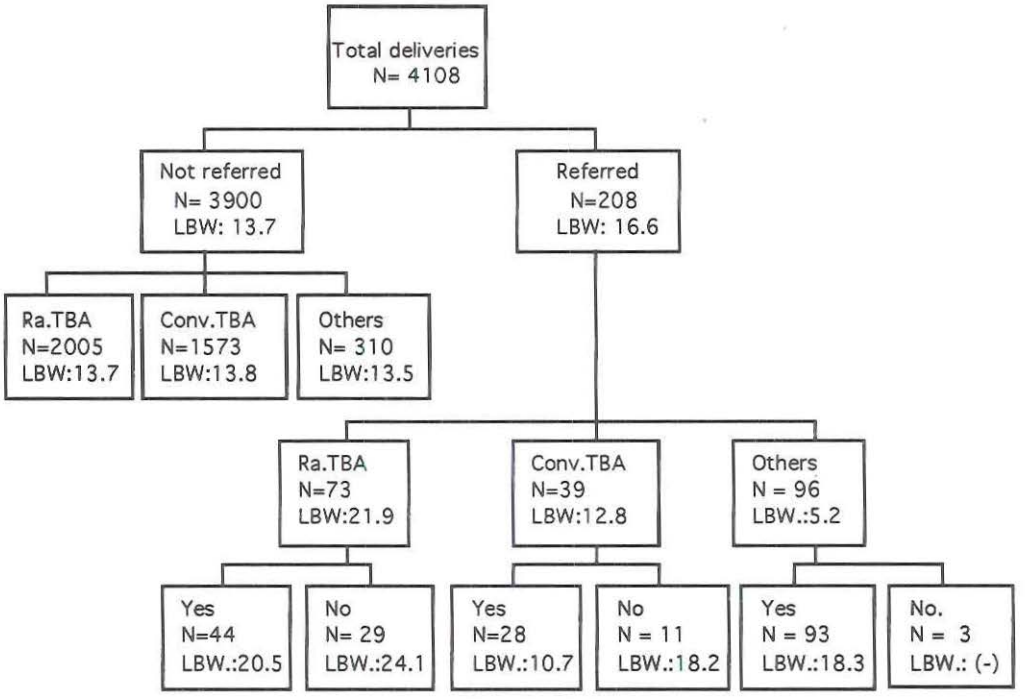
Figure 7.5.

Birth weight distribution of singleton infants in Tanjungsari (1988-1989) and Ujung-Berung (1978-1980)



Birth weight distribution of liveborn infants of the total population in Tanjungsari can be seen in figure 7.5. The distribution for total births from the Ujung-Berung survey in 1978-1988, is added for comparison of the birth weight patterns (Alisjahbana et al., 1983). The shift to lower birth weights is clear although there was a difference of ten years between both studies. To study the incidence of low birth weight infants in the Tanjungsari intervention study, a diagram was developed to control for referrals (figure 7.6)

Figure 7.6 Overview of delivery referrals and low birth weight incidence (both years combined)



The total incidence of low birth weight infants in the non-referred cases compared to the referral cases is 13.7 and 16.6 percent respectively, the difference is not significant (X2=1.63 p=0.202). It is interesting to note that the incidence of LBW in the non-referrals was almost the same in the three groups ranging from 13.5-13.8 per cent. For the referral cases a quite different picture is shown. The incidence of low birth weight for Ra.TBA referrals is 21.9 per cent, which is significantly higher than the non-referrals of the same group (X2=3.93, p=0.047). In the Conv.TBAs the incidence of low birth weight is 12.8 per cent, this is lower than the non-referrals of Conv.TBAs. For the group "Others" the incidence of LBW is 17.7 per cent. There is also a difference between compliers and non-compliers, showing higher low birth rates in non-compliers ("no") except in the group "Others". Several conclusions can be drawn from this result; firstly the Ra.TBAs were probably referring cases too late or the Conv.TBAs were referring low risk women. For the group of "Others", there is the possibility of applying some intervention by health personnel -before delivery- to the risk women which may result in a better outcome.

b. Birth weight distribution of women clients of Ra.TBAs

Low birth weight (LBW) rate was calculated for the two groups indicating that women who could show a card had 11.9 per cent of LBW infants (table 7.28). Women who had no card had higher rates of LBW. There was a significant difference between the incidence of low birth weight infants between the two groups (X2 =4.26, p=0.039).

Table 7.28 Birth weight distribution of infants of mothers who could show a M&C card.

Birth weight (gram)	Could show n	%	Don't have & lost n	%
<2500	142	11.9	68	17.8
≥2500	1042	88.1	324	82.2
Total	1184	100.0	382	100.0

Unknown : 182 (8.7 %)
()= percentage.

One way to assess the impact of the training is the ability to use the M&C card as a recording card for TBAs. The M&C card was designed as a recording and action card for both TBAs and the mother. Were the TBAs filling in the card correctly? Anthropometric measurements of the mother were taken out of the cards the result showed that out of 1689 women who could show a M&C card this information was available for mothers height in 68.7 per cent. For mid upper arm circumference it was 67.3 per cent and for weight it was 61 per cent. Not all TBAs could fill in the card completely for anthropometric measurements.

Maternal nutritional variables were collected from the M&C card of each woman. The cut-off points of antropometric measurements were already discussed in chapter 5. Weight increase during pregnancy was recorded from the M&C card using the difference between two or more recordings. Therefore an assessment of the mothers weight increase was not specifically directed on how much the weight increased in kilograms but more or less on their ability to draw a line between 2 weight measurements and whether the line is going up, straight or down. A difference between antropometric variables and low birth weight was significant only for MUAC, for height and weight-increase there was no significant difference. This was expected for height. Due to an observer error - the difficulty to record weight of mother on the M&C card by TBAs - analysis of weight

increase may give a wrong picture of the true values (table 7.29).

Table 7. 29 Relationship between maternal nutritional variables and low birthweight

Anthropometric variables	Birth weight (gram) <2500 n	%	≥2500 n	%	chi-square	p-value
Height<145 cm	27	(18.6)	118	(81.4)	1.704	0.1918
≥145 cm	147	(14.5)	868	(85.4)		
MUAC <22 cm	29	(29.9)	68	(70.1)	18.017	0.0002*
≥22 cm	143	(13.7)	897	(86.2)		
Weight increase						
no	40	(11.2)	303	(85.1)	1.923	0.1655
yes	238	(14.1)	1401	(83.1)		

MUAC= Mid-upper arm circumference.
* significant

A comparison of the incidence of low birth weight of three different groups can be seen in table 7.30. The incidence of LBW of clients of Ra.TBAs who could show a card was 11.9 per cent. This is lower but not significantly different compared to those who did not have or lost the card (17.8 per cent). The Conv.TBAs reported an incidence of 13.2 per cent low birth weight but the difference to infants of Ra.TBAs with a M&C card was not significant (X2= 1.38, p =0.24).

Table 7.30. The incidence of low birth weight in clients of Ra.TBAs and Conv. TBAs

	Number of women	LBW (%)
Ra.TBA		
M&C card (+)	1689	11.9
M&C card (-)	382	17.8
Conv. TBAs	1428	13.2

LBW = low birth weight

c. Birth rate

Birth rate per total population was compared for both the intervention area, where almost all TBAs were trained in the risk identification, and the control area where the

conventional TBAs live. The birth rate in the study area was calculated during the census in 1990. After the risk approach intervention the birth rate was 2.3 per cent in the intervention area compared to 2.7 per cent in the control area. The difference is statistically significant ($X2=302.9$, $p<0.0001$). Unfortunately there was no information of the birth rate before the intervention had started.

7.4.2. The effectiveness of TBA training at delivery level

Included in this section is the morbidity pattern (risk condition) of pregnant women immediately before and during delivery. Output criteria which will be discussed are perinatal mortality by birth attendant as well as by birth weight. The number of mothers at risk per risk condition will be presented as a percentage of all pregnant women. For effect measurements the number of referrals as percentage of risk condition is used. Another indicator of effect measurement is compliance to delivery referral.

Table 7.31 Summary of effectiveness measures at the delivery level.

	Criteria	Measures	(percentages)
Outputs.	Mothers at risk identified	Number of mothers at risk per risk condition.	Percentage of all mothers at risk per risk condition.
Effects.	Referrals of mothers made by Ra.TBA and other health care provider to health center or hospital.	Number of mothers referred	Number of referrals as a percentage of all mothers. Number of all mothers as a percentage of all mothers at risk.
	Compliance with referral.	Number of referred (by TBA) mothers complying at health center.	Complying mothers as a percentage of all referred
Impacts.	Perinatal mortality (pregnancy outcome)	Number of abortions, stillbirths and early neonatal deaths	Number of abortions, stillbirths/1000 births. Number of stillbirths and early neonatal deaths/ 1000 live births.
	Birth weight specific perinatal mortality rates.	Number of perinatal deaths per birth weight category.	Number of perinatal deaths of specific birth weight/1000 births per birth weight category.
	Perinatal mortality of referrals.	Number of perinatal deaths of referred mothers.	Number of perinatal deaths/1000 births of referred mothers.
	Perinatal mortality of breech delivery.	Number of perinatal deaths in breech delivery.	Number of perinatal deaths in breech delivery / 1000 births.

Table 7.31 presents a summary of effectiveness measurements during delivery. Also here, criteria of measurement are divided into output criteria, effects and impact criteria. The impact of training at delivery level will include more output variables

such as perinatal mortality, birth weight specific perinatal mortality, causes of perinatal mortality.

7.4.2.1. Number of women at risk identified

Intrapartum morbidity was collected retrospectively within 48 hours after delivery using questionnaire 2. The question was directed to the mother and in case of a mothers death to the family or the birth attendant who attended the delivery. The following result was found.

Table 7.32 Incidence and pattern of intra-partum morbidity.

Risk condition	Birth attendant Ra.TBA n=2078	Conv.TBA n=1612	Others n=406	Total n=4096
Breech	54 (2.5)	50 (3.1)	28 (6.9)	132 (3.2)
Prolonged labour	61 (2.9)	53 (3.3)	87 (21.4)	202 (4.9)
Convulsion	27 (1.3)	9 (1.2)	20 (4.9)	67 (1.6)
Massive bleeding	326 (15.7)	181 (11.2)	67 (16.5)	575 (14.0)
Fever during labour	43 (2.1)	60 (3.7)	22 (5.4)	127 (3.1)
Foul discharge	44 (2.1)	10 (0.6)	9 (2.2)	63 (1.5)
Total*	555	373	233	1161

*One woman may have more than one risk factor.
() per cent morbidity in same group.
n = number of women

Table 7.32 shows that massive bleeding was reported by 14.0 per cent of pregnant woman, the second highest incidence is prolonged labour (4.9 per cent). Because the questionnaires were directed at women's knowledge of morbidity it has to be seen whether those who reported massive bleeding were younger and of first parity. This is because women of first parity do not have enough experience and her knowledge of quantity of blood loss may be different from that of TBAs. Table 7.32 may give a wrong impression of the number of women who complain about a risk condition. Therefore table 7.33 will give a better picture of the real situation. It shows that clients of Ra.TBA were reporting more women in need for referral compared to Conv.TBAs (23.3 % versus 19.3 %), the difference is significant (X2=8.51, p=0.035). The group "Others"have the highest number of cases (41.1 per cent). This is expected because in"Others" are included referrals from the TBAs.

Table 7.33 The incidence of intrapartum morbidity per woman

N.condition	Ra.TBA		Conv.TBA		Others		Total	
	n	(%)	n	(%)	n	(%)	n	(%)
(-)	1593	76.7	300	80.6	239	58.9	3132	76.5
1	426	20.5	264	16.4	119	29.3	809	19.7
2	49	2.4	39	2.4	35	8.6	123	3.0
3+	10	0.4	9	0.5	13	3.2	32	0.8
Total	2078	100.0	1612	100.0	406	100.0	4096	100.0
Need referral	485	23.3	312	19.3	167	41.1	964	23.5
Referred	73	15.1	39	12.5	96	57.5	208	21.6

n = number of women

Referrals made by Ra.TBAs are slightly higher than Conv.TBAs (15.1 % versus 12.5 %) however both groups have less referrals compared to "Others". No statistical difference in the number of referrals by Ra.TBAs and Conv.TBAs was found (X2= 1.02, p=0.312).

7.4.2.2. Delivery referrals by TBAs

Table 7.34 Delivery referrals by risk condition as percentage of total women with the same risk condition.

Risk condition	Per cent referred			
No.referred	Ra TBA n=73	Conv TBA n=39	Others n=96	Total n=208
Breech	13.0	2.0	28.6	12.1
Prolonged labour	9.8	7.5	41.1	22.8
Convulsion	7.4	0.0	25.0	10.4
Massive bleeding	4.9	3.9	9.0	5.0
Fever during labour	2.3	3.3	13.6	4.6
Foul discharge.	2.3	0.0	11.1	3.2

n = number of women

Table 7.34 shows that women with massive bleeding which has the highest incidence, were less often referred compared to women with prolonged labour even in the category "Others"(table 7.32 and 7.34). Ra.TBAs were referring more women with breech compared to Conv.TBAs. The same result was found for prolonged labour. Convulsion during pregnancy was reported only by clients of RA.TBAs, there were no referrals from

Conv.TBAs.

7.4.2.3. Compliance to referral

The same method of evaluation as was carried out at antenatal level was applied at delivery level. Table 7.35 gives a picture of the percentace of compliance to referral. Here again the question was asked whether the women did go to the place they were referred to. The result shows that more clients of Conv.TBAs were complying to the TBAs advice compared to the clients of Ra.TBAs, but the difference is not significant (X2=1.46, p=0.228). As expected the clients of health personnel ("Others") showed the highest compliance rate (96.9 per cent).

Table 7.35 Did you go for labour referral by birth attendant ?

Agree	Ra.TBA		Conv.TBA		Others		Total	
	n	%	n	%	n	%	n	%
yes	44	60.3	28	71.8	93	96.9	165	79.5
No	29	39.7	11	28.2	3	3.1	43	20.5
Total	73	100.0	39	100.0	96	100.0	208	100.0

n= number of women.

Table 7.36 Non-compliance to delivery referral by birth attendant

Reasons	Ra. TBA		Conv TBA		Others		Total	
	n	(%)	n	(%)	n	(%)	n	(%)
Not necessary	6	20.7	3	27.3	-	0.0	9	20.9
No transportation	2	6.9	1	9.1	1	33.3	4	9.3
Too expensive	6	20.7	-	0.0	-	0.0	6	14.0
Husband not agree	2	6.9	1	9.1	-	0.0	3	7.0
Too sick	6	20.7	4	36.4	-	0.0	10	23.3
Died before leaving	1	3.4	-	0.0	-	0.0	1	2.3
Health personnel came	2	6.9	1	9.1	1	33.3	4	9.3
Mother went to private midwife	3	10.3	1	9.1	1	33.3	5	11.6
Prefer own tradition	1	3.4	-	0.0	-	0.0	1	2.3
Total	29	100.0	11	100.0	3	100.0	43	100.0

n = number of women

Reasons for non-compliance were analysed in table 7.36. In general," feeling too sick"

was the main complain (23.3 per cent), followed by "not necessary" (20.9 per cent) and "too expensive" (14.0 per cent). In four occasions women were referred but the health personnel came over to their house. It is interesting to find that "husband not agree" covers only 7.0 per cent as reason for non-compliance. The difference in attitude between clients of Ra.TBAs and Conv.TBAs may be due to problems such as transportation and communication beside the cost as was mentioned by clients of Ra.TBAS. Compared to the control area, the geographic condition of the intervention area where most of the Ra.TBAs live and work is worse and people are poorer.

7.4.2.4. The impact of TBA training at delivery level

The impact of training TBAs at delivery level was evaluated using the following criteria: abortion rate, perinatal mortality rate, birth weight specific mortality rates and perinatal mortality rates of referrals and non-referrals.

a. Abortion rate

The definition of abortion rate is the number of abortions per woman in the reproductive period (Last, 1988). During the two year period of study, 101 cases of abortions were reported, an abortion rate of 0.8 per cent. Based on the total number of pregnant women registered in the cohort the incidence was 2.3 per cent or 24.5 per thousand births. Because most of the abortions were reported as spontaneous abortion or miscarriage, it was difficult to categorize abortions into type of birth attendant. This figure may be underestimated, because not all pregnant women were registered in the first trimester of pregnancy. There is also a shyness among the women especially among the very young and older women to report a pregnancy before it is apparent physically. Out of the 101 cases, 54.5 per cent were reported from the intervention area and 45.5 from the control area. Calculated on total population, the incidence of abortion is the same in both areas.

b. Perinatal mortality rate

This last section will describe the impact of training on outcome of current pregnancy, complications (and morbidity) during pregnancy, delivery and causes of perinatal, neonatal and maternal deaths. From the figures for stillbirths it can be seen that the

stillbirth rate for Ra.TBA is lowest compared to Conv.TBA and "Others", but the difference is not significant (X2=0.13, p=0.715). The stillbirth rate for the total population is 23.6 per thousand births (table 7.37).

Table 7.37 Rates of pregnancy outcome by birth attendant

Pregnancy outcome	Ra.TBA	Conv.TBA	Others	Total
Stillbirths*	19.8	21.1	54.5	23.6
Livebirths*	980.2	978.9	945.5	972.4

*) per 1000 deliveries.

Perinatal mortality is one of the impact variables that was considered important for the study. Perinatal mortality is a crude outcome variable because many factors may play a role, the most important being birth weight. This section will first discuss perinatal mortality in general comparing groups of birth attendant followed by analysis in relation to birth weight. The reason for analysing in relation to birth weight is that traditional birth attendants are more involved in intrapartum care and postpartum care. It is expected that with better care and guidance during delivery the number of stillbirths caused by intrapartum asphyxia will decrease, particularly for big babies. The definition of big babies is based on birth weight distribution of Indonesian babies by using the 97 percentile (unpublished data).

Table 7.38 Perinatal mortality rate per thousand births by year and birth attendant.

	1988				1989			
Birth attendant	n	SBR	ENDR	PMR	n	SBR	ENDR	PMR
Ra.TBAs	939	19.7	25.9	40.5	1138	21.1	16.3	37.1
Conv.TBA	705	21.3	34.9	55.5	907	20.0	13.5	33.3
Others	192	67.7	7.3	93.8	214	33.0	58.5	89.6
Unclassified	9	111.1	125.0	222.2	3	-	-	-
Total	1845	23.3	30.0	52.7	2262	21.8	19.0	40.5

n= number of infants
SBR = stillbirth rate per thousand births.
ENDR = early neonatal death rate per thousand live births.
PMR= perinatal mortality rate per thousand births.

The general results of perinatal mortality rates in Tanjungsari can be seen in table 7.38. Infants born in 1988 by Ra.TBAs had already lower perinatal mortality rates compared

to Conv.TBAs infants and "Others". In 1989 deliveries attended by Ra TBAs showed a decrease in perinatal mortality rate from 40.5 to 37.1 per thousand births, a decrease of 3.4 per thousand births, the difference is not significant (X2=2.05, p=0.152). More infants of Conv. TBAs survived the perinatal period in the second year compared to the first year (perinatal mortality rates 55.5 versus 33.3 per thousand births) a decrease of 22.2 per thousand births, the difference is not significant (X2=1.86, p=0.172). For the general population the perinatal mortality rates showed a decrease of 12.2 per thousand births, the difference is not significant (X2=3.54, p=0.059).

Does training of TBAs improve perinatal mortality? To study the relationship of perinatal mortality rate, infants of the three groups were compared. The first group were infants of clients of Ra.TBAs who could show a M&C card, the second group were infants of clients Ra.TBAs who could not show or lost the M&C card and the last group were infants of clients of Conv.TBAs (table 7.39). More perinatal deaths occurred in the Conv.TBAs group but the difference is statistically not significant (X2=1.60, p=0.206). The question remains whether infants of mothers with M&C card were different from those who has no M&C card. According to table 7.23 (section 7.4.1.6) there is no difference in the mean age of women with a M&C card and those without.

Table 7.39. The perinatal mortality rate of infants of clients of Ra.TBAs and Conv. TBAs (both years combined)

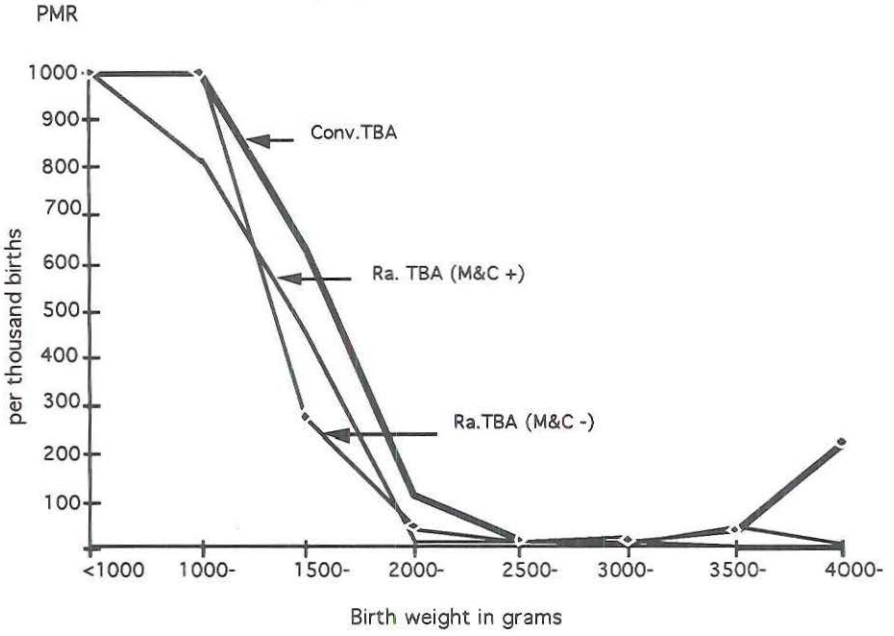
	Number of women	PMR(‰)
Ra.TBA		
M&C card (+)	1684	34.4
M&C card (-)	380	47.4
Conv. TBAs	1612	42.8

PMR = perinatal mortality rate per thousand births.

The pattern of infant mortality by birth weight appears to be similar in many studies in the literature with the lowest death rates occurring among newborns with birth weight of more than 2500 gram (Puffer and Serrano, 1987).

Figure 7.7

Birth weight specific perinatal mortality rate in three groups



The same trend was found in the Tanjungsari study (figure 7.7). High mortality rate for the smaller infants can be seen in all groups, the lowest perinatal mortality rate found for infants between 2500-3500 gram. Perinatal death was higher in infants wi a birth weight of more than 3500 gram. Compared to perinatal mortality rate, bi weight specific mortality (BWSM) may give a better picture of the real situation.

c. Birth weight specific perinatal mortality rate

For calculating birth weight specific mortality (BWSM) rate, infants were grouped according to birth weight e.g. 1000-<2500 grams, 2500-<3500 grams and more than 3500 grams. The following result can be seen in table 7.40. Several interesting findings can be seen. In the first year of study perinatal mortality rate of Ra.TBAs infants ≥3500 grams was 15.6 per thousand births and perinatal mortality declined to zero in the second year. In infants of Conv.TBAs with a birthweight of ≥3500 gram, perinatal mortality rate was 69.8 per thousand births in the first year and decreased to 35.1 per thousand births in the second year.

Table 7.40 Birth weight specific mortality rates* during two consecutive years by birth attendant

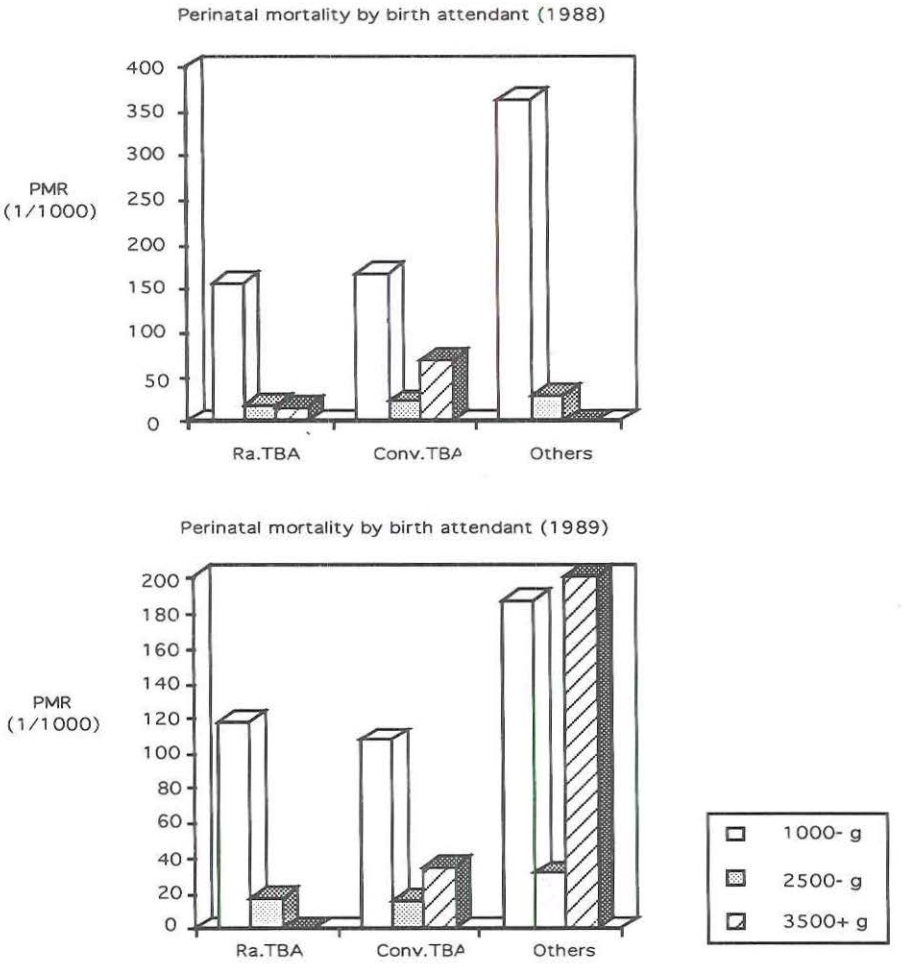
Birthweight (grams)	Perinatal mortality rates					
	1988			1989		
	Ra.TBA	Conv.TBA	Others	Ra.TBA	Conv.TBA	Others
1000-	157.9	168.2	363.6	117.6	108.1	187.5
2500-	18.1	21.4	29.9	17.2	15.7	31.3
3500+	15.6	69.8	0.0	0.0	35.1	200.0
Total	38.3	48.7	69.4	30.0	26.5	74.3

* per thousand births
Note : Unknown birthweight 149 infants (3.6 per cent).

However the number of infants were too small for statistical analysis. Why should the study concentrate on the bigger babies? Bigger babies have in fact the best survival rate, but they may have problems related to prolonged labour resulting in birth trauma or neonatal infections. Some authors use birth weight specific mortality rates of babies ≥ 2500 g as an indication of quality obstetric care (Chalmers, 1980; Roosmalen, 1989).

An overall decline in perinatal mortality was found in all groups within two consecutive years, except for birthweight ≥3500 grams for infants attended by "Others". The trend of decreasing perinatal mortality rate was particularly seen in the Ra.TBA group. If the impact of newly acquired skills of TBAs can be seen in the perinatal mortality rate of big babies, then Ra.TBAs performed better delivery care compared to Conv.TBAs. No stillbirths occurred in the first year and no perinatal death occurred in the second year of observation in infants delivered by Ra.TBAs. A graphic distribution of BWSM can be seen in figure.7.8.

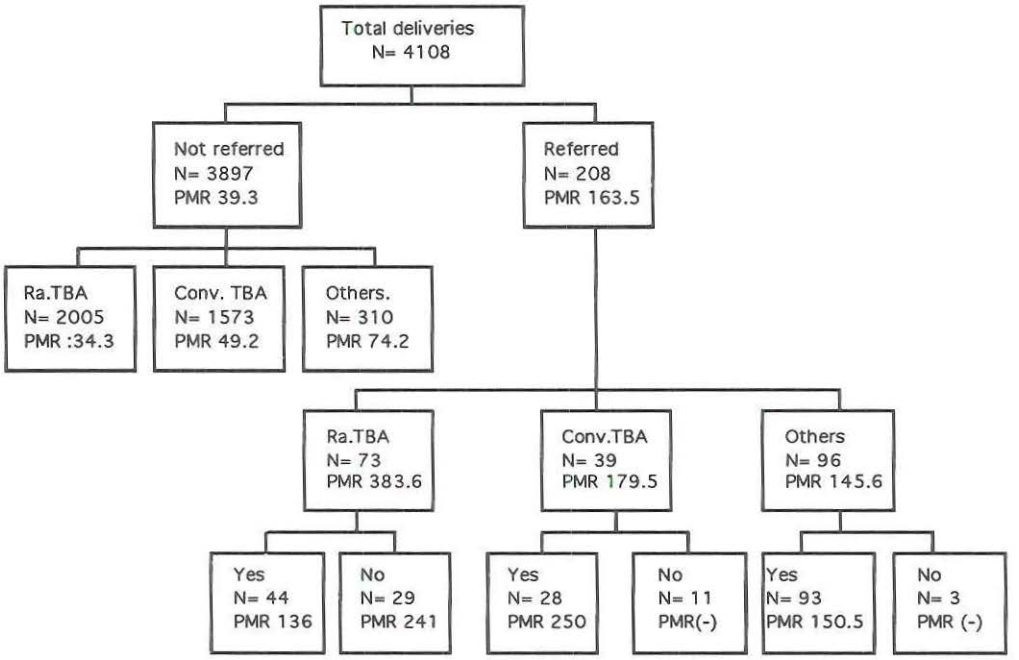
Figure 7.8 Birth weight specific perinatal mortality rates Tanjungsari 1988-1989



d. Perinatal mortality rate of referral cases

An overview of all non-referral and referral cases during two consecutive years of study can be seen in figure 7.9. It shows that perinatal mortality was significantly lower in non referred cases by Ra.TBA compared to Conv.TBA. Some questions may arise; were the cases referred too late, or were the cases not appropriately managed at the referral system. Both situations are possible although the first alternative is most likely to occur. In the village the decision to deliver outside the woman's house is not easily accepted. The difficulty of making the decision at home will contribute to the delay of reaching the health facility (Thaddeus and Maine, 1990).

Figure 7.9. Overview delivery referrals and perinatal mortality rates.



N = number of women

For further analysis respondents were divided into two groups, the non-referral and referral cases while PMR was calculated for each group (Figure 7.9). The non-referred cases had significantly lower PMR than the referral cases (RR=4.31, X2=60.59, p=<0.0001).

Table 7.41 A comparison of PMR * of referral and non referral cases by birth attendant.

Birth attendant	Not-referred	Referred	RR	X2	p-value	(95% C.I.)
Ra.TBA	34.3	383.6	11.15	192.86	<0.0001	(7.68 -16.17)
Conv.TBA	49.2	179.5	3.67	13.12	0.0002	(1.81 - 7.40)
Others	74.2	145.6	1.97	4.53	0.0033	(1.05 - 3.67)

* per thousand births
RR. = relative risk.
C.I. = confidence interval.

Within groups of non-referral cases, Ra.TBA had the lowest perinatal mortality rate followed by Conv.TBAs while "Others" showed the highest PMR. Within each groups, a significant difference between non-referral and referral cases was found (table 7.41). If non-referral clients of Conv.TBAs were compared to non-referral clients of Ra.TBAs, then clients of Conv.TBAs had significantly higher perinatal mortality rates (RR=1.42, X2=4.76, p=0.039).

The study also tried to analyse perinatal mortality rates of compliance and non-compliance to referral. The following result is shown (table 7.42). There is no significant difference of perinatal mortality rates between compliance and non-compliance of Conv.TBA and " Others", probably because the numbers were too small to expect any significant difference.

Table 7.42 A comparison of PMR of compliance and non-compliance by birth attendant

Birth attendant	Compliance	Non-compliance		RR	X2	P.value	(95% C.I.)
Ra.TBA	136	241	2.73	11.29	<0.001		(1.48-3.05)
Conv.TBA	250	(0)	(0.0)		0.07		
Others	150.5	(0)	(0.0)		0.469		

PMR = perinatal mortality rate per thousand births.
RR = relative risk.

e. Causes of perinatal death

Perinatal death was diagnosed based on verbal autopsy conducted by the field doctor using preconstructed questionnaires. For every death whether perinatal, infant or maternal, the research interviewer or the birth attendant was instructed to notify the field doctor within 24 hours after death. The field doctor visited the house of the deceased and where possible conducted an external autopsy and/or apply a verbal autopsy. The verbal autopsy questionnaires were already pretested in a previous study in Ujung-Berung.
The field doctor would present his case during the monthly perinatal meeting to diagnose the causes of death. For classification of causes of death the International Code of Disease Edition IX (1975) was used. A special section in the ICD was suggested to be used for perinatal death. The results of causes of perinatal death for the total population are

summarized in table 7.43.

Table 7.43 Causes of perinatal death in Tanjungsari

Cause of death	ICD	Number	%
1. Intrauterine hypoxia and birth asphyxia	768	150	76.9
2. Congenital malformation	740-759	3	1.5
3. Infection specific to perinatal period	771	6	3.0
4. Respiratory problems after birth	769-770	11	5.6
5. Disorders related to unspecific low birth weight	765	15	7.7
6. Conditions involving the integument & temperature regulation	778	3	1.5
7. Hematologic disorders	776-772	3	1.5
8. Miscellaneous		4	2.3
Total		195	100.0

It can be seen that asphyxia and hypoxia are the main cause of perinatal death, followed by disorders relating to unspecific low birthweight. It is interesting to find that infection specific to the perinatal period is the cause in only 3.0 per cent of total perinatal deaths, showing that septic delivery is relatively becoming more uncommon. In the Ujung-Berung survey, death because of infection was on the second place while in the Tanjungsari study it was on the fourth place (Alisjahbana et al., 1983; Perera and Lwin,1984). There was no case of neonatal tetanus reported which is to be expected due to the high coverage of pregnant women by tetanus immunization.

f. Causes of perinatal death in relation to mothers condition

Causes of perinatal deaths were crosstabulated to the condition of the mother during pregnancy and delivery, Figure 7.10 and figure 7.11 are showing this relationship.
From figure 7.10 it can be seen that intrauterine hypoxia and birth asphyxia are highest in all mothers conditions and reach almost 96 per cent in "complication of labour and delivery". This is followed by "disorders related to low birth weight" which is highest in maternal complications of pregnancy. Infection specific to perinatal period is found to be 13.7 per cent in" unclassified mothers condition". In "maternal condition may be related to pregnancy", respiratory problems after birth is second highest followed by disorders related to unspecific low birth weight. Birth asphyxia was closely related to birth weight and breech delivery.

Figure 7.10 Causes of perinatal death by mothers condition (singletons only, 1988-1989)

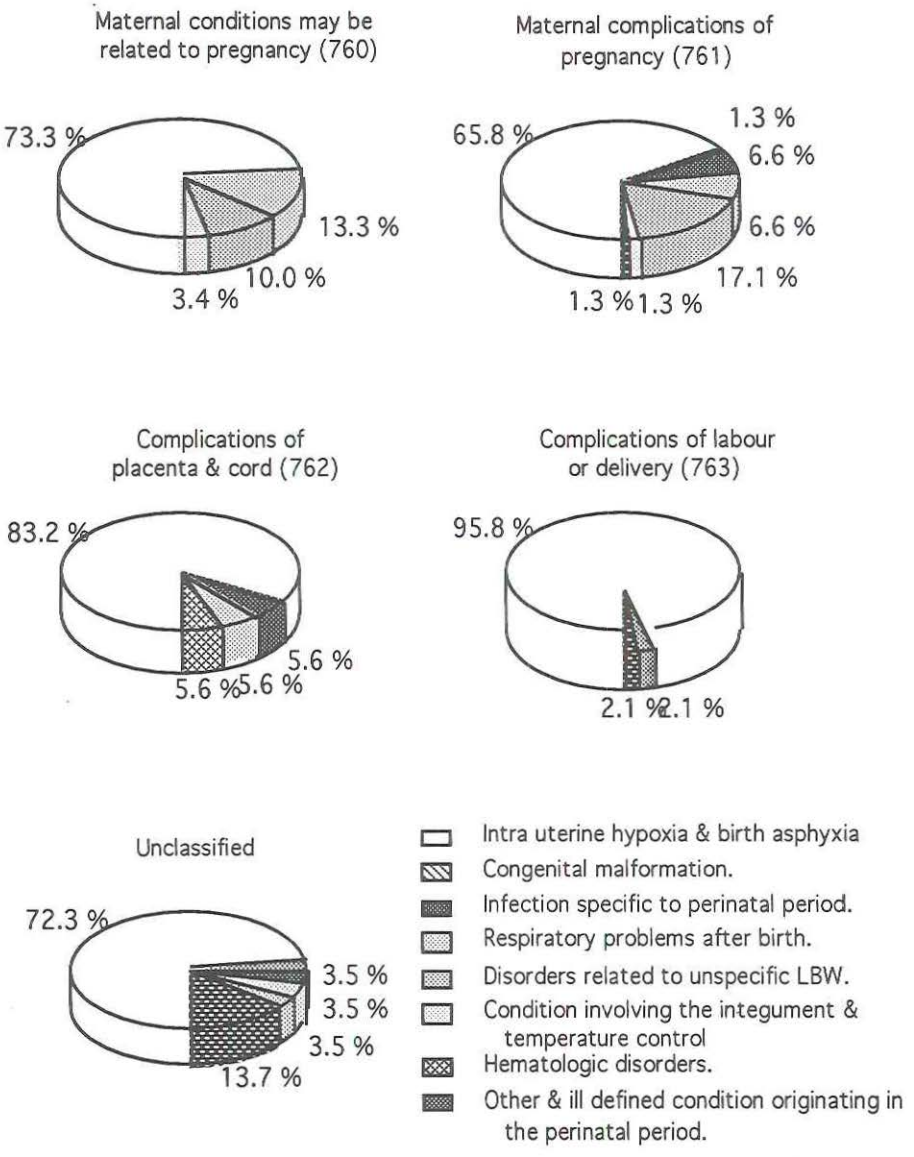


Figure 7.11 Stillbirth and early neonatal death by mothers conditions (singletons only, 1988-1989).

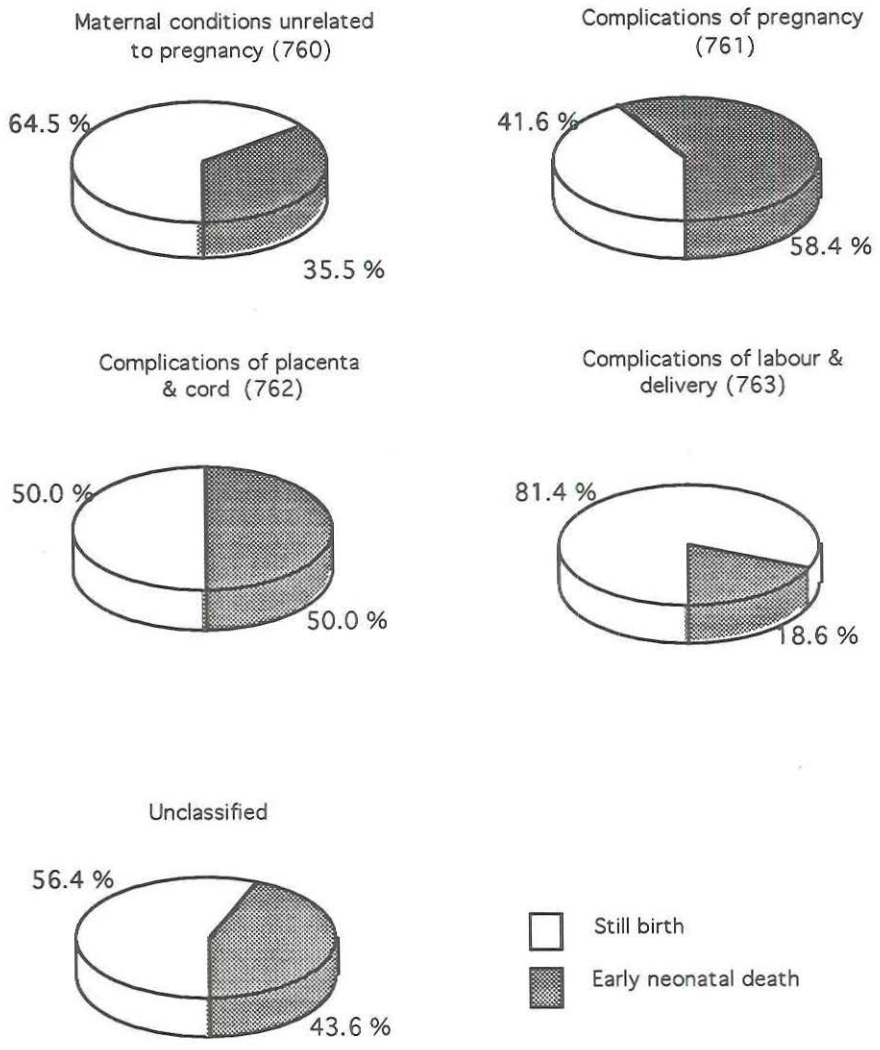


Figure 7.11 was designed to study stillbirths and early neonatal deaths in relation to mothers condition. Almost the same pattern as in figure 7.10 was found. Stillbirth was high in almost all mothers conditions. The highest incidence for stillbirths was found in complications during labour and delivery (81.4%). The lowest percentage of stillbirths was found for mothers conditions included in complications of pregnancy (41.6 %).

Perinatal mortality has decreased more or less through the control of infection but more efforts have to be taken to decrease stillbirths. Unfortunately this study could not specify the ratio between macerated stillbirths and fresh stillbirths. To know this difference is important for program implementation. Stillbirth was highest in complications of labour and delivery, which also shows the lowest percentage of early neonatal deaths. These results show that to prevent stillbirth, interventions have to be directed to appropriate case management during labour and delivery, while to prevent early neonatal death intervention has to be directed to prevent complications of pregnancy. It should be noted however that death because of disorders related to unspecific low birth weight is also highest in the last group.

7.4.3. The effectiveness of TBA training at postpartum level

The postpartum period is the most vulnerable period during child birth, most of maternal deaths occurred in this period. Referral may be delayed by lack of communication and transportation. While postpartum bleeding may happen any time after birth, almost all were caused by retained placenta or inertia of the uterus. In rural communities TBAs used to stay with the woman until both mother and child are cleaned and washed. This has the advantage that the woman is not left alone in the immediate postpartum period, but carefully observed by the TBA while she keeps herself busy preparing the needed rituals or massage the mothers body (Laderman, 1987).
Measures of effectiveness of TBA training at postpartum level follow the same sequence as the discussion at antepartum and intrapartum level. A summary of the effect and impact measurements can be seen in table 7.44.

Table 7.44 Summary of effectiveness measures at postpartum care

	Criteria	Measurements	Percentage
Outputs.	Mothers at risk identified.	Number of mothers at risk per risk factor.	Percentage of all mothers at risk per risk factor.
Effects.	Referrals of mothers	Number of mothers referred by Ra.TBA and other health care workers to health center or hospital.	Number referred as a percentage of all mothers.
	Compliance with referral	Number of mothers referred (by TBA),mothers complying at health center.	Complying mothers as a percentage of all referred.
Impacts.	Maternal mortality. (MMR)	Number of mothers died.	Number of mothers died as percentage of all live births.
	Maternal mortality of referred women.	Number of referred mothers died	Number of referred mothers died as percentage of all live births.

7.4.3.1. Number of women at risk identified

In the postpartum period, 1101 (26.9 per cent) women developed postpartum morbidity. The distribution of disease pattern can be seen in table 7.45 and 7.46.

Table 7.45 Pattern of postpartum conditions by birth attendant.

Risk condition	Birth attendant Ra.TBA n=2078	Conv.TBA n=1612	Others n= 404	Total (%) n=4108
Massive bleeding	37 (1.7)	11 (0.7)	7 (1.7)	55 (1.3)
Postpartum fever	315 (15.2)	274 (16.9)	67 (16.5)	659 (16.0)
Foully smelling discharge	170 (8.2)	85 (5.2)	28 (6.9)	283 (6.9)
Postpartum anemia	235 (11.3)	176 (10.9)	43 (10.6)	454 (11.1)
Postpartum convulsion	8 (0.3)	8 (0.5)	2 (0.5)	18 (0.4)

Unknown birth attendant of 3 cases with postpartum fever(4.6%)
One woman may have more than one condition.
() per cent postpartum condition in the same group.

Postpartum condition will give an impression of women at risk during the postpartum period. The incidence of postpartum fever is the highest and almost the same in clients of the three categories of birth attendants. Postpartum fever was followed by anemia postpartum (or lack of blood). A higher incidence rate was found for massive bleeding and foul discharge in Ra.TBAs clients compared to Conv.TBAs clients. The differences are significant for massive bleeding (X2=8.77, p=0.012) and for foul discharge (X2=11.93, p=0.003).

Table 7.46 Number of risk condition per woman during postpartum period.

Risk condition	Ra.TBA n	Ra.TBA (%)	Conv.TBA n	Conv.TBA (%)	Others n	Others (%)	Total n	Total (%)
(-)	1511	72.7	1189	73.8	294	72.4	2994	73.1
1	411	19.8	314	19.5	83	20.4	808	17.8
2	122	5.9	89	5.5	24	5.9	235	5.7
3+	34	1.7	20	1.2	5	1.2	59	1.4
Total	2078	100.0	1612	100.0	406	100.0	4096	100.0
Need referral	567	27.4	423	26.2	111	27.5	1101	26.9
Referred	91	16.0	71	16.8	12	10.8	174	15.8

*) Unknown birth attendant 12 cases (0.3 per cent).

From table 7.46 it can be seen that amongst clients of Ra.TBA and Conv.TBA there is no difference in the number of women with postpartum morbidity (X2=0.50, p=0.4773).

7.4.3.2. Postpartum referrals

In the postpartum period the percentage of referrals by birth attendants in relation to specific morbidity can be seen in table 7.47.

Table 7.47 Postpartum referrals by risk condition as percentage of total women with the same risk condition .

Risk condition	Birth attendant Ra.TBA n	(%)	Conv.TBA n	(%)	Others n	(%)	Total n	(%)
Massive bleeding	6	16.2	2	18.2	2	28.6	10	18.2
Postpartum fever	20	6.3	10	3.6	2	3.0	32	4.7
Foul smelling discharge postpartum	5	2.9	5	5.9	1	3.6	11	3.9
Postpartum anemia	14	6.0	8	4.5	1	2.3	23	5.1
Postpartum convulsion	2	25.0	-	0.0	-	0.0	2	11.1

n = number of women

In general there were more postpartum referrals for massive bleeding and postpartum convulsions. Conv.TBAs and "Others" were referring more massive bleeding and foul discharge. For postpartum convulsion more cases were referred by Ra.TBAs and none by Conv.TBAs and "Others". Ra.TBAs were referring more cases with postpartum anemia and post partum fever compared to Conv.TBAs and "Others".

7.4.3.3. Compliance to postpartum referral

Table 7.48 Did you go for postpartum referral?

Did you go?	Ra.TBA n	(%)	Conv.TBA n	(%)	Others n	(%)	Total n	(%)
yes	29	31.7	18	25.4	7	58.3	54	31.0
no	62	68.3	53	74.6	5	41.7	120	69.0
Total	91	100.0	71	100.0	12	100.0	174	100.0

n= number of women.

Except for "Others", non-compliance was higher in postpartum referrals in Ra.TBAs clients as well as Conv.TBAs clients. Women were more likely to comply with referral in the antepartum period and during delivery, but not in the postpartum period although more maternal deaths occurred in the postpartum period. However in the postpartum period Ra.TBAs clients comply better to referrals compared to Conv.TBAs, the difference is significant (X2= 7.95, p=0.0047).

The distribution of preferred health facility for referral is shown in table 7.49. In the postpartum period women and especially those with bleeding, are mostly referred to the nearest health center. The health center has the highest percentage followed by the integrated health service post (IHSP). There were more women referred when compared to the number reported as "referred" by birth attendant because some women came by their own decision.

Table 7.49 Health facilities for postpartum referral

Health facility	Ra.TBA				Conv.TBA			
	1988		1989		1988		1989	
	n	%	n	%	n	%	n	%
IHSP	13	21.0	17	26.2	9	16.6	7	13.7
Health post	8	12.9	4	6.1	-	0.0	2	3.9
Health center	30	48.5	32	49.2	33	61.1	34	66.7
Hospital	3	4.8	5	7.7	2	3.7	5	9.8
Private MD	-	0.0	-	0.0	-	0.0	-	0.0
Private midwife	3	4.8	7	10.8	5	9.3	3	5.9
Others	3	4.8	-	0.0	-	0.0	-	0.0
Don't know	2	3.2	-	0.0	5	9.3	-	0.0
Total	60	100.0	65	100.0	49	100.0	51	100.0

n= number of women
IHSP= integrated health service post

7.4.3.4. The impact of TBA training at postpartum level

The purpose of the intervention study was not directed to decrease maternal mortality, for such a study a larger population size is needed. Maternal mortality will therefore be discussed from the point of view of improving health services at grassroot level, in this case in relation to training of TBAs.

a. Maternal mortality ratio

During the 2 year study period 20 mothers died, showing a maternal mortality ratio of 480 and 490 per 100 000 live births in 1988 and 1989 respectively. There was no significant difference between maternal mortality ratio in the first year and the second year although a lower rate was recorded for the second year in the intervention area where most of the Ra.TBAs live. But it is not clear whether this was actually caused by the intervention.

b. Causes of maternal mortality

Referral of complicated cases did not always occur, and in fact only 17 of the fatal cases were actually referred (85%), 3 cases refused referral (15%). The correlation with the number of antenatal care visits was not evident from the findings as 80% of women who died had 4 or more antenatal examinations. The evidence for biological risk factors such as age and parity revealed no significant facts. Six women died after their first delivery, only one was 19 years of age. Out of 4 women over 35 years, 3 were in the risk category from the parity point of view (P3 and P4). None of the fatal cases were in the multiparae category, but 3 women were 40 years and older.

Most of the maternal deaths occurred within 10 hours after delivery (11 cases or 55 %) or more than 48 hours after pregnancy termination (7 cases or 35%). One death occurred with the infant undelivered. Out of the 4 cases dying within 2 hours after delivery, 2 died at home, one case en-route to the hospital and only one made it to the hospital before dying (she arrived in very poor condition). Seven women died more than 48 hours after pregnancy termination, 4 died at home while the other 3 died in the hospital. One woman died at home 16 days after septic abortion, previously treated in the district hospital but the woman was unable to buy antibiotics. Two cases of possible intra uterine rupture were treated by nurses.

The main direct cause of maternal death was postpartum hemorrhage. Infection is on the second place if septic abortion is included in infection, while uterine rupture becomes the third cause of death, leaving eclampsia on the fourth place (table 7.50). All these direct causes of maternal death are in fact preventable if the women were referred earlier and proper management was conducted at the health center as well as at home.

Even the indirect causes of maternal death are both preventable.

Table 7.50 Causes of maternal death.

Cause of death	No. of cases	%
Direct cause :		
1.Postpartum hemorrhage	9 *	45
Atonia uteri	5	
Retentio placentae	4	
2. Puerperial infection	3	15
3. Eclampsia	2	10
4. Septic abortion	1	5
5. Uterine rupture	3 * *	15
Indirect cause :		
Gastro enteritis	1	5
Bronchopneumonia	1	5
Total	20	100.0

* 2 cases postpartum hemorrhage complicated by infection (febris)

* * Some doubt exists over the actual cause of one death, with differential diagnosis of heart disease and amniotic fluid embolism.

7.4.4. The effectiveness of TBA training at the level of the newborn

The summary in table 7.51 shows the sequence of assessing the effectiveness of the training program at the level of the newborn. Neonatal morbidity is divided into three groups. The immediate postnatal morbidity is the morbidity pattern in the first 48 hours of life. The early neonatal morbidity covers the period of birth until 7 days postnatal and the late neonatal period covers the period of 8 days until 28 days postnatal.

Table 7.51 Summary of effectiveness measures at the level of the newborn.

	Criteria	Measures	(percentage)
Outputs	Infants at risk identified.	Number of infants at risk per risk factor.	Percentage of all infants at risk per risk factor.
Effects	Referrals of infants made by TBA to health center.	Number of infants referred.	Number of infants referred as a percentage of all infants. Number of infants referred as percentage of all infants at risk.
	Compliance with referral.	Number of referred newborns (mothers) complying at health center.	Complying mothers as percentage of all referred newborns. Complying mothers as percentage of all referred newborns at risk.
	Infants receiving BCG.	Number of infants with BCG vaccination.	Number of vaccinated newborns as a percentage of all infants.
Impacts	Neonatal mortality.	Number of newborns died between 0-28 days.	Number of newborns (0-28 days) died/ 1000 live births.
	Birth weight specific neonatal mortality.	Number of infants died with specific birth weight.	Number of infants died/ 1000 live births of specific birth weight.
	Weight-increase	Weight increase in the neonatal period.	Percentage of infants with weight increase.

The purpose of differentiating the three periods of early life is that the morbidity pattern may be different for each period. It is expected that training of TBAs may have

the highest impact in the immediate and early postnatal period and less so in the late neonatal period.

7.4.4.1. The immediate postnatal period

Because the numbers were quite small neonatal morbidity and referrals were analysed by birth attendant for singletons and both study years combined.

Table 7.52 Immediate postnatal condition as percentage of infants in each group

Risk condition	Ra.TBA n	(%)	Conv.TBA n	(%)	Others n	(%)	Total n	(%)
1. Baby too small	40	2.3	30	2.7	10	3.7	80	2.3
2. Baby too large	8	0.4	8	0.5	2	0.6	18	0.5
3. Baby pale	48	2.9	39	3.6	11	4.7	98	2.4
4. Baby blue	11	0.5	18	1.1	7	1.9	36	0.9
5. Floppy baby	47	2.3	46	2.9	32	8.6	125	3.1
Total	154		141		62		357	

( ) rate per number of infants per group.
One infant may have more than one symptom.
n = number of infants

The highest incidence of immediate postnatal condition (table 7.52) is "floppy baby" (3.1 per cent). It can be seen that "floppy baby", "baby pale" and "baby too small" has the highest percentage in all groups, the incidence is almost the same except that the group "Others" reported relatively more floppy babies.

Table 7.53 Number of risk conditions per newborn in the immediate postnatal period

Number of risk condition	Ra.TBA n	(%)	Conv.TBA n	(%)	Others n	(%)	Total n	(%)
(-)	1925	94.1	1473	93.3	345	89.4	3743	93.4
1	89	4.4	74	4.7	22	5.7	185	4.6
2	28	1.4	26	1.7	17	4.4	71	1.8
3+	3	0.1	5	0.3	2	0.5	10	0.2
Total*	2037	100.0	1578	100.0	386	100.0	4001	100.0
Need referral	120	5.9	105	6.7	41	10.6	266	6.6
Referred	37	30.8	16	15.2	7	17.1	60	22.6

* calculated on total live births
n= number of infants

From table 7.53 it can be seen that the number of infants showing one or more symptoms was lowest in infants delivered by Ra.TBAs compared to Conv.TBAs and the difference was significant (X2=11.67, p=0.003). Infants of "Others" have the highest incidence of infants in need for referral. Thirthy seven infants out of 120 risk infants were referred by Ra.TBAs, this number is higher compared to referrals by Conv.TBAs and "Others".

Reasons for referral in the immediate postnatal period are shown in table 7.54.
Why Ra.TBAs were not referring babies with asphyxia needs further analysis, because it is a fact that geographically Conv.TBAs had more access to the main road. Other problems from the point of view of the mother herself or the family are cultural reasons. In this area newborn infants may not be taken out of the house unless the baby is 40 days old.

Table 7.54 Reasons for referrals in the immediate postnatal period (per cent)

Risk condition	Ra.TBA		Conv.TBA		Others		Total	
	n	(%)	n	(%)	n	(%)	n	(%)
Baby too small	12	32.4	2	12.5	3	42.8	17	28.4
Baby too large	1	2.7	1	6.3	-	-	2	3.3
Baby pale or blue	2	5.4	3	18.7	-	-	5	8.3
Floppy baby	2	5.4	2	12.5	1	14.4	5	8.3
> than one reaon.	20	54.1	8	50.0	3	42.8	31	51.7
Total	37	100.0	16	100.0	7	100.0	60	100.0

* per cent of morbidity cases (see also table 7.54)
Referred by unknown birth attendant: 5 cases (4.3 %)
n = number of infants

7.4.4.2. The early neonatal period

Early neonatal morbidity includes the period of ≥ 24 hours until the7th day of life. Although some conditions may be a continuation of morbidity from the immediate postnatal period, other conditions are not. Table 7.55 shows the incidence of each risk condition separately. As can be seen, the incidence of specific morbidity of Ra.TBAs infants is less compared to Conv.TBAs infants. The same result can be seen when the number of symptoms per newborn is calculated (table 7.56). Ra.TBA newborns had less morbidity compared to the Conv.TBAs. The group "Others" showed the lowest number of infants with morbidity.

Table 7.55 Early neonatal condition as percentage of all infants in each group

Risk condition	Ra.TBA n	(%)	Conv.TBA n	(%)	Others n	(%)	Total n	(%)
1. stop sucking	69	3.4	76	4.8	7	1.9	52	3.8
2. rigidity(convulsion)	8	0.2	3	0.2	1	0.3	12	0.3
3. fever >3 days	8	0.4	13	0.8	1	0.2	22	0.5
4. cough & dyspnoe	2	0.1	6	0.4	1	0.3	9	0.2
5. diarrhoea	2	0.1	5	0.3	1	0.2	8	0.2
Total	87		98		11		203	

( ) rate per number of infants per group.
One infant may have more than one symptom
n = number of infants

Table 7.56 Number of risk condition per newborn in the early neonatal period

Number of risk condition	Ra.TBA n	(%)	Conv.TBA n	(%)	Others n	(%)	Total n	(%)
(-)	1964	96.0	1484	94.0	376	97.4	3824	95.4
1	73	3.6	88	5.6	9	2.3	170	4.2
2	8	0.4	4	0.3	1	0.3	13	0.3
3+	-	0.0	2	0.1	-	0.0	2	0.1
Total*	2037	100.0	1578	100.0	386	100.0	4009	100.0
Need referral	81	3.9	94	6.0	10	2.6	185	4.6
Referred	78	96.3	31	32.9	7	70.0	116	62.7

* calculated on total livebirths

Ra.TBAs were referring more babies with rigidity, stop sucking, diarrhoea, cough and dyspnoe. The number of infants referred in the early neonatal period is significantly higher in the Ra.TBA group compared to the Conv.TBAs infants (96.3 per cent versus 32.9 per cent) (table 7.56). In general of all infants who showed one or more risk conditions, 62.7 per cent were referred.

The number of referrals by type of morbidity showed that Ra.TBAs were referring more cases than Conv.TBAs. For "stop sucking" there was 7.2 per cent referral by Ra.TBAs compared to 1.3 per cent by Conv.TBA ($X2=74.83$, $p<0.001$)(table 7.57). It is interesting to find that for convulsion no case was referred by Conv.TBA and "Others". The same result was found for cough, dyspnoe and diarrhea, none of the cases were referred .

Table 7.57 Reasons for referrals in the early neonatal period (per cent)

Risk condition	Ra.TBA n	(%)	Conv.TBA n	(%)	Others n	(%)	Total n	(%)
Stop sucking	5	6.4	1	3.2	1	14.3	7	6.0
Convulsion	2	2.6	-	-	-	-	2	1.7
Fever	2	2.6	2	6.5	-	-	4	3.4
Cough & dyspnoe	-	-	-	-	-	-	-	-
Diarrhea	-	-	-	-	-	-	-	-
> than one reason	66	84.6	26	83.9	6	85.7	98	84.5
Unknown reason	3	3.8	2	6.5	-	-	5	4.3
Total	78	100.0	31	100.0	7	100.0	116	100.0

* per cent of morbidity cases (see also table 7.64)
Referred by unknown birth attendant: 5 cases (4.3 %)
n = number of infants

7.4.4.3. The late neonatal period

The late neonatal period includes the period between the 7th day of life until the infant is 28 days old. To collect this information the interviewers visited the infants house directly after the 28 days of life. As was the case with previous interviews, conditions were recorded retrospectively. Infants included in this group were those infants who were still alive between day 8 and day 28. Compared to the previous early neonatal morbidity, in the late neonatal period more risk conditions were recorded by the interviewer from infants delivered by Ra.TBAs compared to Conv.TBAs. The risk conditions reported are "stop sucking", "fever and cough" and "dyspnoe" (table 7.58).

Table 7.58 Late neonatal morbidity as percentage of all infants in each group

Risk condition	Ra.TBA n	(%)	Conv.TBA n	(%)	Others n	(%)	Total n	(%)
1. stop sucking	51	2.6	33	2.1	7	1.8	91	2.3
2. rigidity (convulsion)	6	0.4	5	0.4	2	0.5	13	0.3
3. fever >3 days	75	3.7	47	2.9	9	2.2	131	3.2
4. cough & dyspnoe	49	2.4	22	1.4	7	1.7	78	1.9
5. diarrhea	14	0.7	8	0.5	3	0.7	25	0.6
Total	195		115		28		338	

( ) rate per number of infants per group.
n= number of infants infants
One infant may have more than one symptom.

If calculated to the number of risk conditions per infants, more infants delivered by Ra.TBAs were in need for referral compared to Conv.TBAs, but the difference was not significant (X2=3.92, p=0.14). Contrary to the immediate postnatal and early neonatal period, more infants of Conv.TBAs were referred although the difference was not significant (table 7.59).

Table 7.59 Number of riks conditions per newborn (late neonatal period)

Risk condition	Ra. TBA		Conv.TBA		Others		Total	
	n	(%)	n	(%)	n	(%)	n	(%)
(-)	1842	92.0	1442	93.6	345	93.5	3629	92.7
1	133	6.6	85	5.5	20	5.4	238	6.1
2	25	1.2	12	0.8	4	1.1	41	1.0
3+	4	0.2	2	0.1	-	0.0	6	0.2
Total*	1996	100.0	1443	100.0	352	100.0	3890	100.0
Need referral	162	7.8	99	6.1	24	5.9	285	6.9
No.referred	124	76.5	83	83.8	14	58.3	221	77.5

* calculated on total live born infants
n = Total number of infants who survive the neonatal priod

Also here, the research team tried to identify the reason for referral, as can be seen in table 7.60. Although there were more cases in need for referral, Ra.TBAs were referring only 76.5 per cent of their cases compared to 83.8 per cent of Conv.TBAs. For each specific morbidity Ra.TBAs were referring more cases except for convulsion , other reasons and unknown reason, which is higher in the group of Conv.TBAs. The numbers are too small for statistical analysis.

Table 7.60 Reasons for referral in the Late neonatal period (per cent)

Risk condition	Ra. TBA		Conv.TBA		Others.		Total	
	n	(%)	n	(%)	n	(%)	n	(%)
Stop sucking	4	3.2	1	1.2	1	7.1	6	2.7
Convulsion	1	0.8	1	1.2	1	7.1	3	1.4
Fever>3days	8	6.5	3	3.6	1	7.1	12	5.4
Cough & dyspnoe	5	4.0	1	1.2	-	-	6	2.7
Diarrhoea	5	4.0	1	1.2	-	-	6	2.7
Other reasons	95	76.7	68	81.9	11	78.7	174	78.7
Unknown reason	6	4.8	8	9.7	-	-	14	6.4
Total	124	100.0	83	100.0	14	100.0	221	100.0

Referred for unknown reason : 14 cases (6.3%).
n = number of infants.

There has to be a certain caution in the evaluation of neonatal morbidity, because especially infants more than 7 days old may experience morbidity which has nothing to do with the perinatal period or the delivery process itself. But for the purpose of comparability, the analysis will be kept the same as for the early neonatal period.

Neonatal morbidity, particularly when it is associated with low birth weight and pre-term delivery, may result in delayed morbidity (WHO, 1992). This can be seen in the number of infants showing morbidity in the immediate neonatal period, the early neonatal period and the late neonatal period (table 7.61).

Table 7.61 The number of infants with morbidity, clients of Ra.TBAs and Conv. TBAs

Neonatal period	Ra.TBAs		Conv.TBAs		X2	P value
	n	%	n	%		
Immediate	2037	5.9	1578	6.7	0.94	0.331
Early neonatal	2037	3.9	1578	6.0	7.72	0.005*
Late neonatal.	1996	8.1	1542	6.4	3.66	0.056

* significant
n = number of infants.

In the immediate and early neonatal period, the percentage of infants of Ra.TBAs with signs of disease were less compared to Conv.TBAs infants, the difference is however significant only for the early neonatal period. In the late neonatal period environmental factors may play a role and morbidity pattern is not directly related to TBAs care.

7.4.4.4. Compliance with referral

Table 7.62 Did you go for referral ?

Birth attendants	immediate postnatal. yes n (%)		no n (%)		early neonatal yes n (%)		no n (%)		late neonatal yes n (%)		no n (%)	
Ra.TBA	6	18.8	26	81.9	21	26.9	57	73.1	82	66.1	42	33.9
Conv.TBA	5	38.5	8	61.5	5	16.1	26	83.9	27	32.5	5	66.5
Others.	4	57.1	3	42.9	2	28.6	5	71.4	7	50.0	7	50.0

( ) percentage
n = number of infants

Compliance with referral is different for each category (table 7.62), Ra.TBAs show the lowest rate in the immediate postnatal period, but have the highest compliance rate in the late neonatal period. Compliance in the neonatal period is influenced by many factors such as culture, distance to health center and financial reasons. This may also be the reason why clients of Ra.TBAs have the lowest rate of compliance in the immediate postnatal period and increase afterwards. This is not shown by Conv.TBAs clients, here the lowest compliance rate was in the early neonatal period. As expected the group "Others" showed a higher compliance rate except in the late neonatal period.

7.4.4.5. Infants receiving BCG immunization

Table 7.63 Number of liveborn newborns immunized for BCG

BCG	Ra.TBA		Conv.TBA		Others		Total	
	n	(%)	n	(%)	n	(%)	n	(%)
Yes	203	10.1	124	8.6	59	15.5	386	9.8
No.	1793	89.9	1418	91.4	293	84.5	3504	90.2
Total	1996	100.0	1542	100.0	352	100.0	3890	100.0

n = number of infants

The Indonesian government policy is to give BCG immunization already in the first month of life. Ra.TBAs were instructed to bring the infant to the health center or integrated service post for a BCG immunization. Whether the Ra.TBAs were succesful can be seen in table 7.63. It shows that more infants of Ra.TBAs had received BCG immunization compared to Conv.TBAs, but both groups had lower percentage compared to "Others".
An important factor of the low coverage of infants with BCG immunization may be due to the local habits that newborns were not allowed to leave the house unless they are 40 days old.

7.4.4.6. The impact of TBA training at newborn level

This report is more or less oriented to the perinatal period and neonatal period, therefore no attempt is made to discuss the outcome of the infant in the post neonatal period. Because of the low numbers of cases neonatal deaths will not be divided by birth attendants, but presented as one group.

a. Neonatal deaths during the study period

Neonatal death is divided into two categories, the early and late neonatal death. Early neonatal death rate covers the first week of life, the late neonatal period covers the last three weeks of the postnatal period. Many developed countries combine both periods, because of better survival of very low birth weight babies (<1500 grams) beyond the first week of life. In developing countries most small babies and those with asphyxia die in the first postnatal week.

Table 7.64 Neonatal death rate by birthweight

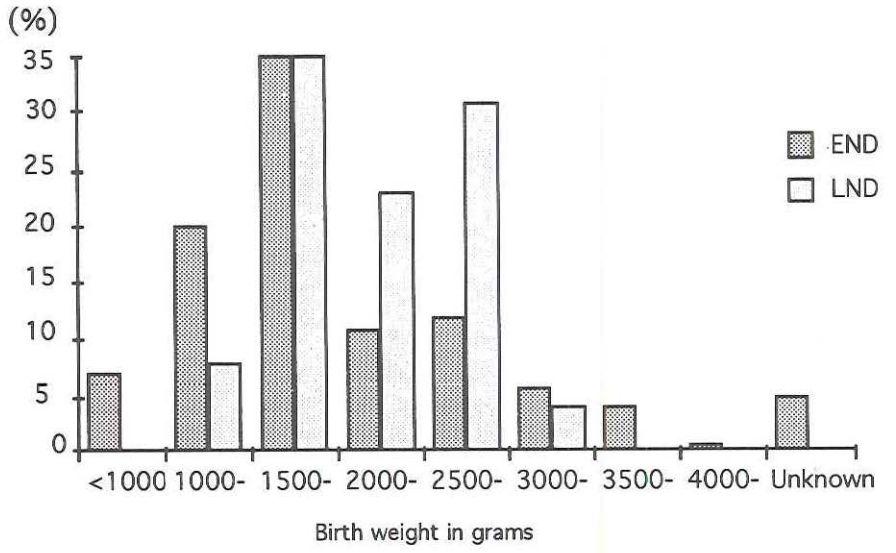
Birthweight	Early neonatal		Late neonatal		Total	
	n	‰	n	‰	n	‰
<2500 gr	62	120.1	18	34.9	80	155.0
≥2500 gr	19	5.8	-	0.0	19	5.8
Unknown	4	20.3	7	35.5	13	55.9
Total	85	21.2	26	6.2	111	27.7

n = number died
‰ = rate per thousand livebirths.

During the whole study period, there were 4014 live born singletons babies (included were live born infants with a birth weight of <1000 grams). Out of this number 85 infants died in the early neonatal period and 26 in the late neonatal period. This resulted in an early neonatal death rate of 21.2 per thousand live births and neonatal death rate of 27.7 per thousand live births. More than 75 per cent of these infants died in the early neonatal period. Neonatal death rate by birth weight can be seen in table 7.64. It shows the relationship between birth weight and mortality, the higher birth weight the better is the survival. Low birth weight infants in the early neonatal period showed significantly higher early neonatal mortality rates compared to infants with normal weights ($X2=281.1$, $p<0.001$). All infants with a birth weight of more than 2500 grams survived the late neonatal period. Figure 7.12 shows the relationship between birth weight and age at death. Infants with low birth weight show higher percentages in the early neonatal period. All infants less than 1500 grams died in the neonatal period. It is interesting to find almost no late neonatal deaths of infants with a birth weight of more than 3500 grams.

Figure 7.12

Early - and late neonatal death by birth weight.



b. Causes of neonatal death

Causes of neonatal death will be discussed both by period of death as well as by cause of death. Cause of death was diagnosed based on a verbal autopsy conducted within the first days after death by the field doctor who visited all deaths using a structured questionnaire. Open ended questions were added if it was considered necessary.
The result of the verbal autopsy was discussed during the monthly perinatal meetings and the final diagnosis was made by the research team. For the classification of cause of death the International Classification of Diseases of the World Health Organization (1975) is used.

Main causes of death in the early neonatal period are birth asphyxia followed by disorders related to unspecific low birth weight. In the late neonatal period respiratory problems after birth shows the highest percentage and is followed by infection and disorders related to unspecific low birth weight. The influence of environmental factors is shown in the percentage of infection which is on the third place and became the second cause of death in the late neonatal period. It clearly shows that death related to unspecific low birth weight may be delayed to a later period (table 7.65).

Table 7.65 Number and causes of neonatal deaths.

Causes of death	ICD	Early neonatal	Late neonatal	Total
1. Birth asphyxia.	768	42 (48.8)	- (0.0)	42 (36.2)
2. Congenital malformation	740-759	3 (3.5)	1 (3.3)	4 (3.5)
3. Infection	771	6 (8.2)	5 (20.0)	13 (11.2)
4. Respiratory problems after birth.	769-770	10 (11.6)	12 (46.7)	24 (20.7)
5. Disorders related to unspecific low birth weight.	765	15 (17.4)	5 (20.0)	21 (18.1)
6. Condition involving the integument & temperature regulation.	778	2 (2.3)	1 (3.3)	3 (2.6)
7. Hemolytic disorders	776	1 (1.2)	- (0.0)	1 (0.8)
8. Neonatal hemorrhage	772	2 (2.3)	- (0.0)	2 (1.7)
9. Perinatal disorders of digestive system	777	- (0.0)	2 (6.7)	2 (1.7)
10. Other ill defined conditions originating in the perinatal period.	779	4 (4.7)	- (0.0)	4 (3.5)
Total		85(100.0)	26(100.0)	111 (100.0)

ICD = International classification of disease (1975)
( ) percentage.

c. Postnatal growth during the neonatal period

Table 7.66 Weight-increase (grams) in the first month of life by birthweight *

Birth weight (gram)	Number cases	Mean birth weight.	SD	Mean weight increase.	SD	per cent increase.
1500-<2000	42	1748	142	528	344	30.2
2000-<2500	418	2263	133	813	322	35.9
2500-<3000	1718	2713	142	862	348	31.8
3000-<3500	1259	3146	138	881	367	28.0
3500-<4000	258	3643	192	772	409	21.2
4000+	16	4159	238	616	478	14.8
Total	3710	2867	395	852	360	29.7

SD= standard deviation.
*only infants with known birthweight and alive at 28 days of life

In rural areas almost all infants are breastfed, only those babies whose mother died during childbirth were formula fed. Several studies have mentioned the catch-up growth

of the low birth weight infant, this can not be seen for infants in Tanjungsari (table 7. 66). What is shown, however is the mean weight increase in the first month of life. For this purpose only infants with known birth weight and alive on day 28 were included in the analysis. As can be seen, the mean birth weight of all infants in the study area was 2867 grams, at 28 days there was an increase of 852 grams or an increase of 29.7 per cent from the mean birth weight. If the infants were grouped according to specific birth weight it can be seen that the highest weight increase as percentage of birth weight occurs in infants between 2000 - 2500 grams (35.9 per cent) The expected growth spurt in infants less than 2000 gram is not shown in this table, probably due to the high morbidity rate in this specific group. A lower mean weight increase was found in infants with higher birth weight.

7.5. Inferential statistics

The health condition of pregnant women in this study was evaluated at three time periods, e.g. during the antenatal period, delivery and postpartum period by using a list of independent (explanatory) variables classified into three categories: a) biological factors such as mothers age, parity, birth-interval, b) socioeconomic variables such as education, household ownership, sanitation and watersupply, c) health services such as birth attendant, number of antenatal visits and distance to the health center (accessibility). The dependent (response) variables of interest are perinatal mortality, low birth weight and antenatal care. Low birth weight and number of antenatal care visits work as independent variables for perinatal mortality as well as dependent variables. The independent variables are partly nominal with two (dichotomous) values and partly numerical variables, while dependent variables are dichotomus.

A multivariate analysis refers to interactions that involve more than one independent variable. The term multivariate is also used to refer to methods that examine the simultaneous effect of multi variables (Dawson-Saunders and Trapp, 1990). In the conceptual framework for questions involving two or more independent variables, in particular where the variable of interest is nominal or numerical while the dependent variable is nominal and dichotomous, the model recommended by Dawson-Saunders and Trapp (1990) is the logistic regression. Stepwise multiple logistic regression (MLR) analysis is frequently used to determine variables that help explain certain health outcomes.

7.5.1. Perinatal mortality in the Tanjungsari study

It is well known that perinatal mortality is dependent on a variety of independent variables both discrete and continuous. As was mentioned earlier, the independent variables are classified according to the nature of the variable such as biological, socioeconomic and health care factors. Variables selected for multiple logistics regression are those variables which have a known relationship to perinatal mortality. This information was collected from previous studies (Alisjahbana et al., 1983), as well as from the literature (Bakketeig et al.1984, Sastrawinata , 1987). Lack of accurate recording of age of mother (as is frequent found in rural areas) there is less possibility of lost of information if age of mother which can be included in an orderd scale are using a

cut-off point sometimes also referred as partial ordered scale. Parity is handled the same way and the cut-off point is based on risk criteria. Education of mother is using the cardinal discrete scale, it is a numerical integer measure. Nominal scales are used for simple level of measurement when data values fit into categories, as can be seen for occupation (housewife versus working mother), birth attendant (Ra.TBA versus Conv.TBA) and infant sex (male versus female). Distance to the health center is using a special type of ordered scale called the rank-order scale (near, moderate and far).

Independent variables for perinatal death.

Independent variable	scale
Biological	
1. age of mother	partial ordered (< 20 vs. ≥20 yrs).
2. parity	partial ordered (≥ 5 vs. <5).
Socioeconomic	
3. education	cardinal discrete
4. occupation	nominal dichotomous
Health care	
5. birth attendant	nominal dichotomous
6. distance to HC	rank-order
Infant:	
7. birthweight	continuous
8. infant sex	nominal dichotomous

In multiple logistic regression the first step is comparing risk, to measure how strong the association between a particular risk factor and a given outcome is, the ratio of these two rates is the relative risk. If the risks are identical, or nearly so between two groups then the relative risk ratio will approximate 1.0. If there is a big difference between the incidence rates then the relative risk will be considerably higher. A significance test will tell whether the difference between two observed values could have arisen by chance. The test tells how likely it is that the findings are due to chance although it will tell nothing about the strength of an association. A crucial aspect of building a logistic regression model (selecting independent variables) is the choice of an "alpha" level to judge the importance of variables. The choice of "alpha level of 0.05 is often too stringent and often excluding important variables from the model. Hosmer and Lemeshow (1989) recommend the range of 0.15 to 0.20. Sometimes the goal of the analysis may be broader and models containing more variables are sought to provide a more complete picture of possible models. In these cases use of an "alpha level" of 0.25 might be a reasonable choice.

To measure relative risk for biological factors, cut-off points were taken from the previous perinatal study in Ujung-Berung (Alisjahbana et al, 1983) such as maternal age ≥20 years to differentiate between high and low risk. Included in the category of >20 years are mothers of >35 years of age but their proportion is relatively small. For parity the cut-off point taken was parity 5. From previous studies (Alisjahbana et al., 1983, Puffer and Serano, 1986, Bakketeig et al.,1987) it was found that male infants are known to be more vulnerable compared to female infants, this was also the reason why sex of the infants was included in the model. For socioeconomic factors it was found that working mothers had better outcome probably due to a better financial condition. Distance to a health facility was another factor that may have influenced better outcome. The Chi-square and the p.values were calculated for each variable.

Table 7.67 Summary table of relative risk of prenatal factors associated with perinatal deaths (n deaths 47, number of births 3475)

Risk factors	Relative Risk	X2	p-value	95% C.I.
Biological factors				
Age mother (<20 vs≥20 yrs)	1.17	0.56	0.455	0.81-1.70
Parity(≥5 vs <5)	1.21	0.68	0.608	0.48-3.03
Infant sex: (male vs.female)	1.81	3.89	0.049*	0.99-3.30
Socioeconomic factors				
Mothers occupation (house vs. working)	1.90	2.87	0.090*	0.89-4.05
Place of residence.				
Distance (far vs. moderate & near)	1.39	1.26	0.263	0.78-2.46
Health care				
Birth attendant(Conv. TBA vs Ra.TBA).	1.06	0.03	0.85	0.60-1.87

C.I.= confidence interval.
* p value <0.25

As can be seen from table 7.67 and using the alpha level of 0.25, factors significant are sex of infant and mother's occupation. Deliveries by birth attendant show no statistical difference. Mother's education and birth weight were both continuous variables. The mean years of education and the mean birth weight in relation to perinatal death was calculated and the student t.test was used (table 7.68). The results show that birth weight has a significant association to perinatal death. Mother's education had no significant association. For birth weight the t test for separate heterogeneous variance was used. The next step was to include all variables that have a significance associated

with perinatal mortality. Because of the lowest p.value of birth weight to perinatal death, birth weight was introduced as the first variable in the multiple logistic model, followed by infant's sex .

Table 7.68 Student t test for mothers education and gestational age

Risk variable	n.cases	Mean	SD	t-test	p-value
Mothers education(years)					
perinatal death	47	5.681	2.25	0.09	0.93
still alive	3428	5.653	2.15		
Birthweight (gram)					
perinatal deaths	47	2051.06	743.27	7.45	<0.001*
still alive	3428	2860.56	398.47		

N = number.
SD = standard deviation.
* significant

The p-values calculated in the stepwise selection procedures are not p-values in the traditional hypothesis testing context. Instead they should be thought of as indicators of relative importance among variables. In the MLR equation model, the B is the estimated coefficient and S.E. is its standard error. The Wald statistics is the square of the ratio between the estimated coefficient to the estimated standard error and may be used to assess the significance of the components of the trends (Hosmer and Lemeshow, 1989). The constant is a coefficient showing the probability of a person having a perinatal death without any influence of independent variables.

Table 7.69 Multiple logistic regression of perinatal risk factors on perinatal mortality.

Variable	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I._
Birth weight	-.004	.0003	177.778	1	<.0001	.996	0.995-0.997
Sex infant	.869	.3397	6.538	1	.011	2.384	1.225-4.640
Constant	4.709	.7604	38.342	1	<.0001		

B = estimated logistic coefficient
C.I = confidence interval.
S.E = Standard error.
df. = degree of freedom

The result of the logistic regression analysis is shown in table 7.69. The regression equation shows that birth weight and sex of the infant have a significant association to perinatal mortality. These two independent variables may be considered as the main predictors for perinatal mortality in the Tanjungsari study.

7.5.2. Low birth weight

Low birth weight is known to be dependent on a variety of multi variables which can also be differentiated into biological, socioeconomic and maternal factors. Independent variables known from the literature as well as from our own experiences were selected as well as the scales to be used. For the purpose of predicting the probability of having a low birth weight in the study area a multiple logistic regression was applied following the regular steps required for its calculation.

Independent variables for low birth weight.

Independent variable	scale
Biological	
1. age of mother(<20 vs.≥20 yrs)	partial ordered
2. parity (≥ 5 vs. <5)	partial ordered
3. birth-interval	continuous
Socioeconomic	
4. education	cardinal discrete
5. occupation	nominal dichotomous
Health care	
6. ANC	cardinal discrete
Infant	
7. sex	nominal dichotomous (male vs. female)

The total number of singleton deliveries that fulfill the criteria for the multiple logistic regression in the study area were 2528 respondents (61.5%) and 1.580 cases (38.5%) were rejected because of incomplete data. To calculate the relative risk of biological and socioeconomic variables the same cut-off points were used for in perinatal mortality showing the following result (table 7.70). By taking the alpha level of 0.25, risk factors which had a significant association to low birth weight were parity and sex of the infant. Age of mother and mother's occupation show p-values of more than 0.25 and have to be eliminated from further calculation. For variables such as birth interval, mothers education and number of antenatal visits the difference

between the mean of low birth weight infants and normal weight infants were calculated using the Mann-Whitney-Wilcoxon test (table 7.71). The results of the Wilcoxon test show that birth-interval and number of antenatal visits showed p-values of less than 0.25 while mother's education did not show any significant association.

Table 7.70 Relative risk of independent variable for low birth weight

Risk factors	Relative Risk	X2	p-value	95% C.I.
Biological factors				
Age mother (<20 vs.≥20 yrs)	0.71	0.14	0.794	0.24-2.11
Parity(≥5 vs 1-5)	0.63	0.63	0.020*	0.42-0.94
Infants sex	0.78	4.49	0.034*	0.63-0.98
Socioeconomic factors				
Mothers occupation (house-wife and working)	1.02	0.02	0.875	0.80-1.30

* p-value <0.25

Table 7.71 The Wilcoxon test for birth interval, mothers education and number of antenatal visits in relation to birth weight.

Risk variable	n.cases	mean	median	SD.	Z.	p-value
Birth interval (months)						
<2500 gr	274	72.2	65.0	42.5	3.566	0.0004
≥2500 gr	2254	62.4	59.0	35.0		
Mothers education						
<2500 gr.	274	5.1	6.0	2.0	1.657	0.098
≥2500 gr	2274	5.5	6.0	2.4		
Mumber ANC visits						
<2500 gr	274	4.9	4.0	3.1	2.392	0.017
≥2500 gr	2254	5.3	5.0	3.2		

All risk variables that fulfill the criteria (p<0.25) to be introduced in the multiple logistic regression are the following; birth interval, mother's education, parity, number of ANC visits and sex of the infants. Birth interval was used as the first variable because of the lowest p-value, this is followed by number of ANC visits,

parity and sex of the infant.

The multiple logistic regression analysis is using low birth weight as the dependent variable of birth interval, parity number of ANC visits and sex as independent variables. The result is the following (table 7.72).

Table 7.72 Multiple logistic regression analysis of low birth weight on some independent variables.

Variable	B	S.E.	Wald.	df	Sig.	Exp(B).	95% C.I.
Birth interval	.007	.002	12.250	1	.000	1.007	1.003-1.011
Parity	-.543	.225	5.831	1	.016	.581	0.374-0.903
Nr.ANC visits	-.059	.022	7.399	1	.007	.943	0.903-0.984
Sex	-.286	.129	4.887	1	.027	.752	0.584-0.968
Constant	-2.061	.179	131.239	1	.000		

The regression equation shows that birth interval, parity, number of ANC visits and infant sex can be used as predictors which are significantly associated with low birth weight.

7.5.3. Antenatal care

An attempt was made to analyze whether delayed attendance for perinatal care (defined as not attending prior to 28 weeks of gestation) was associated with adverse outcome of pregnancy (perinatal death). For this purpose only women with known gestational age (based on recall of last menstrual period) were included in the analysis. Table 7.73 shows that pregnant women with delayed antenatal care (≥ 28 weeks of gestation) tend to have lower PMR compared to women with early ANC (Z=1.025; p=0.30) but the difference is statistically not significant. It is expected that women starting ANC before 28 weeks will have more ANC visits compared to those women starting late in pregnancy. However, it is also clear that the degree (in numbers) of antenatal visits is related to age, parity and education of the mother and particularly to the accessibility of health services. Thus any difference observed in the number of antenatal care visits may really be a difference in the characteristics of the pregnant women themselves.

Table 7.73 Number of women with delayed ANC >28 weeks by birth attendant

Gestational age	n	(%)	SB	END	PMR*	
< 28 weeks gestation	2822	(68.7)	65	66	131	(46.4)
≥28 weeks gestation	449	(10.9)	10	6	16	(35.6)
Unknown gestation	836	(20.4)	40	2	42	(50.2)
Total	4107	(100.0)	115	74	189	(46.0)

SB = number of stillbirths.
END = number of early neonatal deaths.
* PMR= number of perinatal deaths and perinatal mortality rate per thousand births.

So the question was asked whether the degree of antenatal visits is due to mothers characteristics, socioeconomic condition or health services. Therefore early and late ANC visits had to be controlled for possible confounding factors.

The term confounders is used to describe a covariate that is associated with both the outcome variable of interest and a primary independent variable or risk factor. When both associations are present then the relationship between the risk factor and the outcome variable is said to be confounded (Hosmer and Lemeshow,1989). Confounding factors occur most often when subjects can not be assigned at random to different groups, as in the case of antenatal care visits. The logistic regression coefficient (in the sence of probability) for any given variable is interpreted as the change in the dependent variable, holding all other variables constant. Therefore, the logistic regression model is a perfect way to control for a confounding variable (Dawson-Saunders and Trapper, 1990). For each variable the appropriate scale was assigned:

Independent variable for antenatal care.

Independent variable	**scale**
Biological	
1. age of mother	partial ordered (<20 vs.≥20 yrs)
2. parity	partial ordered (≥ 5 vs. <5)
3. gestational age	continuous
Socioeconomic	
4. education	cardinal discrete
Health care	
5. provider	nominal
6. distance	ordinal

The same method, as was applied for perinatal mortality and low birth weight, was used. Independent variables were grouped according to biological, socioeconomic and health services. After correction, the total number of valid cases eligible for further analysis was 2973 (72.4 per cent) pregnant women. The same cut-off points as for previous calculations were used. The chi-square was calculated for mother's biological factors e.g. mother's age and parity, place of residence and health care by Ra.TBA and Conv.TBA.

Table 7.74 Summary table of relative risk of prenatal factors associated with antenatal care

Risk factors	Relative risk	X2	p-value	95 % C.I.
Biological factors				
Age mother (<20 vs.≥20 yrs)	1.36	1.33	0.249*	0.81-2.28
Parity(≥5 vs 1-5)	0.79	0.45	0.501	0.39-1.59
Place of residence.				
Distance (far vs. moderate & near).	1.67	1.01	0.002*	1.221-2.31
Health care				
Birth attendant(Ra.TBA vs.Conv.TBA).	1.21	9.63	0.314	0.81-1.76

* significant p-value <0.25.

In table 7.74 it can be seen that age of mother and accessibility of health services (distance to health care) shows p <0.25 and will be used for further calculation in the logistic regression.

Table 7.75 The student t test and p-values of risk variables associated with ANC visits starting < 28 weeks of gestation and perinatal deaths

Risk variable	n.cases	Mean	SD	t-test	p-value
Mothers education					
perinatal death	139	5.75	1.991	1.26	.208*
still alive	2834	5.98	2.433		
Gestational age in weeks					
perinatal deaths	139	33.70	6.13	8.97	<.0001*
still alive	2835	38.42	4.25		

For variables such as mothers education and gestational age the student-t.test and p-values were calculated to study the relationship of early ANC visits to outcome. The continuous variables selected were number of antenatal visits and the gestational age at the time of delivery as can be seen in table 7.75. Mother's education will further be used in the regression equation because it fulfills the criteria of showing a p<0.25. The following step is to check for confounding factors using the multiple logistic regression model. A forward stepwise regression was calculated starting from the variable which has the lowest p.value, in this case gestational age (in weeks). The result can be seen in table 7.76.

Table 7.76 Multiple logistic regression analysis of independent variables for antenatal care

Variable	B	S.E.	Wald.	df	Sig.	Exp(B).	95% C.I.
Gestational age	-.173	.014	147.592	1	<0.000	.842	0.801-0.856
Distance	.487	.156	9.787	1	0.018	1.628	1.246-2.563
Constant	3.122	.505	38.223	1	<0.000		

It is interesting to find that variables such as mother's education, parity, birth attendant disappeared from the equation leaving gestational age and distance to the health center as the most predictive variable for the number of antenatal care visits. Why mother's education, parity and birth attendant disappeared is may be due to population characteristics which is more of homegenous type.

7.5.4. Factors studied in relation to maternal morbidity

Very few longitudinal studies on the pattern of general morbidity amongst rural pregnant women are available. Morbidity for this purpose has been defined as any ailment of pregnant women reported by them during the home visits by the interviewers. Only those pregnancies which could be followed up throughout have been taken for analysis. The total number of recorded pregnancies were 4146 women (including twins). Maternal deaths occurred in 20 pregnancies resulting in a maternal mortality ratio of 480/100.000 live births in 1988 and 490/100.000 live births in 1989, almost no difference between both years. The relationship between maternal morbidity and

mortality is difficult to evaluate because of the relatively small number of maternal deaths and beyond the scope of this report. The relationship between maternal morbidity and perinatal mortality was studied as can be seen in the following table 7. 77.

Table 7.77 Maternal morbidity according to stage of pregnancy and perinatal mortality.

Maternal morbidity	n.of peri-natal deaths	Number of. observations.	RR	X2	p-value	95% C.I.
Prepartum	189	4108	2.16	30.78	<0.0001	1.64-2.85
Intrapartum	189	4105	2.59	47.71	<0.0001	1.96-3.42
Postpartum	189	3094	1.45	6.32	0.012	1.08-1.94

RR= relative risk

As can be seen in table 7.77, maternal morbidity has at all stages of pregnancy a significant association with perinatal mortality although prepartum and intrapartum complications shows a higher risk to perinatal mortality compared to postpartum complications. It has to be seen whether it is a cause or effect relationship.

7.6. Women's perception of risk

In many communities of less developed countries, people rely on both modern and traditional health systems to solve their health problems. However the bulk of knowledge that influences their thinking and behaviour in this matter is influenced by local and traditional information and experience. The decision when and whether or not to seek help from a modern or traditional health care provider depends on how well modern health concepts and views are integrated into people's thought processes.

In order to identify gaps and establish acceptable areas for integration between modern and traditional knowledge and views in this case -childbearing and childcaring-, it is necessary to understand the women's knowledge, perceptions and to study their cultures views on the perception of life. In many countries, having a baby is viewed as part of the natural experiences in normal growth and development (Laderman, 1987). The first few months of pregnancy are expected to be relatively normal. It is therefore not uncommon for rural pregnant women to consult the health care provider after the first trimester of pregnancy. Most childbearing women in the third world have little knowledge what goes on during labour and delivery. It is the traditional birth attendant who has the greatest knowledge about pregnancy, labour and delivery. The formal health care is viewed as specializing in the relief of acute of physical illness by the use of scientifically prepared drugs, injections and operative interventions with which the traditional health care system has little or no experience. Mutambirwa in Zimbabwe (1987) reported from her comparative study that if an obstetric complication is perceived as a spiritual health problem the patient is often referred to a local (traditional) healer.

To study the health seeking behaviour of women in the study area, two KAP (knowledge, attitude and practice) studies of women were conducted. The first study was done in 1987 at the beginning of the Tanjungsari intervention study, both in the intervention area where almost all Ra.TBAs live and in the control area where the main TBAs were the conventional TBA group. The second survey was conducted in 1990 after the risk approach field study was finalized. Both surveys were done based on a sample.

The purpose of the first KAP-study was to:

1. collect cross sectional data on attitude, knowledge and behaviour of women in a rural area in Tanjungsari, West-Java.

2. provide baseline information on the situation in Tanjungsari before the intervention started.
3. assess the comparability of the intervention and the control groups. The question of interest to be answered is here whether there are any significant differences between intervention and control area that could be considered confounding variables in the evaluation.

While the objectives of the second KAP-study were to :

1. state changes in knowledge, attitude and behaviour of the rural women, in comparison with the results of the first KAP-study.
2. provide additional information necessary to evaluate the Tanjungsari intervention study.

The following result was found (table 7.78):

Table 7.78 Characteristics of women in the sample.

Characteristics of the women	1987 Intervention n = 254	Control n = 172	1990 Intervention n = 584	Control n = 581
Mean age at first marriage(yr)	-	-	17 (2.5)	17 (2.4)
Mean age at first delivery	-	-	19 (3.2)	19 (3.2)
Mean number of childern	-	-	2 (1.8)	2 (2.1)
Marriage <15yrs (%)	17.0	9.0	14.0	10.8
Delivery by (%)				
TBA	88.9	83.7	88.0	88.0
health personnel	11.1	12.4	10.0	9.5
Place of last delivery(%)				
Own house	84.0	80.6	81.2	77.2
Grandmother	6.2	11.5	8.9	13.6
Midwife clinic	1.6	1.8	3.4	4.2

( ) standard deviation.

There was no significant difference in the characteristics of women in the intervention and control area in 1987 as well as in 1990. The same result was found for characteristics of women in both areas in 1990, except for age at first marriage.
In the 1987 KAP study, a large proportion of respondents married at an earlier age: 17 per cent in the intervention area and 9 per cent in the control area were younger than 15

years at first marriage. The difference is statistically significant in the sense that the proportion of young marriages is higher in the intervention area ($X2 = 7.43$, $p<0.01$). The mean age at first marriage is 16.9 years in the intervention area compared to 17.3 in the control area. In comparison with the result of the KAP-study of 1990 it can be seen that the proportion of women married at an early age is declining to 14 per cent in the intervention area , but not in the control area. The age at first delivery is somewhat older although the same trend can be found. The number of women delivered before 15 years decreases from 4.5 per cent up to 3.1 per cent in the intervention area, while in the control area there was an increase from 1.2 per cent upto 2.8 per cent (in 1990, mean age at first delivery was the same (19 years) in the intervention as well as in the control area).

The number of deliveries conducted by TBAs in both areas was the same in both KAP studies. The grandmother's house was the second place preferred for delivery by the women in the rural areas. This is in accordance with tradition in many Indonesian societies where women go back to their mothers house, although they live in the same village. The result also shows less deliveries at a midwife clinic in the intervention area compared to the control area, probably due to the midwives visiting the pregnant womans house.

Table 7.79 Number of women reporting health problems during last pregnancy/delivery by area.

	1987				1990			
	Intervention		Control		Intervention		Control.	
	n	%	n	%	n	%	n	%
No health problem reported.	202	83.5	141	86.1	386	66.4	358	62.4
Health problems reported.	34	16.5	23	13.9	195	33.6	216	37.6
Total	236	100.0	164	100.0	571	100.0	574	100.0

n = number of women

Health problems reported during last pregnancy/delivery in the intervention area and the control area in 1987 were higher in the intervention area (table 7.79). In 1990 more health problems were reported from both areas, more reports came from the control area but the difference was not significant ($X2=2.35$, $p=0.1254$). The increase in reporting may be due to the improved knowledge of risk factors considered

"harmfull" by the women.

Table 7.80 Health problems reported during pregnancy/delivery by all women during last pregnancy/delivery in the intervention and control area (in percentage)

Health problems	1987				1990			
	Intervention		Control		Intervention		Control	
	n	%	n	%	n	%	n	%
Bleeding early in pregnancy	2	5.9	1	4.3	4	2.1	2	0.9
Antepartum bleeding	1	2.9	2	8.7	4	2.1	5	2.3
Postpartum bleeding	3	8.8	6	26.1	1	0.5	4	1.9
Lack of blood (anemia)	7	20.6	6	26.1	41	21.0	39	18.1
Fever	7	20.6	2	8.7	12	6.2	23	10.6
Edema	5	14.7	-	-	6	3.1	6	2.8
Others	9	26.5	6	26.1	127	65.1	137	63.4
Total	34	100.0	23	100.0	195	100.0	216	100.0

n = number of women

Table 7.80 shows the distribution of health problems as reported by the women. For more specific morbidity, women in the intervention area were reporting less health problems compared to the control area except for anemia (lack of blood) and edema. In the category of "others" are included more than one health problem as well as health problems not mentioned in the table, but still related to pregnancy or delivery. For single health problems, lack of blood (anemia) and fever show the highest percentage in the intervention area in 1987. In the control area postpartum bleeding and lack of blood (anemia) show the highest percentage. In 1990 the percentage of anemia is still higher among women in the intervention area than in the control area.

7.6.1. Women's knowledge of potential risk factors

One of the main objectives of the Tanjungsari intervention study is to change the perception and knowledge of potentially harmful risk-factors in the population. In order to assess this effect, a clear idea on the baseline perception is necessary, table 7.81 summarizes the results. The table shows the value of chi-square when significant at $p<0.05$.

Table 7.81 Knowledge of risk factors in intervention and control area. Percentage shows proportion of respondents answering "harmful"

	1987				1990			
	Interv. n = 254	Contr. n = 172	X2	p-value	Interv. n = 584	Contr. n = 581	X2	p-value
During pregnancy								
Stillbirth (≥2)	71.7	68.4	0.46	0.499	79.8	80.6	0.022	0.639
Abortion(≥3)	80.7	81.9	0.03	0.895	86.6	87.3	0.10	0.753
Caesarean section.	81.5	74.3	3.05	0.081	83.2	87.8	4.88	0.027*
Pregnancy after miscarriage.	77.2	66.1	6.12	0.013*	73.5	78.1	3.48	0.062
Height (<145cm)	51.8	48.0	0.56	0.452	46.2	48.5	0.72	0.397
MUAC(<22cm)	57.5	56.1	0.12	0.733	49.5	50.2	0.07	0.792
No weigth increase	91.3	86.5	46.15	<0.001*	91.1	94.1	3.96	0.046*
Oedema (hand+face)	84.6	90.6	3.33	0.068	89.9	82.8	12.49	<0.001*
Fever>3days	90.6	92.4	0.46	0.497	91.6	93.5	1.44	0.229
Bleeding	93.3	91.8	0.32	0.573	96.1	96.0	0.03	0.867
Cough & dyspnoe	98.6	84.2	21.36	<0.001*	96.2	97.1	0.64	0.425
Intra-/postpartum								
Breech position	87.8	88.3	0.03	0.857	83.4	90.2	11.74	<0.001*
Twins	63.4	56.7	1.76	0.184	65.6	69.5	2.07	0.149
Prolonged labour	96.8	92.4	4.24	0.039*	96.4	95.2	1.08	0.298
Antepartum bleeding	79.8	67.8	7.75	0.005*	69.0	76.2	7.67	0.005*
Excessive bleeding	96.9	97.7	0.25	0.614	98.8	99.0	0.07	0.787
Fever	78.7	60.2	16.72	<0.001*	76.7	70.6	5.66	0.017*
Foul amniotic fluid	92.9	83.0	3.58	0.058	81.0	74.5	7.04	0.007*
Convulsion labour	96.1	94.7	0.40	0.525	97.8	91.9	20.48	<0.001*
Postpartum bleeding.	92.9	95.3	0.51	0.474	79.5	79.5	0.00	0.977
Massive bleeding.	97.2	97.1	0.01	0.926	99.0	98.3	1.03	0.309
Postpartum fever	82.7	60.2	26.05	<0.001*	74.7	74.2	0.03	0.852
Fouly smell postpartum	94.1	86.5	7.02	0.008*	83.6	78.0	5.86	0.015*
Convulsion	95.7	95.3	1.73	0.188	97.1	93.5	8.52	0.003*
The newborn infant								
Weight <2000gr	81.5	69.0	8.63	0.003*	78.3	71.9	6.20	0.012*
Weight≥4000gr	63.8	57.3	1.67	0.196	70.0	58.7	21.29	<0.001*
Pale colour	96.0	91.8	3.40	0.065	93.5	93.3	0.15	0.703
Blue colour	97.6	94.2	1.24	0.266	94.2	94.8	0.13	0.717
Weak/flaccid	98.4	92.4	9.56	0.001*	94.3	91.7	3.07	0.079
Convulsion	99.6	95.9	7.50	0.008*	98.5	97.2	2.04	0.153

MUAC = mid upper arm circumference.
* = significant.

Table 7.81 shows the knowledge of women in both KAP studies. In 1987, women in the intervention area were reporting a higher percentage of risk conditions that they considered "harmful". This knowledge is consistent for most of the risk conditions during pregnancy except for fever> 3 days, bleeding during pregnancy, edema (hand and face),

cough and dyspnoe. Risk conditions in the intra and postpartum period considered harmful by women in the intervention area were also consistently higher except for breech position, excessive bleeding, postpartum bleeding, massive bleeding, and convulsion. The same result was found for risk conditions of the newborn infant. Women in the intervention area had more knowledge of risk conditions as being harmful compared to women in the control area, although not all differences were significant. In 1990, a change in knowledge was observed, more women from the control area reported risk conditions as being harmful. More specifically, knowledge of cesarean section, pregnancy after miscarriage, no weight increase, breech position, twins delivery, antepartum bleeding, fever intra/postpartum were reported as being harmfull. Knowledge of risk factors in the newborn have in general increased in the control area. Knowledge of other risk factors practically remained the same.

7.6.2. Referrals

The proportions of respondents referred to a health facility in the KAP-study of 1990 were 43.5% in the intervention and 34.9% in the control area. This difference is statistically significant (X2=5.58, p=0.003). Almost all those referred reported to have followed the advice of the traditional healer (96.1 % in the intervention area and 95.1 percent in the control area). This result differs with the results of the self reporting questionnairs presented in section 7.4 and 7.5. and may be due to the fact the questions in this section were directed to women stratified by area and not by birth attendant. The same information was collected with respect to the children: did the traditional healer ever refer one of the respondent's children to the health center or integrated health service post? The proportion of respondents reporting a referral is 52.1% in the intervention and 39.3% in the control area. The difference is statistically significant (X2=18.38, p<0.001). In the KAP of 1987 the following proportions were shown: 54 per cent in the intervention and 58 per cent in the control area. The difference here is not significant. In the KAP study of 1987, in almost all cases, the respondent took the child to the referred place: 96.7% in the intervention and 98.2% in the control area.

7.6.3. Consultation at health facilities by own decision

For comparison, in the longitudinal questionnares of the cohort the women were asked whether they had consulted the health facilities (personnel) for pregnancy, delivery and

postpartum condition by their own decision although they were still delivered by TBAs. Table 7.82 shows the result of consultation by own decision. Out of 4108 women in the cohort, 332 women (8%) consulted a health facility by their own decision. The distribution of preference for a special health facility was nearly the same for clients of Ra.TBA and Conv.TBA. This is also shown in the total number of women in both groups. In the Conv.TBA group more women were going to formal health sectors compared to Ra.TBA.

Table 7.82 Consultation for pregnancy,delivery and postpartum condition at health facilities by own decision

Health Facility	1988			1989		
	Ra.TBA n (%)	Conv.TBA n (%)	Others n (%)	Ra.TBA n (%)	Conv.TBA n (%)	Others n (%)
IHSP	8 (0.9)	1 (0.1)	- (0.0)	7 (0.5)	- (0.0)	1 (0.4)
Health post	5 (0.5)	6 (0.9)	1 (0.5)	3 (0.3)	12 (1.3)	- (0.0)
Health center	3 (0.3)	10 (1.1)	3 (1.5)	8 (0.7)	17 (1.9)	4 (1.7)
Hospital	3 (0.3)	- (0.0)	4 (2.0)	2 (0.2)	4 (0.4)	11 (4.6)
Private MD	1 (0.1)	1 (1.4)	2 (1.0)	4 (0.4)	4 (0.4)	- (0.0)
Private midwife	14 (1.5)	31 (4.4)	20 (1.2)	42 (3.7)	57 (6.3)	36 (16.8)
Total	41 (4.4)	49 (7.0)	30 (15.6)	66 (5.8)	94 (10.4)	52 (21.3)
Total women	939	705	192	1138	907	214

IHSP = Integrated health service post.
MD = Medical doctor.
( ) percentage was calculated to total women in each group.

The number of women consulting health facilities by their own decision have in general increased during the second year of study. This is particularly so for Conv.TBA clients, which showed a significant increase ($X2=5.75$, $p=0.0017$). There is also an increase of 5.7 per cent of women clients of "Others", consulting a health facility in the second year compared to the first year of study. Although the numbers were very small, Ra.TBAs clients showed the least increase. It is interesting to note that the private midwife is the most preferred health person for referral.

7.7. Task analysis of health personnel at the health center in Tanjungsari.

The health center is an important part of the health care delivery system and its responsibility is to provide comprehensive care to the community in a certain geographic area. The health center is situated in a subdistrict which according to governmental policy will cover an area with a population of about 30.000 people. Due to lack of staffing and problems in the health infrastructure in Tanjungsari there was only one health center which served a population of almost 90.000. There were two more health posts managed by a male nurse. The responsibility of the health center is to conduct 13 programmes with priorities which were decided by the provincial health authorities.
About 6 months after the intervention study had started, a task analysis of health personnel was conducted by the research team (Dadang Primana et al, 1988). The purpose was to identify the task of each health personnel and to recognize the productivity of the health staff as well as to recognize the scope of the health services. The type of study was cross sectional through interviews and observation.

Table 7.83 Distribution (%) of activities in hours per week by health personnel

Activity	MD	Nurse	Midwife	Nurse-midwife	Vaccinator
1. Morning roll call and work preparation	190' (7.8)	95' (4.2)	155' (6.5)	155' (7.0)	130' (5.4)
2. Promotive/preventive services	660' (27.2)	460' (20.2)	1085' (45.7)	1305' (58.9)	1670' (44.0)
3. Curative services	500' (20.6)	630' (27.6)	250' (10.5)	150' (6.8)	0' (0.0)
4. Administration	195' (8.0)	310' (13.6)	280' (11.8)	260' (11.7)	570' (23.5)
5. Formal meetings/ consultations.	270' (11.1)	350' (15.4)	240' (10.1)	125' (5.6)	120' (4.9)
6. Others	615' (25.3)	435' (19.9)	370' (15.6)	220' (9.9)	540' (22.2)
Total	2430'(100.0) or 40 hrs 30 min.	2280'(100.0) or 38 hrs	2380'(100.0) or 39 hrs 40 min	2275(100.0) or 37 hrs 55 min	2340' 100.0) or 40 hrs 30 min

Source : D. Primana et al, 1988
( ) percentage.

The research undertaken was on health personnel involvement in Mother and Child health services and the objective was to study how well prepared the health facility and personnel were to manage referrals. The result shows that formal education, additional education, skills and knowledge of the staff were relatively sufficient, however the staff

still needed to be encouraged to improve their skills and knowledge. In general, all health personnel involved in the care of the mother and child also have other responsibilities. The health center doctor as the head of the health center, also has such responsibilities as being a manager, local expert, district head assistant as well as some other kinds of responsibilities.

As can be seen from table 7.83 the time spent by the personnel is described in detail according to their task, type of activity and working hours. The health personnel should work for 38-40 hours a week, which is acceptable. However the quality and the coverage of the areas of work should be improved.

In Indonesia as in many other developing countries, preventive and promotive care has the main priority, the time spent for both programmes activity ranged from 20 - 58 per cent of total hours per week. Preventive and promotive services are mostly carried out by midwives and nurses. The activities relate to examination of pregnant women, infants, immunization, family planning and nutritional education. Activities outside the health center consists of visits to the integrated health post.

The time spent for curative services ranges between 6.8-27.6 percent. Curative services include examination of patients, emergency care and treatment of patients. A health center doctor may delegate his authority to a midwife or nurse if he is too busy with managerial responsibilities. The health center doctor is also responsible for treating cases referred by the midwives or nurses. However if the health center doctor has only 20.6 % per cent of his time available for curative services (this means only 1 - 1.5 hours a day) it will be difficult to maintain his clinical skills. It is therefore understandable that the longer the health center doctor works at the health center the less he is able to manage emergency cases. The same result was found for the health center midwife and the nurses. This condition is frequently found in Indonesia where manpower and resources are very thinly distributed especially in an area such as Tanjungsari which has a population of almost 90 000 and only one health center doctor. This same condition is also reported by Kusin et al. (1989); she related the constantly high infant mortality rate to the meager available resources and health personnel in rural areas.

To analyze the knowledge and skill of the health center personnel, this study will report the summary of case studies of perinatal and maternal deaths (see Appendix A).

Case review of perinatal and maternal deaths.

The research team has reviewed all perinatal deaths and 20 maternal deaths which occurred during the study period; nine of these cases are included in Appendix A. In each

case the performance of the health personnel and the informal sector was evaluated. The informal sector included the mother's attitude and behaviour and that of her family and community. The organized health care delivery system included the village doctor, the midwife and the nurses. And lastly are the intersectoral level and its resources. The key questions here; were the right things done, were things done right (McCarthy ,1991)?.

Lack of resources appeared to be the major obstacle to adequate performance, although the need for increased knowledge and skill in perinatal care was also evident. Incorrect recording, referrals not made appropriately and mothers with high risk pregnancies not given proper follow-up were identified. Only a limited number of staff members skilled in providing perinatal care was available. Very few health providers were skilled in treating risk women. So, there is lack of knowledge especially concerning emergency care and stabilization of the patients before referral to the hospital. Health personnels attitude were in general appropriate. The major attitudinal obstacle is probably related to the low salaries for health care providers. In addition to the previously mentioned problems, there were not enough educational and training programmes. Other problems included clinic scheduling that did not anticipate the unpredictable nature of problems related to high risk pregnancies, as well as policies and standard operating procedures that were not always followed.

7.8. A general overview of the Tanjungsari study

7.8.1. Pregnancy related morbidity of women

Pregnancy related morbidity (or pregnancy complications) was collected based on the pictures of risk condition on the problem action guidelines as well as from the mother & child card. The purpose was to keep simplicity in identification by mother and TBAs. Pregnancy related morbidity has to be differentiated from chronic morbidity as result of pregnancy and delivery such as prolaps of the uterus or fistulas as consequences of prolonged and difficult labour.

Table 7.84. Incidence of morbidity among pregnant women during period of pregnancy and delivery (number of pregnant women = 4108)*

Complications	antenatal		delivery		postpartum		total	
	New cases	%	New. cases	%	New cases	%	New cases	%
No weight increase.	516	(12.6)	-	-	-	-	516	(12.6)
Paleness (anemia)	-	-	-	-	454	(11.1)	454	(11.1)
Hemorrhage	136	(3.3)	532	(12.9)	30	(0.7)	698	(16.9)
Prolonged labour	-		202	(4.9)	-	-	202	(4.9)
Fever >3 days	273	(6.6)	97	(2.4)	544	(13.2)	914	(22.2)
Convulsion	-	-	27	(0.6)	18	(0.4)	45	(1.1)
Foul discharge	-	-	63	(1.5)	261	(6.3)	324	(7.8)

() percentage from total women.
* One woman may have more than one symptom.

So far there is less information available of both kinds of morbidity for rural areas, especially in Indonesia. The incidence of pregnancy related morbidity as defined above was calculated for each period of pregnancy (table 7.84). Fever >3 days was highest especially in the postnatal period. Second highest was hemorrhage at delivery. New cases of bleeding which started in the postpartum period consisted of only 0.7 percent of total women. Postpartum hemorrhage that started immediately after delivery was included in the delivery period, because it was impossible to separate both events. Symptoms of anemia such as paleness and dizziness was reported by 11.1 per cent of total women particularly in the postpartum period.

When comparing the Tanjungsari study with the study of Datta et al. (1980), they show different patterns. His study in Alwar-Rajastan, showed that for every maternity death there were 60 episodes of sicknesses of which 16.5 sicknesses were related to pregnancy and puerperium. The Tanjungsari study showed higher ratios, In the first trimester 101 women had an abortion (2.4%). During the second and third trimester 1248 women reported one or more pregnancy comlications and complaints, 969 women reported in the delivery period and 1105 women reported in the postpartum period. Some women continued to have problems during delivery and postpartum period. The total number of women complaining about pregnancy complications at any time during pregnancy, delivery and postpartum period is 2434 or 42.9% of all women in the study area (table 7.85). However some women may have more than one complication.

Table 7.85. The progress of the Tanjungsari cohort study of 4209 singleton pregnancies.

Stage of pregnancy	No cases	Termination by stillbirth or early neonatal death	death of mother	Total reported cases related to pregnancy or puerperium n cases	%	new cases
First trimester	4209	101/2.4*	1	101	2.4	101
Second/third trimester	4108*	1/ 0.2 **	2	1248	30.6	1248
Delivery	4105	74/1.85**	3	969	23.6	601
Puerperium	4102	97/2.37***	14	1102	26.9	484
Total	4209	273/6.2 %	20	3420		2434

Total 4108 women excluding abortion
* abortion per thousand pregnancies
* * stillbirth rate per cent births (included one abortion).
* * * early neonatal mortality rate per cent livebirths

One objective of the risk approach is to be able to identify a risk factor or risk condition and apply some intervention to minimize or eliminate the risk factor. The basic principle of the risk-approach is that the strategy should be explicit and its value measured. Improvement in the biological indices however may not be apparent for some considerable time so that the statistical proof of the value of the new intervention will not be readily available. It might be possible however, to demonstrate a reduced frequency of undesired outcome in defined

subgroups such as fewer morbidities and perinatal deaths or a lowering of infant mortality rates in children of grande multiparae. In the case of pregnancy complications a summary of results can be seen in table 7.86.

Table 7.86 Percentage of women reporting pregnancy complications by birth attendant (after adjustment for "no tetanus immunization")

Period of pregnancy and postnatal period	Ra.TBA n = 2078	Conv.TBA n = 1612	Others n = 406
Previous history	19.7	24.7	19.8
Antepartum	27.1	32.7	39.7
Delivery 15.1	12.5	57.5	
Postpartum	27.4	26.5	26.9
Postnatal period			
Immediate neonatal	5.9	6.7	2.6
early neonatal	3.9	6.0	2.6
late neonatal	7.8	6.1	5.9

It shows that clients of Ra.TBAs were reporting fewer morbidities based on pregnancy history and in the antepartum period, during the delivery and postpartum period it is almost the same. In the immediate and early neonatal period, the incidence of morbidity of infants who were the pregnancy outcome of clients of Ra.TBAs was also lower compared to Conv.TBAs and "Others" except in the late neonatal period.

When pregnancy complications were cross tabulated by mothers age and pregnancy period it shows that women ≥35 years reported more complications in the antepartum period and the postpartum period. Women less than 20 years reported the lowest number of complications compared to women in the most favourable age group (20-35 years). This result still needs further research for possible confounding factors.

Women of first parity (<2) have almost the same percentage of complications at any period of pregnancy. The result was different for women in the favourable parity group (2-4 children) and women with 5 or more children. There was a higher percentage of complications in the antenatal period followed by the postnatal period, while during the delivery period less morbidity was reported.

Education of women was classified into two groups, those with 6 or less years of education and those with more than 6 years of education. In this area, the percentage of women with 6 years or less years of education is almost 70 percent while illiteracy can be found in women more than 40 years old. Pregnant women with ≤6 years of education reported more complications except in the postpartum period compared to those with more than 6 years of education, although the difference is small.

7.8.2. Referrals

Referrals is an indicator of effect measurement, a comparison of percentage of referrals between the groups of birth attendants and stage of pregnancy can be seen in table 7.87.

Table 7.87 Percentage of women referred out of those in need for referral by birth attendant

Period of study	Ra.TBA	Conv.TBA	Others
Previous history	53.4	47.7	42.4
Antepartum	75.1	44.9	38.4
Delivery	15.1	12.5	57.5
Postpartum	26.7	13.4	17.4
Postnatal period			
Immediate neonatal	18.8	38.5	57.1
early neonatal	26.9	16.1	28.6
late neonatal	66.1	32.5	50.0

In the Tanjungsari intervention study the strategy to enhance compliance was to train the TBAs to motivate the pregnant woman and her family about the problems that may occur when a risk condition was identified. How able the TBA was to motivate the clients for referral can be seen in the referral rate. In general there were more referrals by Ra.TBAs in the antepartum period exceeding 75 per cent of all pregnant women in need of referral, less referrals were made by Ra.TBAs during the delivery and in the immediate neonatal period (table 7.87).

This result differs from the results of the KAP study. In the latter the respondents were women selected at random in the intervention and control area (section 7.6.2). The purpose is to study the impact on the total population in both areas. The KAP study also does not

differentiate between the various stages of pregnancy and delivery.

7.8.3. Compliance and non-compliance

Figure 7.12 shows the percentage of compliance of referred women to health facilities by birth attendants. For the purpose of comparison only women referred by TBAs were discussed.

Figure 7.12. Compliance of women by birth attendant and stage of pregnancy and delivery

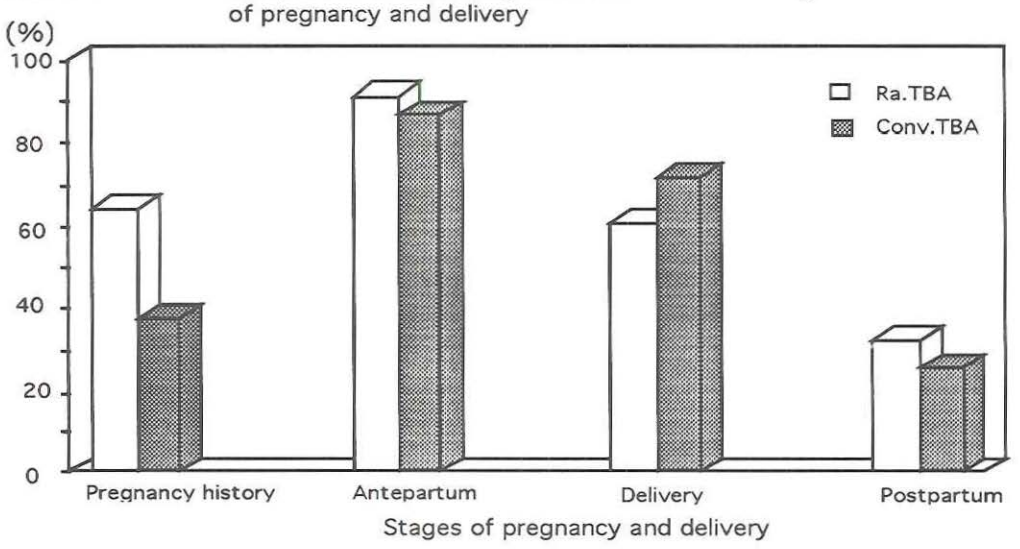


Table 7.88 Percentage of non-compliance by birth attendants and stage of pregnancy

Stages of pregnancy	Ra.TBA	Conv.TBA	Others
Previous history	35.9	63.6	23.3
Antepartum	8.6	13.9	6.6
Delivery	39.7	28.2	3.1
Postpartum	68.3	74.6	41.7
Postnatal			
immediate neonatal	81.9	73.1	33.9
early neonatal	61.5	83.9	66.5
late neonatal	42.9	71.4	50.0

In table 7.88 it can be seen that at all stages of pregnancy, except during delivery, more clients of Ra.TBAs were complying to the instructions of the Ra.TBA, although the difference was significant only for antepartum referral. The same result was found in the early neonatal and late neonatal period. Highest non-compliance rate was in the immediate neonatal period, this may be due to the traditional habits where newborns infants may not be taken out of the house unless they are 40 days old

Because the numbers were very small, reasons for non-compliance were discussed for all women irrespective of birth attendant. The reasons for non-compliance can be seen in table 7.89. In the antepartum period the main reason for non-complying is "no-time" followed by" other reasons" as a compilation of several reasons. Too expensive was in the third place. During the delivery period feeling "too sick" was the main reason which is understandable, considering the difficulty in making the decision to follow the instruction of the birth attendant as well as the problem of transportation. This is followed by feeling of "unnecessary" probably related to the acceptance of fate and too expensive is still in third place for non-compliance during delivery. In the postpartum period "feeling too sick" was on the first place followed by "not necessary'.

Table 7.89. Reasons for non-compliance to referral

Reasons	antepartum		delivery		postpartum	
	n	%	n	%	n	%
Not necessary	15	11.7	9	20.9	20	16.5
Too far/no transport.	6	4.7	4	9.3	6	4.9
To expensive	16	12.5	6	14.0	9	7.5
Husband not agree	4	3.1	3	7.0	2	1.6
No care for children	11	8.6	-	-	12	9.8
No time	39	30.5	-	-	7	5.7
Too sick	-	-	10	23.3	56	45.9
Died before leaving	-	-	1	2.3	-	-
Health personnel came	-	-	4	9.3	1	0.8
Mother went to private midwife*	-	-	5	11.6	1	0.8
Prefer own tradition	-	-	1	2.3	1	0.8
Others*	37	28.9	-	-	7	5.7
Total	129	100.0	43	100.0	122	100.0

* Mother did not go to the recommend referral place.
**Others, includes immunization.

7.8.4. A comparison of biological and social variables in infants who die and those who stay alive

Are there any differences in the characteristics of those infants who stayed alive and infants who died in the perinatal period? To be able to answer these questions the characteristics of pregnant women with perinatal mortality, clients of Ra.TBAs and Conv.TBAs were compared (table 7.88)

Table 7.90 Percentage of risk factors for perinatal deaths and survivals, clients of Ra.TBAs and Conv.TBAs (singletons , years combined).

Risk factors	Ra.TBAs Died	alive	X2	p-value	Conv.TBAs Died	alive	X2	p-value
Mother characteristics								
age ≥35 yrs	16.4	8.2	4.34	0.037*	15.7	10.7	1.72	0.189
parity ≥5	15.0	9.1	3.21	0.073	10.0	8.8	0.13	0.719
birth interval								
< 18 months	8.3	5.7	0.56	0.455	10.6	6.8	1.03	0.309
Socioeconomic conditions								
education ≤3	5.0	5.6	0.06	0.814	7.1	7.2	0.00	0.968
occupation								
(housewife)	77.5	73.5	0.62	0.431	77.0	71.2	0.00	0.968
farmer	58.7	52.0	1.40	0.236	48.6	42.7	0.93	0.334
no safe water	63.8	47.5	8.14	0.004*	25.7	28.1	0.20	0.658
open latrine	62.5	58.2	0.59	0.441	44.3	48.5	0.48	0.489
house owner	80.0	79.2	0.03	0.855	74.3	75.5	0.05	0.819
Health services								
ANC <4	41.0	30.8	3.64	0.05	33.3	30.1	0.15	0.699
not accessible	50.0	33.7	9.04	0.026*	42.8	35.5	1.56	0.211

* significant at p value <0.05

The results showed that a significant difference of risk factors was found in pregnant mothers who were clients of Ra.TBAs especially for age of mother ≥35 years, no safe water supply and no accessibility of health center (distance to the health center). Number of ANC visits is an almost significant factor to perinatal death. This result also supports the multiple regression analysis that distance to a health facility is an important factor for number of ANC visits and therefore indirectly to perinatal mortality rate. For pregnant women who were clients of Conv.TBAs there is no significant difference for any

of the demographic (or biological) and socioeconomic risk factors. The conclusion that could be drawn from table 7.91 is that pregnant women clients of Conv.TBAs were of a more homogeneous group.

Table 7.91. Relative risk and population attributable risk of risk factors and risk conditions for perinatal mortality.

Risk factors	n	+	percent	RR.	X2	p-value	95% C.I.	PAR.(%)
Previous history.								
Age of mother, ≥35 yr.	404	22	9.9	1.26	1.08	0.298	0.82-1.95	2.5
Parity ≥ 5	339	19	8.8	1.07	0.09	0.765	0.68-1.70	0.6
Birth interval <18 ms	101	10	3.9	2.53	8.76	0.003*	1.36-4.70	5.6
Stillbirth.	64	4	2.3	1.48	0.63	0.437	0.56-3.89	1.1
Cesarean section	42	6	1.5	3.47	10.47	0.001*	1.62-7.44	3.6
Prepartum:								
No weight gain	514	38	12.5	1.7	9.1	0.002*	1.20-2.19	8.0
Antepartum bleeding	135	26	3.3	4.5	65.0	<0.001*	3.11-6.59	10.4
Fever > 3 days	271	19	6.6	1.5	3.3	0.069	0.47-2.41	3.2
Cough & dyspnoe	181	12	4.4	1.4	1.5	0.223	0.80-2.50	1.7
Edema	417	28	10.2	1.5	3.9	0.046*	1.01-2.19	4.9
Delivery								
Bleeding in labour	572	36	13.9	1.12	0.4	0.524	0.74-1.58	1.6
Fever in labour	114	15	2.8	2.92	18.3	<0.001*	1.78-4.78	5.1
Foul smelling discharge	62	6	1.5	2.07	3.4	0.071	0.96-4.49	1.6
Prolonged labour	199	26	4.8	3.02	32.0	<0.001*	2.05-4.45	8.8
Convulsion in labour	37	2	0.9	1.14	0.1	0.694	0.29-4.42	0.1
Breech	120	32	2.9	5.15	93.87	<0.001*	3.66-7.26	10.7

N= number of cases
+ = number of perinatal deaths.
RR = relative risk.
95% C.I.= 95 per cent confidence interval.
PAR = population attributable risk.
* = significant.

The population attributable risk (PAR) was calculated for each risk condition irrespective whether or not the relative risk shows significant p-values. Risk conditions were divided into three groups; risk factors which occurred before pregnancy were included in the previous history. This includes also mothers characteristics and previous stillbirth or previous cesarean section.It can be seen that, although the relative risk is low when the frequency of the risk factor is high then PAR is also high. During prepartum period and delivery, risk factors that show significant p-values have also high PAR. These are: no-

weight gain, prepartum bleeding, prepartum edema, fever (infection), prolonged labour and breech delivery. The PAR in table 7.91 is calculated for perinatal mortality. This may be the reason why bleeding and foul smelling discharge and convulsion in labour show low PAR's. A different picture may arise if the analysis was directed to maternal death. The elimination of risk conditions during antepartum and delivery is more or less dependent on the services available at the health center and the quality of care by the health personnel.

7.9. Summary

The results of the Tanjungsari intervention study can be summarized into 5 parts:

1. Demographic characteristics including the characteristics of the women.
2. The traditional birth attendants.
3. Effects and impact measurements of training TBAs in risk approach.
4. Women's perception of risk
5. Task analysis of the health care provider.

The TBAs were our target group of interest while the pregnant women were the subjects of the study. In the analysis subjects of the Tanjungsari intervention study were divided into three groups, clients of the RA.TBA, clients of Conv.TBA, included in " Others" are clients of formal health personnel.

1. Geographically there were some differences in the condition of the areas, the northern part of Tanjungsari, where most of the Ra.TBAs live is mountainous. Some villages are not accessible by a four wheel vehicle. Electricity was available only in the area near the main road and there was almost no water during the dry seasons in the northern part. Demographic characteristics show that there was some difference in the characteristics of pregnant women in the three groups. The demographic tree of the intervention area (northern part of Tanjungsari) has a broader base compared to the control area (southern part) which shows a smaller base, a typical profile of a more developed community. Characteristics of subjects in the three groups show that clients of each category of birth attendant were not different except that the educational level of clients in group "Others" were higher.
2. The TBAs in the intervention area were trained to identify risk factors and risk conditions. Post-training evaluation shows that TBAs could absorb the newly acquired knowledge, this result was also shown from the first KAP study of TBAs conducted in 1978. Ra.TBAs could identify risk conditions and conduct the expected action of referral. A second KAP study was conducted after the Tanjungsari study had finalized the operational part in December 1989. The results show that within two years of intervention the Conv.TBAs had improved their knowledge, there was almost no difference in knowledge, attitudes and practice of both groups of TBAs. The conclusion that could be drawn from this result is that a contamination of knowledge of TBAs from the intervention area to the control area had occurred.

3. The tools that were used for the Ra.TBAs were the mother & child card. This home based recording card was kept by the mother and filled-in by the Ra.TBA, whom she had contacted during pregnancy and delivery. A problem action guideline booklet was developed to be used as a handbook by the Ra.TBA. The mother & child card was effective from the point of recording, it is easy to record and to take information about mothers condition in pregnancy until the postpartum period. However it was not very much effective for the TBAs because those TBAs who could not read and write were not filling the card properly. During the training period they could fill-in the card. But as soon as they are alone they do not have the confidence to do it by themselves. Parents were helping the TBAs to fill in the birth weight, the result shows the tendency to record higher birth weight.
4. Almost ninety per cent of deliveries were attended by TBAs and about 10 per cent by health personnel. More than 90 per cent were home deliveries. The health center is underutilized for delivery.
5. Effects measurements were using the methods suggested by Reynolds and Gaspari (1985). The input was the training of TBAs in the risk identification, referral and the mother and child card. Outcome measurement was divided into three categories, the outputs and effects measurements as well as the impact of the training. For the purpose of analysis, the period of pregnancy was divided into four groups e.g.; antepartum period, delivery period, postpartum period and the neonate. For each of these periods the same approach of analysis was applied. In the results the morbidity pattern and number of women with the risk condition in each period of study were discussed. Number of antenatal visits and women immunized against tetanus and referral was discussed as a measure of effects. Included were compliance rate to answer how able the TBA was to motivate her clients for referral. It was decided to use this method with the assumption that a birth attendant should be able to recognize, refer "at risk" cases and motivate a woman to go for referral. In the best situation there should be no non-compliance. The following results were found: in the outputs measurement, there was modest improvement in the number of morbidities of clients of Ra.TBAs compared to Conv.TBAs. They reported lower morbidity in the antenatal period of pregnancy but not in the delivery, postpartum and late neonatal period, but the differences are not significant.
6. Effect measurements covered percentage of women referred by birth attendant and the compliance rate. The following results were shown : as was expected non-compliance

were in general high in clients of all birth attendants. For Ra.TBA the percentage of non-compliance was lower compared to Conv.TBAs when referral was based on previous history and antepartum period and postpartum period. It was higher in the immediate postnatal period. This may be due to difficulties such as transportation and communication in the northern part of Tanjungsari. Number of antenatal visits was generally high in the three groups. The same was found for number of tetanus immunizations. The latter was due to a mass campaign conducted in both areas by the local health authorities.

7. Impact measurements included birthweight distribution and mortality rates. The results can be summarized as follows: there was no difference in the mean birth weight and incidence of LBW. There was a significant difference of LBW rates between referred and non referred cases of Ra.TBAs but not so by clients of Conv.TBAs and Others. In the first year, perinatal mortality shows the lowest rate by Ra.TBAs, highest by Others. In the second year of the study, the situation changed showing moderate decrease of PMR in RA.TBAs infants, significant decrease in PMR of Conv.TBAs infants and still high PMR in clients of " Others". A better way of assessing result is birth weight specific mortality (BWSM). It was found that PMR for Ra.TBAs infants ≥3500 gram was lower compared to Conv.TBA. in the first year of study. In the second year, no perinatal deaths occurred in Ra.TBAs infants more than 3500 grams. There was still a high PMR of infants >3500 grams by Conv.TBAs. A significant difference between PMR of infants referred by Ra.TBAs and non referred infants was found, while between infants of Conv.TBA and "Others" there was almost no difference in the perinatal mortality rates of referred and non referred infants. This result may lead to two possibilities: identification of risks were incorrect and the referral cases were not the mothers at risk, or timely referral and correct case management resulted in better survival.
8. Maternal mortality ratio (MMR) was 480-490 /100.000 live births, there was no difference in maternal mortality ratios in the first and second year. Eighty five percent of maternal deaths were referred by TBAs. Lack of facilities, delayed decision at home, distance, skills of health personnel were the main reasons of delay. The three main causes of death were: bleeding, prolonged labour and infection.
9. Women's perceptions of risk conditions were studied based on two KAP studies, the

first at the beginning of the intervention study and the second after the intervention study finished in 1990. A significant difference at the beginning of the study was found, this was not apparent at the end of study. The result shows that contamination of the RA. intervention to the control area had occurred. Surprisingly the number of women consulting health facilities by own decision is still low.

10. The formal health care had only limited staff skilled in providing perinatal care, very few were skilled in treating women with high risk pregnancies.This can be seen from the case review of perinatal and maternal deaths. The major attitudinal obstacle was presented by the low pay structure of health care providers and thus they were less likely to devote adequate time and effort to prenatal and delivery services. Next are the many programmes that had to be carried out leaving less time for health care providers to conduct clinical and emergency care.

Chapter 8. GENERAL DISCUSSION

The basic needs in planning for medical care in pregnancy are essentially the same throughout the world, although there is an enormous variation in the standards of skills and facilities available. In perinatal care the primary need is to ensure that all pregnant women have access to a basic level of obstetric care, so that higher skills and more sophisticated technology can be made available to mothers at risk. Furthermore in developing countries shortage of resources, manpower and equipments stresses the need for seeking ways to optimize the use of whatever existing resources are available (Viega et al, 1987). In countries where most of the deliveries take place at home by traditional birth attendants the most frequent proposed strategy for reducing perinatal mortality is the training of TBAs. The justification for this is that TBAs are accepted members of the community and reimbursed by women and their families and do not add to the government budget (Laderman, 1985; Maine, 1991).

8.1. The conceptual framework of perinatal and maternal mortality

Results from various studies showed that major social and biological effects on perinatal and maternal mortality were the same in each country studied. The degree to which they influenced the level of perinatal mortality however might vary from country to country even within a certain geographic area, but a common pattern may be found. The health of the newborn and the reproductive health needs of women are inseparable. Both are deeply embedded in the social pattern of marriage, the expectation of child bearing and the competitions of production and reproductions (WHO, 1992). These factors influence the incidence of low birth weight which in turn represents a major factor contributing to subsequent infant mortality and morbidity.

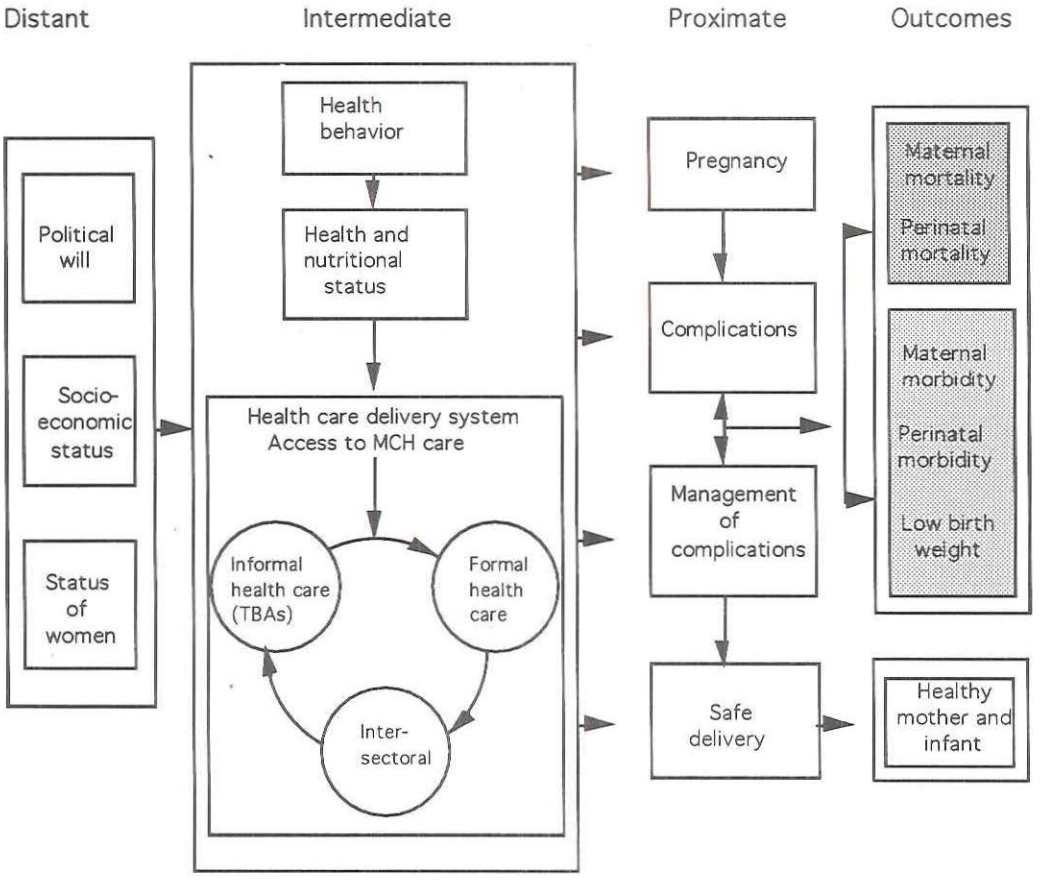
Maternal and perinatal mortality are indicators of the health of women of reproductive age and an indirect measure of the quality of the health care delivery system (Walsh et al., 1991). In the conceptional framework of perinatal and maternal mortality adapted from McCarthy and Maine (1991), the TBAs play an important role. Pregnancy outcome is also dependent on other factors as can be seen in figure 8.1.

To improve perinatal outcome distant variables that may have an effect on pregnancy outcome are the political will, socioeconomic condition and the status of the women.

Variables that may have an intermediate effect are mothers health status and her health behaviour including reproductive behaviour. Next is health services. In the conceptual framework, health services are divided into three groups, the informal, the formal sector and the intersectoral services. The informal sector are the TBAs and the community, while included in the formal sector are all services available through the health center, hospital and private midwives. Access to perinatal care is also dependent on intersectoral conditions such as the availability of transportation (distance to the health center) and communication.

Figure 8.1.

Conceptual framework of perinatal and maternal mortality.



Modified from McCarthy and Maine, 1991

Proximate factors related to outcome are the availability of quality care for the management of complications. Appropriate case management will result in safe delivery and healthy mothers and infants, while mismanagement of pregnancy with complications will increase the risk of perinatal and maternal mortality and morbidity. Outcome variables covers the two extremes, perinatal and maternal deaths and healthy mother and child. Low birth weight is an outcome closely related to perinatal mortality and is now considered an indication of the health status of a community (Lechtig et al., 1978; Kusin et al., 1989; WHO 1992).In the conceptual framework, perinatal mortality is not only the concern of the medical science, a social science approach is equally important.

8.2. The implementation of the risk approach in Tanjungsari

The risk approach is a frame work for selective provision of health care services advocated by the World Health Organization for quantifying risk factors associated with perinatal mortality (WHO, 1984; WHO, 1992). This method has been successfully employed in several countries. The principles of the risk approach are generally applicable. At present, special attention is being directed to the problem of the most vulnerable groups, namely mothers and children. In the meantime, there is a need for a more realistic approach to priority health problems, particularly in the poorer areas of the world. An approach that will have as its objective the increase of effectiveness of primary health care by directing existing and potential human resources for those in greatest need. Inherent in the risk approach is the managerial strategy and the need for maximal utilization of available resources to complement the health care delivery system. Because the relative weight of the risk factors in predicting outcome varies greatly in different populations, intervening and confounding variables always require local studies (WHO, 1984).

The WHO suggests the RA strategy may be usefully applied to various activities both inside and outside the formal health system. Eight such uses of the risk approach strategy of resource allocation and care in proportion to need are suggested. Each seems likely to have a positive effect upon the health care of mothers and children (WHO,1984). The eight suggested intervention of the risk approach are the following. Inside the formal health care system are: increasing coverage, improving referrals, modifying risk factors, local, regional and national reorganization and training. Outside the formal

health care system are: self and family care, local community care and intersectoral policy. However the RA. literature is almost exclusively concerned with increasing coverage, improving referral or modifying risk factors; examples are treating pregnancy complications, providing iron tablets to prevent anemia etc. (Workbook, 1984; Hayes, 1991).

8.2.1. The effectiveness of training TBAs to increase coverage

The main objective in this thesis is to improve knowledge, attitudes and skills of traditional birth attendants to identify high and low risk mothers and to conduct appropriate action in this case referral. Screening for risk factors is often presented with the hope that through screening a large proportion of the pregnant women at risk can be identified early in pregnancy. To be able to re-allocate resources according to need, the risk approach advocates collecting data on every individual woman and infant, therefore every pregnant woman must be contacted (McCarthy, 1992). Since all women are under surveillance, they can receive early treatment for any complications. In a country situation where 90% of deliveries are conducted by TBAs there is almost no other alternative than to use the TBAs in the surveillance system.

Of all implementations of the risk approach the accuracy of identification or measurement of risk is probably the most crucial point. The WHO document identifies three criteria to determine the appropriateness of a risk measurement tool for the purpose of screening. First, the technology should be simple, accurate and appropriate to the setting. Second, the process of detection should be accepted by both those carrying out the screening and those subjected to it. Third, the result should be easy to record and interpret meaning that the risk factor should be easily recognized by the local people who should be trained to use the risk approach.

a. The technology should be simple, appropriate and accurate.

Primary health care is likely to be most effective if it employs means that are understood and accepted by the community and applied by community health workers at a cost the community could afford. These community health workers or TBAs, will function best if they reside in the community they serve and are properly trained socially and technically to respond to its health needs (Alma Ata, 1978). With this consideration in mind the tools

developed in the Tanjungsari study were expected to be appropriate for semi-illiteracy and old age community health workers. The simplicity of the pictorial form were the basis for the development of the Mother & Child card and the problem action card which follows a logical flowchart for the identification of risk condition and action to be taken by traditional birth attendants. As home based recording and action card the M&C card is also aimed as an educational tool for the mother and community about risk factors or risk conditions that may develop during pregnancy, delivery and the postpartum period.
Although the appropriateness of the approach is well recognized it was not possible to evaluate the accurateness of the instruments. However Davies et al. (1991) comments that it is difficult to predict accurately the association between risk factors and outcome. Risk is a proxy for need and it is not necessary to demonstrate the causal chain to every situation before identifying those in greater need and improving their access to care. The management consequences of the risk approach are to require each health worker (in this case the TBA) to examine what she is doing and to think about the needs of each individual client (referral) In this way, the standards and coverage are likely to be improved even if risk prediction is not accurate, if valid the community will benefits.

b. The process of detection should be accepted by both those carrying out the screening and those subjected to it.

Critical to the success of any risk approach strategy is the identification of risk markers that can accurately predict specific adverse health outcomes. However this screening process is of limited value if it is not built upon a foundation of epidemiologically defined problems and appropriate performance within the health care delivery system. The screening tool must be tuned to answer clearly and correctly five basic questions the why, who, when, where and what technology will be used for screening (McCarthy,1991). The "why" will answer the purpose of screening to detect at risk women for the purpose of providing the needed care. The "who" are the TBAs who are the most accessible and acceptable persons for the pregnant woman in the study area. The "when" is the time frame, in this case the first contact of the health care provider and her client as well as the number of antenatal visits. The sooner the contact the higher is the possibility that the woman is under surveillance. The Tanjungsari study has shown that the percentage of women covered by ANC visits <28 weeks is already high e.g.68.7 percent (section 7.5.3.). The "where" may be related to the place of contact, the nearer it is to the woman house the higher is the possibility that the woman will use the services

provided. With additional training the Ra.TBAs were providing ANC at her own place. The percentage mothers who could show a M&C card had 4 and more antenatal visits than mothers who did not have a card (section7.4.1.6). The"what" technology is related to the tools used for identification which have to be appropriate and acceptable by the providers and the consumers, this is presented in the development of the M&C card as a home based recording card and the problem action guidelines. All these basic questions are important if a screening tool is supposed to be implemented and accepted by the community.
From the results of the pilot survey, it was found that women in rural areas do not consider biological of demographic variables as a risk factors (section 6.3). This may be due to the low educational level of the women as well as her low status in the community. It was for this reasons that in the screening process by TBAs, demographic variables although easy detectable was not included as a risk factor for screening. The risk factors selected in this study were risk conditions or pregnancy complications, which have an immediate impact on outcome and thus may be considered as a secondary prevention approach. The next major difficulty associated with risk measurement in this study is the process of scoring specific marker sets. The Tanjungsari study has shown that It is too much to expect from a TBAs that she should be able to calculate the weighted score of a specific marker. The concept of drawing a line between to points is already difficult for her.

The appropriateness and acceptability of the selection of risk factors in the M&C card can be seen in the following result of the KAP study conducted at two points of time. In the first year there was a difference in the knowledge of Ra.TBAs and Conv.TBAs. The difference was less in the second year. The same result was found for women perception of risk factors in the intervention as well as in the control area. Conv.TBAs and women from the control area were requesting a M&C card probably they feel the need for information and recording of their own health. This results confirms the fact that Conv.TBAs and the women had improved their knowledge and awareness for risk factors both in the intervention area and the control area in the second year of the study.

c. The result can be interpreted and recorded.

This is the epidemiological component of the risk approach and the third objective of the study. The risk approach after all is a method that includes problem definition, performance and risk assessment, intervention and evaluation. But epidemiology is not

the only part of the health services research. Epidemiology measures morbidity, mortality and risk factors in a community. Health services research assesses the ability to affect the desired objectives. Risk assessment will categorize patients into needed levels of care and provide services to them to prevent or lessen the impact of its occurrence or modify the risk factor.

When a strategy is implemented the next step is to evaluate and evaluation cannot take place without a predetermined set of measurable objectives. Evaluation also requires comparison. It is for this purpose that the result of the Tanjungsari study will be compared with other studies in the field of perinatal and maternal care.
The impact of the intervention on perinatal mortality is not expected to be significant because a change in behavior of TBAs and women may take some time. The risk approach is more a process than a one time statistical study. On the other hand training TBAs may not be the only independent variable for perinatal mortality. This is also shown from the stepwise regression analysis (section 7.6) that variables significantly predictive for perinatal mortality are birth weight and sex of the infant. Previous studies have shown that the decrease in perinatal mortality as an impact of training TBAs is mainly due to the decrease in early neonatal infection and less due to the number of stillbirths. This result is also seen if stillbirth rate was compared to early neonatal death rate. Compared to the Ujung-Berung study the stillbirth rate was higher in the Tanjungsari study. By excluding infants of less than 1000 grams the stillbirth rate of Ra.TBAs infants was 18.7 and of Conv.TBAs infants it was 21.2 per thousand births. The early neonatal death rate was 22.8 and 20.1 per thousand live births respectively (both years combined).

Statistical reports in developed countries have shown that half of the perinatal deaths occur during the antepartum period or intrapartum period, the other half during the first week of life. Neonatal and perinatal mortality decline more slowly being less affected by general social change and more affected by preventive measures, early diagnosis and treatment of specific disorders or by changes in the quality of pregnancy and delivery care (WHO, 1992). Among developing countries, more than 50% of infant deaths occur in the first four weeks of life. In contrast to infant mortality which is more sensitive to general social changes, perinatal and neonatal mortality are more sensitive to changes in the quality of health care. The WH0 (1992) reported from several selected countries a decline in perinatal mortality with 50 % over a period of 15 years (1965-1980). Compared to this report a decrease of 12.2 per thousand births over a period of

two years in Tanjungsari may be acceptable. The results of the Tanjungsari study were compared with the results of the Madura study (table 8.1).

Table 8.1. A comparison of the Madura study and the Tanjungsari study

Mortality rates	Madura (1982-1984) n =741	Ujung-Berung (1978-1980) n=2335*	Tanjungsari (1988-1989) n= 4108
Perinatal mortality	58.0	45.0	40.5
Stillbirth	31.0	14.0	18.5
Neonatal deaths	51.5	51.0	29.5
Infant deaths	121.0	120.0**	49.4

* Singletons and twins
** Indirect method (Brass method)

The Madura study was a prospective intervention study in a rural area using energy supplementation for pregnant women. In the Tanjungsari study the objective was to improve the maternal care by training TBAs. Both studies covered a period of two years. Unfortunately in both studies baseline data for comparison could not be presented. For the Tanjungsari study the Ujung-Berung survey was used as baseline data. Both study areas were adjacent to each other and separated by the village Cikeruh. Ujung-Berung survey was conducted almost 10 years earlier. It is interesting to see the large variation in the three studies. The decrease in mortality rates is particularly shown for neonatal deaths resulting in a decrease of neonatal deaths of almost 50 percent. For the Tanjungsari study this is partly due to the higher coverage of tetanus immunization of pregnant women. Infant mortality rates of singletons was correspondingly lower. Stillbirth rate was higher in the Madura study, Tanjungsari has more stillbirths compared to the Ujung-Berung study although the difference is not significant.

The age specific mortality rate in the study is compared in table 8.2. In the Tanjungsari study, late neonatal mortality rate were significantly lower compared to both other studies. The rate for early as well as late neonatal death rate was lower in Tanjungsari compared to Ujung-Berung survey probably due to the fact that no cases of tetanus neonatorum was found which decreases neonatal mortality by more than 50 per cent. In the Madura study the late and early mortality rates were almost the same. The low difference in the age specific mortality rates of the Madura study may be due to the fact that there were no infants less than 1500 grams (Kusin et al., 1990). Confounding factors such as

birth weight and environmental factors and infections especially after the first week life have to be considered.

In the Tanjungsari study the percentage of low birth weight first week death ranges from 60-70 per cent. All infants with a birth weight of less than 1500 gram died during the first 4 weeks of life. This also demonstrate that birth weight is an important determinant factor in neonatal death and infant death. Factors contributing to perinatal and neonatal mortality are many but among those factors birth weight is the most determinant factor.

Table 8.2 Age specific mortality rate of liveborn singleton infants in three selected studies

Age death	Madura study* n =718		Ujung-Berung survey** n = 2313		Tanjungsari study n = 4005	
Week 1	20	(27.9)	78	(31.3)	95	(23.7)
Week 2-4	17	(23.7)	31	(13.5)	23	(5.7)
Total	37	(51.5)	109	(51.0)	118	(29.5)

( ) mortality rates per thousand livebirths.

* Kusin et al (1989)

** Alisjahbana et al (1983)

Birth weight is also the outcome of a complexity of several biological and sociodemographic variables. The Sigtuna workshop (Lechtig et al., 1978) rightly concluded that birth weight distribution can be an useful indicator of overall health conditions of a particular community. It can also be used to assess major health problems in less developed countries, specifically malnutrition (e.g mother's nutrition during early childhood and during gestation), common infection, unfavourable fertility and suboptimal mental development (Lechtig et al., 1978.). Puffer and Serrano (1987) divided birth weight into three grouping: low birth weight for infants with a birth weight of less than 25OO grams, deficient birth weight for infants with a birth weight of 2500 - 2999 grams and favourable birth weight for infants with a birth weight of more than 3000 grams. In Europe, the country which has the highest incidence of favourable birth weight is Sweden (85%). In the Americas, the United States has the highest incidence of favourable birth weight (77%). At the other extreme India reported only 31.1% favourable birth weight.

Table 8. 3. Distribution of birth weight of total live births in selected countries (in percentage).

Birth weight (grams)	USA (1984)	Cuba (1983)	India (1979)	Indonesia Ujung-Berung (1980)*	Tanjungsari (1990)	Sidoarjo (1989*)	Madura (1988)
N. births	3.611 316	164,094	3040	2.303	3.829	6.082	687
< 2500	6.8	7.9	19.9	14.7	13.9	4.9	9.4
2500-< 3000	16.1	24.0	48.8	34.8	45.5	94.1	37.4
3000+	77.1	68.1	31.3	50.5	40.6		53.2

* based on total births.
N= number of live births

The Tanjungsari study showed an incidence of favourable birth weight of more than 40 %. Table 8.3 shows the differences in birth weight distribution of total births in selected areas based on prospective studies. The USA (1984) report is based on total births, both black and white population combined, LBW was 6.8 percent while favourable weight was 77.1 percent.(Puffer & Serrano, 1987). For Indonesia four studies were compared showing different results. For West-Java two studies were reported, the Ujung-Berung study (Alisjahbana et al., 1983) and the Tanjungsari intervention study. Although there was a difference of 10 years between both studies, the results were almost similar. Better findings were found for the Madura study after food supplementation to pregnant women (Kardjati et al, 1988). Different results were found in the Sidoarjo study (East Java) which reported only 4.9 percent of LBW (Pudji Rochjati, 1990). Unfortunately her study did not report the kind of weighing scales and the percentage of infants of favourable weight.

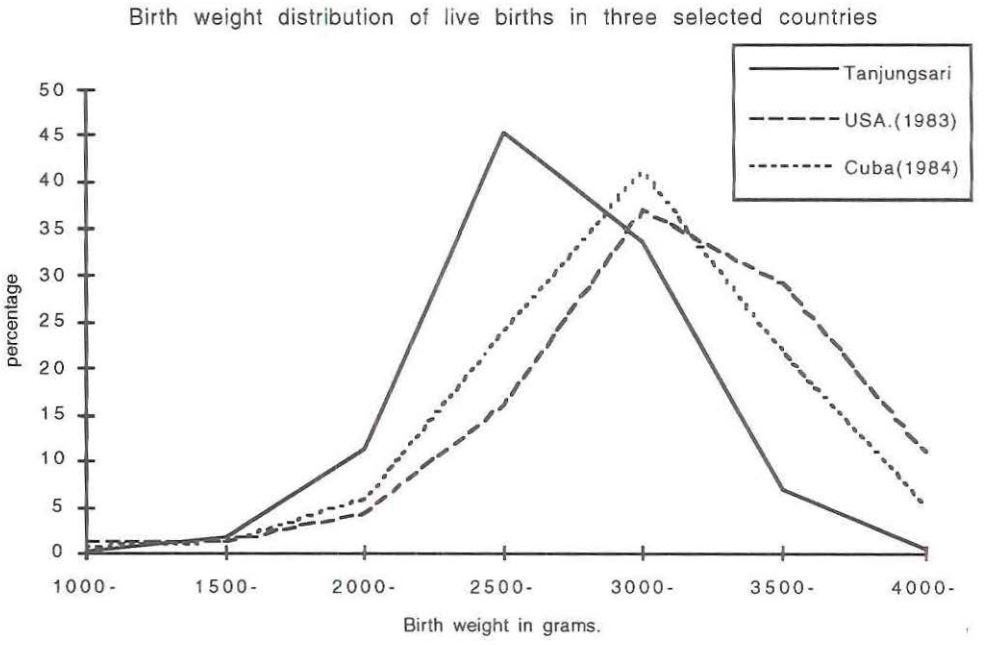
Two community surveys to study the percentage of LBW was conducted in Central and West-Java. Wibowo (1992) reported from her study in Bogor (West-Java) a prevalence of 16.1 %, while Hakimi (1988) in his study reported an prevalence of 13.4%. Both studies were using almost the same methodology and instruments to measure birth weight as the Ujung-Berung and the Tanjungsari study. It can be concluded that low birth weight is still a problem in rural Java.

A study on hospital deliveries in Makassar (Central Sulawesi) was conducted by Barron (1974) to study mean birth weight of local Indonesian newborns and newborns of chinese origin. He found the mean birth weight of Indonesian newborns was lower

compared to the chinese newborns (3200 gam and 3287 gram respectively). He concluded that the difference could not be accounted for the differmces of social class, maternal status or birth rank. Unfortunately he did not mentioned the prevalence of low birth weight in his study. Compared to his result, the mean birth weight in Tanjungsari is considerable lower (2854 gram). The difference may be due to the fact that his study population were hospital deliveries and maternity clinics were mainly women of low risk.

Birth weight distribution of live born infants in three selected countries is presented in figure 8.1. The skewing to the left is found in the Tanjungsari intervention study, the birth weight distribution for the USA infants is skewed more to the higher birth weight. Birth weight distribution of Cuba's infants is found between the USA infants and the Tanjungsari infants.

Figure 8.1



The Tanjungsari study was not designed to address maternal mortality directly. The data presented in table 8.4 should therefore be regarded as an indication of maternal mortality ratio. A comparison of maternal mortality ratios was made with other studies

in Indonesia (table 8.4). Although the type, time and place of study may play a role in these differences, it clearly shows the large variations within each province (West Java).

Table 8. 4 Maternal mortality rates in selected studies in Indonesia.

Place	Reference	Year of study	Study type	MMR(/100 000)
West Aceh	Quinley et al.	1988	prospective	580
West.Java	Budiarso.	1989	indirect method*	580
W.Java	Alisjahbana et al.	1979-1980	prospective	170
W.Java	Alisjahbana et al	1988-1989	prospective	490
Center.Java	Agustina et al.	1989	retrospective	340
Bali	Fortney et al	1983	retrospective	720
12.Teaching hospitals	Sastrawinata et al.	1977-1980	prospective	390

* Sisterhood method.
MMR = Maternal mortality ratio per 100.000 live births.

Causes of maternal death are mostly classified under three headings: direct, indirect and coincidental. Behind the medical causes of maternal death, women may die from logistic causes, failures in the health care system, lack of transport (Thaddeus and Maine, 1990). Behind these factors are the social, cultural and political variables which together determine the status of women, their health, fertility and health seeking behaviour (Abou Zahr and Royston, 1991).

Table.8.5 Causes of maternal death in selected places in Indonesia (%)

Cause of death	Bali (1983) n = 295	Center-Java (1986-1987) n = 50	Hospital studies* (1977-1980) n = 108	Tanjungsari (1990) n = 20
Direct causes				
Hemorrhage	46	46	41	45
Infection	10	20	27	15
Hypertensive disorders of pregnancy	5	16	20	10
Septic abortion	7	-	-	5
Embolism	2	-	-	-
Uterus rupture	-	-	-	15
Others	7	18	9	-
Indirect cause	23	18	6	10

* 12 teaching hospitals in Indonesia, Sastrawinata 1987

Table 8.5 is a comparison of several studies in Indonesia. It shows that hemorrhage is the main cause of maternal death, followed by infection and hypertensive disorders in pregnancy.In the Tanjungsari study the major risk factors in relation to perinatal death identified were: low birth weight, breech delivery, prolonged labor and prepartum bleeding. These factors showed the highest relative risk and the highest population attributable risk. In Shunyi County, China, five major risk factors were identified (low birth weight, birth defects, hypertensive disorders of pregnancy, breech and asphyxia). The results of both studies support the fact that the relative weight of risk factors in predicting outcomes varies greatly in different populations and the many intervening and confounding variables always requires local study.

8.2.2. The effectiveness of training TBAs to increase referrals.

The effectiveness of traditional birth attendants in health care programms is the second objective of the Tanjungsari study. Effectiveness of TBA training continues to be a controversial issue. Some aspects of modern health systems are certainly more beneficial, such as greater attention paid to aseptic treatment of the cord. In other cases, some of the traditional practices might well be superior and better adapted to local conditions (WHO, 1992). The few evaluations that have been performed focus on the prevention of neonatal tetanus and on family planning activities (Neuman et al., 1985). Less evaluations have been conducted to determine improvement (or deterioration) in the performance of TBAs in referring mothers to health clinics for such services as antenatal care (Harfouche, 1983).

The increased number of referrals made by TBAs after attending a training course is one frequently quoted result that must be beneficial (Bullough,1983). Berggren et al. (1983), showed some evidence of a reduced incidence of neonatal tetanus in rural Haiti. Mangay Angara (1981) in the Philippines, reported that in provinces where 25 per cent or fewer TBAs had been trained, the incidence of neonatal tetanus declined over a period by 41 per cent, while in provinces where 40 per cent or more of the TBAs had been trained there was an overall decline of 85 per cent. However it may be difficult to separate the effect of training TBAs from that of immunization programs and other possible variables such as changing socioeconomic conditions. Nevertheless, neonatal tetanus does seem to be potentially a good indicator of effectiveness (Peeters et al., 1986). Unfortunately this cannot be proven in this study.

Referrals is an effects measurement and the purpose is to answer the questions "does the training of TBAs increases the number of referrals". Identification of risk condition will result in referral, ideally all those identified as "at risk" should be referred. Medical expectation for following the instruction of the health care provider is usually high but the evidence to support this claim is not always substantial. Not only is it easy for some patients to deny the need for treatment, it is also easy for some patients to discontinue treatment as soon as the acute event have passed. It is not seldom that more than half of the information is forgotten immediately after the visit, while written instruction is not very helpful in a community where most of the people are partly illiterate. The scope of non-compliance ranges across all medical disciplines and age groups (Cramer and Spilker, 1991) but probably more among adults (including pregnant women) than children.

To measure the effect of training is the ability to motivate women to go for referral which can be seen in the number of women who comply with referral. The Tanjungsari study has proven that by training TBAs using the risk concept more referrals were made by Ra.TBAs during the antepartum period but less so during the delivery and postpartum period. This result was confirmed by the KAP study of the women in the intervention area that more women were referred (chapter 7, subsection 7.7). It also shows that women who were clients of Ra.TBAs comply better to TBAs advice, although some segments of the population remain strongly bonded to traditional beliefs and superstitions, clients of Ra.TBAs comply better to TBAs advice compared to clients of Conv.TBAs.

Interesting was the perinatal mortality rates of referred cases. Non referred infant clients of Ra.TBAs had significantly lower perinatal mortalities than referred infants. Why referred infants of Conv.TBAs had lower mortality rates compared to the referred clients of Ra.TBAs need further study because it is unlikely that they are treated differently at the same health center, also considering the meager manpower and skills at the health center (chapter 7, section.8 and Appendix A; case reviews). There were less studies for comparison in Indonesia. Even Neumann et al. (1986) found that after TBA training in Ghana the number of referrals for intrapartum care was 4 per cent and 1.5 per cent were referred for postpartum complications. Unfortunately the Danfa study did not mention the geographic condition of the area in Ghana, the difference may be due to problems in transportation and communication. Compared to these figures from Ghana, the Tanjungsari shows better results.

Although there were higher referrals reported, there is still the question how many women followed the instruction of the TBAs. Compliance rate is important for future health planning in particular to know the reasons of non-compliance. How do referral and disease affect compliance, theoretically the perception that referral will "work" should lead to improved compliance. However adverse experiences during treatment and referral can be expected to lead to poor compliance. To what extent these factors actually affect compliance is related to the women's ability to perceive them. How apparent they are is a function of the nature of the consequences and how immediately and consistently it occurs (Krall, 1991).

8.2.3. Modifying risk factor to improve outcome.

a. Factors affecting the effect and impact of training TBAs in the risk approach.

Effect and impact are depended to a complexity of interrelated factors (see conceptual frame work). An evaluation of traditional birth attendant services into PHC was reported by Isenalumbe (1990) in Nigeria. Because of difficulties in transportation mothers were turning to traditional birth attendants to deliver their babies. The encouragement to deliver at home seems to be a major factor in the mother's attitude towards TBAs services. In North East Brazil (Janowitz et al., 1985), however, TBAs were not only trained, they also received weekly supervision by the staff of the hospital, and there was an ambulance at the TBA-run a rural maternity clinic. Here the success of the program did not depend solely on training TBAs, but on the improvement of the whole referral system and access to modern medical care (Maine,1991).

b. Performance and quality of care of the formal health sector.

The community and the informal services are trying new approaches to match needs and resources. The final questions which much be asked is whether the existing health care system is capable to accomodate the risk approach as consequences of training TBAs. In the Tanjungsari intervention study no additional training was given on case management for the health professionals. The first reason was that there already exists a detailed working manual for maternal and child health based on the risk approach developed by the Ministry of Health. Second reason was to study the contribution of TBAs to improve perinatal care by selective intervention.

However a task analysis have shown that health personnel can only give 1-1 1/2 hour per day of their time for curative care. More than 13 programmes have to be carried out at the health center, of which MCH does not seems to have a high priority. This includes also emergency care for mother and child health. The rest of their working hours of health center personnel are used for preventive, promotive and administrative procedures. It is therefore not surprising that the clinical skills of health personnel are becoming less and less. This have its consequences on the quality of care, as can be seen in the discussion on the causes of maternal deaths of which some were due to mismanagement by the health personnel.

The Tanjungsari study also found out that one of the most severe drawbacks was that the referral and feedback system between the health centers and hospitals was not organized in line with risk approach concept. Falkner and Manciaux (1984) stresses the importance of a decentralized organization to reduce perinatal mortality and morbidity that should enamete from the basic health services and be oriented to screening for high risk pregnancies and the referring to properly equipped and quality of care provided by regional centers.

c. The non health and the intersectoral factors

So far the general discussion was more or less discussed from the point of view of the health provider. To define the components of a system such as the perinatal health care system it is important also to see the users as part of the system. Factors that are frequently mentioned here are distance, cost and quality of care. As was presented in the conceptual framework women's status, socioeconomic status and educational level contribute to the delivery of perinatal care. Previous experience and severity of illness also affect woman health seeking behavior. The physical distance is a problem in itself that can not be solved by the community and family. In this case the government must take steps to improve the infrastructure. The issue of quality of care is inseparable from the issue of distance. Issue of distance is really the distance to a facility where action or emergency care can be taken. Living near a health center of a hospital is not helpful for a woman with obstetric hemorrhage if there is no trained person to stop the bleeding. Improving quality of care will not only decrease avoidable delays at the health facility, it is also likely to reduce perinatal and maternal mortality (Thaddeus and Maine,1990).

As was mentioned earlier, perinatal health is embedded in the cultural and social structure of a community, therefore the approach can not be done only through medical intervention. However this study have shown showed that TBAs do accept new knowledge if it is presented appropriate to their level of knowledge and literacy rate. The result of the Tanjungsari intervention study is in agreement with the study of Greenwood et al. (1990) in the Gambia, that trained TBAs have an important role to play in bringing about improvements in the outcome of pregnancy but they cannot bring about major reductions in maternal and neonatal mortality unless they are supported by well equipped and effective referral centers.
The amount of resources allocated to maternal and perinatal health depends also on the status of women. If women occupy a low status than they will be apportioned only small amounts of resources. The risk approach just as many health objectives, is handicapped by societies that do not place adequate value on women (McCarthy, 1991)

To change a behavior may need time, especially when it is already rooted in the traditional way people think and behave such as delivery care which they considered a normal natural process. Therefore it is probably too optimistic to expect big changes in mortality rates in only two years of intervention, especially in this case, where the object of interest is the traditional birth attendant and the subject of the study is the pregnant rural woman. Both may have different knowledge, attitudes and perceptions which are not always in agreement with each other. Compliance and non-compliance to referral is the expression of this behaviour.

8.3 Did the intervention study improve the knowledge, skills and practice of TBAs?.

The knowledge, attitude and practice study in the first year at the start of the intervention study demonstrated that the Ra.TBAs knowledge was better compared with the Conv.TBAs. More Ra.TBAs were able to identify high risk cases and were referring more cases to the health center (section 6.5.3). In the second year of the study the situation changed, showing no significant difference in the knowledge, attitude and practice of both the Ra.TBAs and the Conv.TBAs. Two different explanations are possible: Ra.TBAs were significantly older compared to their counterpart which is shown in the characteristics of the TBAs. There is a tendency to view problems arising from the TBAs age, illiteracy and traditionalism or from the mothers ignorance and manifestation of

"cultural barriers". The modern medical system and training methods employed and the lack of back-up services and supervision are examined less often, though a beginning is now being made (Cosminsky, 1986). TBAs are willing to learn more about new "modern" concepts of practicing childbirth. The second explanation is that the risk approach stresses the importance of more and early antenatal visits for pregnant women for the purpose of screening and maximal coverage of pregnant women. More antenatal care visits automatically increases the TBAs income. This was also mentioned by the Ra.TBAs during the monthly meetings and may be one of the reasons why Conv.TBAs were motivated to learn more from the Ra.TBAs because TBAs practices were income generating. This may be also the reason for a new generation of younger woman cadres in Tanjungsari to apply for TBA training. As work opportunities for a woman in the village are very limited, becoming a TBA will not only increase her status but also her income.

The impact of training is handicapped by the fact that the government policy requires that TBAs may not give any treatment. In the Tanjungsari study there is no real intervention such as supplementary feeding for pregnant mothers who were not gaining weight during pregnancy and iron tablet were not given regularly by the Integrated health services post. The TBAs role is mainly preventive and promotive care. This is however difficult because other factors may play a role such as the condition of the women, the distance and condition of the infrastructure to reach the health center or hospitals. This is also shown from the inferential statistics that distance is an important determinant for perinatal death.

The meager distribution of health personnel in rural areas stresses the need for combining traditional and modern health practitioners in primary health care teams. In Swaziland (Hoff and Nhlavana,1986) a pilot project has successfully brought together nurses and traditional healers, who in the past mistrusted each other. Joint training workshops have led to a marked improvement in attitudes and to the involvement of traditional healers in an effort to promote good health practices and prevent disease.The broader impact of the TBA program on MCH is in general not easy to measure but should not be under estimated as elderly and respected women, TBAs make up one of the most influential groups. As member of the health care team their advice to the mothers is likely to be heeded and with a new knowledge (Eguillon C, 1985). The cost of TBA training programs is clearly a factor to be considered. The Tanjungsari study has not evaluated the cost of training TBAs. But it is certainly less expensive than to train and

equip a state midwife, while running cost of the TBAs, including the cost of supervision and refresher courses, are also relatively low. Compared to the midwives TBAs are not paid by the government(Maine, 1991). For best results, the training of TBAs must be part of a serious attempt to efficiently use available resources, not a potentially cheap solution for remote areas (Walsh et al., 1991).

For the majority of mothers in the third world, the TBA is still an important source of support in pregnancy, childbirth and early neonatal care. Unlike "modern health practitioners", TBAs are concentrated among the poor and in rural areas. In many areas there are many more TBAs than doctors and midwives, making TBAs the most accessible providers of maternal health care. Even when trained midwives and doctors are available women still prefer TBAs as being familiar people who may perform rituals surrounding childbirths. This can be seen in the Ujung-Berung survey which was conducted more than 10 years ago, the Tanjungsari shows almost no difference in the percentage of deliveries by TBAs.

In conclusion a number of prenatal and delivery interventions have been identified based on the local condition and resources in Tanjungsari. However the actual impact of the risk approach intervention depends on several factors: 1) accuracy to identify pregnant women at risk; 2) total coverage or the proportion of women using the services; 3) quality of care; 4) women compliance and 5) frequency of the health problem. All these plus cost and feasibility should be considered in planning a system for improving perinatal and maternal health. While the ability of a health system to decrease the impact of pregnancy complications depends upon the capacity to prevent complications or treat them and refer for skilled obstetric care. When a complication presents itself inspite of antenatal care a back-up obstetric referral facilities is required.

Chapter 9. CONCLUSIONS AND RECOMMENDATIONS

Conclusions:

1. The risk approach is based on the concept of "risk" as a managerial tool for policy and program development, resource allocation and evaluation as well as clinical screening and case management.
2. Predicting needs for women to be referred for more skilled care is one of the features of the risk approach. The TBAs were able to identify women of above average risk and refer them to the health center or hospital for delivery. The Tanjungsari study also shows that traditional birth attendants are not so embedded in traditional and cultural habits as was thought previously. Traditional birth attendants welcome training. Training TBAs who are mostly illiterate and elderly requires special skills. Lectures alone are usually not effective. Rather, TBAs learn best in small groups using a variety of participatory training methods such as role playing, demonstration, discussion and practice.
3. The mother and child card, a home based recording and action card using pictorial forms and simple instruction contributes towards the early identification of risk conditions and encourages referral as well as self care. However it still needs more time for the women and the TBAs to utilize the M&C card more effectively.
4. In rural communities, traditional practitioners can play a significant role in promoting self-reliance in health. Unfortunately in the majority of situations, TBA programmes are not effectively linked to a functioning referral system. In reality TBA training is proposed precisely because the people in the area have very limited access to "modern" medical care.
5. The Tanjungsari study shows that deliveries by traditional birth attendants constitute of 90 per cent of deliveries. Only 10 % were conducted by health personnel showing an underutilization of the available health services.
6. It was found that continuous training and supervision of TBAs are required at all phases of the undertaking intervention. Experiences in Tanjungsari indicate that referral cases by TBAs have resulted in an increased workload in the health center. As a result of lack of trained personnel and facilities risk cases may not receive appropriate management. There was also an unnecessary delay in the management of risk cases that could not be attended at the district hospital.
7. Risk conditions of pregnant women with singleton infants that have the greatest impact on perinatal mortality can be divided into two groups, those related to

maternal factors and those related to infant factors. This is also shown in the high relative risk and the population attributable risk. Included in maternal factors are: hemorrhage, perinatal infection, prolonged delivery and breech presentation. Included in infants factors are: birth asphyxia, low birth weight, respiratory problems after birth and infection.

8. More than 80 per cent of pregnant woman had ever contacted a midwife at least once during her pregnancy period. The neglect on the part of the midwife to screen women for risk factors is a situation frequently found in the study area.
9. A task analysis shows that health center doctors and midwives spent only 20.6 percent of their time on clinical work. The rest of their working hours are spent to conduct and supervise more than 13 program activities and meetings at the health center or the district. There is also the high turnover rate of MDs at the HC as result of government policy. The consequences are that the referral system cannot function as expected and health personnel were loosing their skills and self-confidence to treat women and newborns with complications. The scarcity of health personnel and the spare time allotted to conduct curative care including emergency management result in low quality of care and low utilization of health services at the health center.
10. The impact of training traditional birth attendants in the risk approach on the outcome of pregnancy shows, that although trained TBAs play an important role in bringing about improvement in pregnancy outcomes, they cannot bring major reductions in maternal and neonatal mortality unless they are supported by well-equipped and well-staffed referral centers. TBAs are the important component of maternal care where they provide most of the care during delivery, but as important is a partnership with skilled providers in order to manage obstetrical complications when they arise.
11. Lack of transportation and communication and high cost are reasons for non-compliance with referral of pregnant women. Women do not comply with the instruction of the TBAs mainly because of logistic reasons, other factors equally important are her previous experiences with the formal health sector.
12. Maternal and perinatal health (including low birth weight) are closely linked and efforts to improve the health of either pregnant women or the newborn will have synergistic effects on the health of the other.
13. The Tanjungsari study have so far considered only factors related to biological, socioeconomic and health services. The genetic make-up that consitute the

vulnerability of a women was not studied.

RECOMMENDATIONS:

The risk approach intervention study has been using the primary health care approach focused on community needs and problems and with the utilization of existing health personnel mainly paramedics and midwives. The recommendations are the following:

For program implementation:

1. The implementation of the risk approach should provide an opportunity for the existing health care delivery system to be re-organized into a more systematic structure, developing criteria for problem identification and selection and a framework for a continuous monitoring system.
2. A reasonable reliable system for classifying women who will eventually have poor pregnancy outcome is needed so that those at high risk can receive special care. An excess of women incorrectly identified as high risk means that scarce resources are used for the care of those who will not benefit from the services and may experience complications from unnecessary diagnostic and therapeutic procedures. However a misclassification as low risk denies "at-risk" women access to beneficial services.
3. Quality of care is of fundamental importance to the utilization and effectiveness of women's health services. The approach to quality must look at the process of service delivery from the woman's perspective in her particular setting and not only from the point of view of health professionals.
4. The effectiveness of the TBAs is dependent on the supplies made available to her and to the referral center and on continuing supervision and support for a realistic and effective referral system. Investment in training should not be made if there is not assurance of an adequate support and supervisory system to sustain the program.
5. The first level of care should be provided at home or in a dispensary by community based health workers, but with full participation of the woman and other members of the family. Contact should be established very early in pregnancy in order to identify preexisting disorders, to provide tetanus immunization, and to initiate effective and relevant health education. For deliveries at home, families can be taught certain principles such as recognition of prolonged labour. They can be provided with or make their own "clean delivery kit" and instructed in proper thermocontrol i.e immediate drying and wrapping of the newborn, and early feeding and skin to skin

contact. The home based maternal record can help with the task of risk screening.

6. Monitoring and surveillance systems should be developed that are based on audits of the quality of care in relation to maternal and perinatal deaths.
7. The primary health concept emphasizes the combination of formal and informal health care. A marriage between traditional and modern medicine should be possible. There should be a shift from curative medicine towards preventive medicine, but it does not mean that less emphasis is given to curative care. Health centers have to be fully equipped, doctors and midwives should be skillful and appropriately trained for curative and emergency care, while local people have to be encouraged to apply self care for early identification of risk.
8. The health care delivery system needs to be strengthened to provide for continuous care of cases at risk. The mechanism to facilitate proper management and follow-up of risk cases referred or discharged from hospitals requires further refinement and organization.
9. Further improvement of pregnancy outcome could be made by:
   - identifying those pregnant women who are considered "at risk" so that they may be advised in advance that they should deliver in a facility providing total coverage and applying risk scoring at the health center.
   - educating those women and their families, especially young primigravidae, who do not use the formal health system about the danger signs of pregnancy and delivery and action to be taken.
10. Better communication and transportation will improve accessibility of referral to women in a rural community.
11. Accessibility of care can be solved through two options :
   - moving the women closer to the health center or hospital such as maternity waiting homes especially for women who live far away from the main road.
   - moving the services at the most peripheral level of the health system.
12. Programme options to improve quality of care include training programmes for nurses, midwives and doctors while expanding their roles and strengthening the referral system by improving the knowledge and skills of all health care providers.
13. Planning for the utilization of risk data by other sectors has yet to be implemented in an organized basis in order to affect intersectoral collaboration for planning of community programmes.
14. The generally accepted strategy for dealing with the complications of pregnancy and

childbirth involves a regional network of community risk assessment through antenatal care, the use of first level facilities and a district hospital for the management of high risk cases and treatment of obstetric emergencies. In rural areas maternal health programmes must address the need for emergency transport and communication. Maternity waiting homes near a road are proposed for pregnant women with expected complications.

15. Build in the regional network system is the continuous supervision, evaluation and involvement of the specialist at the district hospital to monitor case management of the health center doctors and midwives.
16. Recent research has led to the acknowledgement of the general lack of knowledge in newborn care at all levels of health care. Training of all health personnel needs to be reconsidered: newborn care must become an integral part of maternal and child teaching. Training should be task-oriented more than theoretical and should be provided partly in neonatal care units.

For further research :

1. The findings reported in this thesis reveal the need for searches into the function of each component of the referral system.
2. Further research is needed for the development of risk scoring that should start with simple risk assessment and permit the development of a more complex risk scoring system taken into consideration the level of semi-illiteracy rate of the community health workers including the TBAs.
3. Can rural women cadres be trained to become traditional birth attendants and community health workers? What would be the cost of such training? What would be the expected effect of such training and what is the best organizational mode of such training? There is a need to study the feasibility of training a new young generation of community health workers who are literate and open to "modern medicine" without loosing the tradition and customs and accepted by the community where they live.
3. The very large variation in the percentage of low birth weight infants reveal the need for research into factors and causes of not only low and deficient birth weight but also of the distribution of birth weight and length of gestation. The latter is more difficult to collect specially from rural women.

4. There is a need to study the implementation of the risk approach in other parts of Indonesia, rural or peri-urban, considering its diversity in ethnomedical background as well as the status of development of health services in each area.
5. To study the impact of a birthing or waiting home for the purpose of accessibility of women in need for emergency care and transportation.
6. Maternal and perinatal health are severely understudied areas. There is little knowledge about factors causing a deline of mortality rates, about measures of the economic impact of death or disability, nor is there any firm idea of the prevalence or duration of maternal and perinatal illness. There is insufficient information to directly relate different service components with effectiveness and cost.

Chapter 10. SUMMARY

Indonesia is made up of more than 13000 islands with defined ecological, ethnic, socioeconomic and cultural conditions and which developed rapidly. Much has been achieved but maternal and child health remains still a problem especially in rural areas. So far the problem of perinatal care was given less attention although death in the early neonatal period comprises of almost 60% of infant death. West-Java is the province where the intervention study has been carried out. The main issue in West-Java is the high infant mortality rate and fertility rates. It was higher compared to other provinces in Java, the most developed island of Indonesia. Factors such as infrastructure and the associated maldistribution of health care facilities may play a role in the low performance of West-Java. Inspite of better socioeconomic conditions, the health status of West-Java is still behind other provinces in Java. The vital statistics report in 1990 shows that infant mortality in West-Java is 84 per thousand livebirths leaving West-Java on the 24th rank of 27 provinces of Indonesia.

The traditional birth attendant is the most important source of support in pregnancy, child birth and early child care. In West-Java 80-90 % of deliveries take place at home by traditional birth attendants. Because of this high coverage it is important to include TBAs in the provision of perinatal care. A review of the available literature has shown that training TBAs does not result in the expected outcome. The reason is the difficulty to train them because of their semi-illiteracy and old age. More studies were reported evaluating their behaviour and impact on mortality which is mostly low. Less attention is given to ways in which the TBAs were trained and no information is available about the level of supervision.

The Tanjungsari study is an intervention study where TBAs were trained in the identification of risk in pregnant women and to conduct appropriate action. The risk approach is the basic concept of the training. The study area Tanjungsari is a subdistrict with more than 90 000 population served by one health center, one medical doctor and one midwife. For the purpose of the study subdistrict Tanjungsari is divided into 2 areas, the northern part is the intervention area, while the southern part is the control area. Both areas are separated by a main road dividing the subdistrict into two areas.
Since 1950 the Ministry of Health has conducted nationwide training for TBAs organized through the health center. All TBAs in Tanjungsari had received the conventional

governmental training. Subsequent training in risk identification was given only to TBAs from the intervention area. The training consists of identification of risk conditions and TBAs were instructed to motivate women for referral if a risk condition was identified, these TBAs were called "Risk approach trained TBA or Ra.TBAs". In the control area the TBAs did not receive any additional training, they were called" Conventional trained TBAs or Conv.TBAs". Birth attendants not classified in the TBA groups were included in "Others", these are the midwives and MDs.

To be able to identify risk, every woman needs to have at least one time contact with a health care provider, therefore coverage is the most important factor in the risk approach. The instruments used in the intervention study for identification and screening were the "Mother and Child Card", the "colored weighing scales" and the "problem action guideline". These instruments were developed using appropriate technology .

During a study period of two years, 4400 women were registered, 2.6 percent were lost to follow-up and 4108 singleton births were available for analysis. Effect and outcome measures were made using the method recommended by Reynolds and Gaspari (1990). Subjects were clients of Ra.TBAs, Conv.TBAs and "Others". The main reason to analyze the results by birth attendant was because birth attendants were not confined to an area, when they are popular they will travel outside their geographic boundaries or patients will come from other areas for delivery.

The following results were found:

The outcome of the risk approach training program is measured through the immediate results (or outputs). Outputs are expected to have effects on target populations Effects in turn are expected to have an impact on the target populations health. The immediate results are the number of women at risk identified and the number referred. The number of high risk women identified in the antepartum period the immediate neonatal and early neonatal period was lower in clients of Ra.TBAs compared to Conv.TBAs. More high risk clients of Ra.TBAs were identified in the delivery, postpartum and late neonatal period compared to Conv.TBAs, but the difference is not significant.

A higher number of referrals and lower number of non compliance of clients of Ra.TBAs was particularly seen in the antepartum period. However in the delivery and postpartum period the number of referrals were lower compared to Conv.TBAs.

Non-compliance were in general high in clients of all birth attendants. For Ra.TBAs however the percentage of non-compliance was lower compared to Conv.TBAs particularly in cases referred for bad previous history, prepartum and postpartum complications. It was higher in the immediate postnatal period. "Feeling too sick", "too expensive" were the main reasons for non compliance to follow the advice of the TBAs. Other factors were cultural barriers as well as logistic reasons such as difficulty of transportation in the northern part of Tanjungsari.

Included in effect measurement are the use of the M&C card, the number of antenatal visits and number of women vaccinated against tetanus. Women using the M&C card show more ANC visits, have lower low birth weight infants and lower PMRs. The number of antenatal visits was generally high in all groups compared to other areas of West-Java. The number of women without ANC visits decreased, in the second year of intervention. Pregnant women who were clients of Ra.TBAs had more contact with their TBAs for ANC visits compared to clients of Conv.TBAs, the difference is significant. A high coverage was found for tetanus immunizations in all groups probably due to a tetanus mass campaign for all women conducted in both areas by local health authorities.

Impact measurements included birth weight distribution and mortality rates. The results can be summarized as follows: there was no difference in the mean birth weight and incidence of LBW. There was a significant difference of LBW rates between referred and non referred cases of Ra.TBAs, but not so by clients of Conv.TBAs and Others.

Although it was realized that for impact measurements such as perinatal mortality and birth weight it may take more years of observation to see some improvements, a difference was found already after the first year, clients of Ra.TBAs had lower perinatal mortality rate compared to clients of Conv.TBAs. In the second year there was a decrease in perinatal mortality rates of RA.TBAs. Clients of Conv.TBAs were showing a significant decrease in perinatal mortality rate compared to clients of Ra.TBAs. For the whole area of Tanjungsari a decrease in perinatal mortality rate of 12.2 per thousand births was found, a decrease of 23 per cent. A better way of assessing impact is birth weight specific mortality rate (BWSR).The Tanjungsari study found that PMR for Ra.TBAs infants ≥3500 gram was lower compared to Conv.TBAs. in the first year of study. In the second year, no perinatal deaths occurred in Ra.TBAs infants with a birth weight of more than 3500 grams. There was still a high PMR of infants >3500 grams of Conv.TBAs.

A significant difference between PMR of referred and non referred clients of Ra.TBAs was found, while between clients of Conv.TBA and "Others" there was almost no difference in the perinatal mortality rates of referred and non referred cases. This result may lead to two possibilities: identification of risks was incorrect and the referral cases were not the mothers at risk, or timely referral and correct case management resulted in better survival.

Maternal mortality ratio (MMR) was 480-490/100.000 live births, there was no difference between maternal mortality ratios in the first and second year. No difference between the MMR of the intervention and control area was found. Eighty five percent of maternal deaths were referred by TBAs. Lack of facilities, delayed decision at home, distance, skills of health personnel were the main reasons of delay. The three main causes of death were: bleeding, prolonged labour and infection.

The formal health care had only limited staff skilled in providing perinatal care, very few were skilled in treating women with high risk pregnancies. The major attitudinal obstacle was presented by the low pay structure of health care providers and they were less likely to devote adequate time and effort to prenatal and delivery services. Next are the many programmes that had to be carried out leaving less time for health care providers to conduct clinical and emergency care.

A KAP study was conducted at the beginning and at the end of the intervention study on a sample of TBAs. The result of the TBA KAP study shows a significant difference in the first year of study. No significant difference was found in the second year of intervention study. It can be concluded that contamination had occurred in the control area. Conv.TBAs improved their knowledge and skills. This result confirms the fact that perinatal mortality rate was significantly lower in the second year of study of clients of Conv.TBAs. It also shows that TBAs are not so embedded in traditional and cultural habits as was previously thought.

Women's perceptions of risk conditions were studied based on two KAP studies, the first at the beginning of the intervention study and the second after the intervention study finished in 1990. A significant difference at the beginning of the study was found and almost no difference at the end of study. The result also confirms that contamination of the risk approach intervention to the control area had occurred. It is concluded that knowledge and awareness for risk factors have increased in the control area.

Chapter 11. SAMENVATTING

Indonesië is een land dat gevormd wordt door meer dan 13 000 eilanden. De ecologische, etnische, sociaal-economische en culturele omstandigheden verschillen. Indonesië heeft zich gedurende de laatste tientallen jaren snel ontwikkeld.
Al zijn de sociaal-economische omstandigheden in het algemeen duidelijk verbeterd, wat betreft de gezondheidszorg voor moeder en kind is er relatief weinig veranderd. Op het gebied van de perinatale zorg is tot nu weinig onderzoek verricht, hoewel de perinatale sterfte, met name de sterfte in de eerste levensweek bijna 65% van de gehele zuigelingensterfte betreft.
De interventiestudie, welke in dit proefschrift wordt beschreven, werd uitgevoerd in West-Java. Het belangrijkste gezondheidszorgprobleem in West-Java is de hoge zuigelingensterfte en het hoge geboortecijfer. Hoewel de sociaal-economische toestand op West-Java beter is dan elders, is de zuigelingensterfte 84/1000 levend geborenen, waardoor West-Java op de 24e plaats van 27 provincies komt. Faktoren zoals de infrastructuur van het gezondheidssysteem en de ongelijke toegang tot de gezondheidszorgvoorzieningen spelen hierbij een belangrijke rol.

De traditionele vroedvrouw (traditional birth attendant, TBA) is de meest belangrijke persoon voor de ondersteuning tijdens de zwangerschap en geboorte, alsmede voor de zorg van de pasgeborene. In West Java vinden 80-90% van de bevallingen thuis plaats met hulp van de TBA. Het is daarom belangrijk de TBA te betrekken bij de zorg rond zwangerschap en geboorte. Uit verschillende studies is gebleken dat een training van deze traditionele vroedvrouwen niet het gewenste resultaat heeft, namelijk een daling van de perinatale sterfte. Veelal wordt dit verklaard door het feit dat TBA's vaak een hoge leeftijd hebben en een zeer beperkte vooropleiding. Het beperkte aantal studies geeft meer aandacht aan hun opvattingen en gedrag, dan aan de wijze van training en vooral de supervisie hierbij.

De Tanjungsari studie is een interventie studie welke gericht is op de TBA's. Hierbij worden zij getraind in het herkennen van risicofaktoren tijdens de zwangerschap en de bevalling, alsook in het herkennen van risico's bij de pasgeborene. Deze risico-benadering ("risk approach") is het kenmerk van de opleiding. Naast het herkennen van risicofactoren bij zoveel mogelijk zwangeren, dient de TBA de patienten tijdig te verwijzen naar het regionale gezondheidscentrum waar verdere maatregelen genomen

kunnen worden.
De Tanjungsari studie vond plaats in de periode van 1 Januari 1988 tot 1 Januari 1990. Tanjungsari is een subdistrict van het district Sumedang (dicht bij Bandung, de hoofdstad van West-Java) met een populatie van 90 000 mensen. Het subdistrict heeft een dokter, een vroedvrouw en enkele verpleegkundigen. Het studie gebied wordt door een hoofdweg in tweeën gedeeld. Het gebied noordelijk van de weg is het interventie gebied, terwijl het gebied zuidelijk van de hoofdweg als controlegebied diende.
Training programma's voor TBA's werden door de Indonesische overheid begonnen in ca. 1950. Zowel theoretische als praktische training werd gegeven in het gezondheids-centrum. Tijdens de interventiestudie kregen de TBA's in het noordelijke gebied een aanvullende opleiding in het herkennen van risicofaktoren en het verwijzen van de risicopatienten. De aanvullende training was meer praktisch dan theoretisch georienteerd, waarbij de supervisie maandelijks door de vroedvrouw van het gezondheidscentrum werd gegeven. De TBA's in het interventiegebied - die dus aanvullende opleiding kregen - werden risk-approach TBA's (Ra.TBA's) genoemd, de TBA's in het controlegebied conventional TBA's (Conv.TBA's). De opzet van de studie was alle zwangeren te vervolgen en hun kinderen tot de leeftijd van een maand.

Gedurende de periode van 2 jaar werden 4400 vrouwen geregistreerd. Daarvan gingen 2.6 % "verloren", o.a. wegens verhuizing naar buiten het district. In totaal 4.108 kinderen (geen meerlingen) waren beschikbaar voor verdere analyze. De vrouwen en kinderen werden ingedeeld in 3 groepen, al naar degene die de vrouw (en kind) begeleidde : Ra.TBA, Conv.TBA en "overigen" (hier is inbegrepen de vroedvrouw, de verpleegkundige en de arts). Verschillen in uitkomst tussen deze drie groepen tonen het effect van de interventie. De methode van Reynolds en Gaspari voor effect metingen werd in deze interventiestudie gebruikt.

De resultaten van de studie laten zien dat de Ra.TBA's in staat waren hun praktische en theoretische kennis te verbeteren. De resultaten waren echter in beperkte mate significant. In de prenatale periode verwezen de Ra.TBA's meer zwangeren (met risicofaktoren). Gedurende de periode van de bevalling en ook tijdens de postnatale periode waren er geen duidelijke verschillen in verwijzing tussen beide TBA groepen.
Vele vrouwen volgden de adviezen van de TBA's niet op ("non-compliance"). De redenen waren vooral transportproblemen (het gezondheidscentrum was moeilijk te bereiken), financiele problemen en het gevoel "te ziek" te zijn. Ook traditionele, cultureel bepaalde faktoren speelden een rol.

De interventiestudie was niet in de eerste plaats bedoeld in 2 jaar een positief effect waar te nemen op de perinatale sterfte en het geboortegewicht. Hiervoor is een langere observatieperiode nodig.
In het eerste jaar was de perinatale sterfte (en de geboortegewicht gerelateerde perinatale sterfte) lager in de Ra.TBA's groep. In het tweede jaar trad een verdere daling op, echter bij de groep Conv.TBA's was deze daling significant groter dan bij de Ra.TBA's. Dit resultaat laat zien dat er waarschijnlijk "contaminatie" optrad vanuit het interventiegebied naar het controle gebied. In een studie naar de kennis en vaardigheden van beide groepen TBA's aan het begin en einde van de studie bleek dat er geen significante verschillen waren aan het einde van de studie, ook niet bij de geintervieuwde zwangeren in beide gebieden.
De "traditionele vroedvrouw" in Indonesie staat zeker niet onverschillig ten opzichte van "moderne medische kennis" Er is nieuwsgierigheid om meer te leren. Wel is het duidelijk dat het trainingsprogramma voor TBA's samen dient te gaan met verbeteringen van de infrastructuur van het gezondheidszorg systeem. De zwangeren en pasgeborenen met risico factoren welke verwezen worden naar het gezondheids centrum dienen op een adequate wijze te worden opgevangen. Dat bleek in de studie niet het geval te zijn.

Chapter 12. REFERENCES

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The author was born on February 20, 1931 in Jakarta. From 1951-1957 she studied Medicine at the University of Indonesia in Jakarta. From 1954-1957 she was research assistant of Professor Lie Kin Joe at the Department of Parasitology , University of Indonesia. During 1957-1958 she studied at the University Clinic in Munich, Germany. In 1962 she graduated from the Medical School, University of Indonesia.

From 1963-1968 she received her pediatric training at the Department of Child health, Padjadjaran University, Bandung. In 1972, she studied neonatology at the Kapiolani Hospital, Honolulu with Professor Alistair Phillip and at the Sophia Children's Hospital in Rotterdam under the chairmanship of Professor H.K.A. Visser. In 1973 she set up the neonatal subdivision at the Hasan Sadikin General Hospital (Bandung) and in 1980 a neonatal intensive care unit was attached to the neonatal ward. From 1973-1989 she was the head of the neonatal ward and neonatal intensive care unit at the Department of Child Health at the Medical School, Padjadjaran University Bandung. While at the same time from 1986-present, she has been the chairperson of the Health Research Unit of the Medical School, University of Padjadjaran Bandung. In 1986 she participated at the Epidemiologic Intelligence Course at the Central Disease Control in Atlanta. Since then she attended a introductory course in clinical epidemiology at the Health Research Unit in Bandung and a course in critical appraisal at the McMaster University in Toronto From 1990-present she has been appointed to developed and chair the Department of Epidemiology and Biostatistics, Padjadjaran University. In August 1992 she was appointed to become the director of the WHO collaborating center in perinatal care in Bandung.

APPENDIX

A. Perinatal and maternal case reviews

Stillbirths

Case no. 1.

The mother was a 20 year old woman who was married to a 30 year old man. She attended school for 2 years and he had attended school for 6 years. They lived in their own home with tap water and a waterseal toilet. The woman was a housewife an the man a tenant farmer.

The woman had 3 previous pregnancies, including 2 liveborn children and 1 stillborn. One child is still alive, her last delivery was in 3/83. During that pregnancy she received no antenatal care, no tetanus vaccination and delivered a breech. Her LMP was 30 April 1987. At 28 weeks gestation her weight was unknown, but she was ≥145 cm tall and had a MUAC of ≥22 cm. During the index pregnancy, she had no prenatal care visits nor any tetanus vaccination. Her weight had increased during pregnancy. At 41 1/2 weeks she went into labour and the TBA was called. She had a breech delivery of a 2500 gram stillborn infant without gross anomalies at her home after a labour of <24 hours. The TBA arrived 1 hour after the delivery.

Cause of death: breech delivery, post term pregnancy, unattended delivery.

Performance problems: The mother is a high risk woman and seemed to lack knowledge and had a poor attitude toward perinatal care. She did not realize the importance of continuous regular prenatal care inspite her experiences with previous pregnancies.

Case no. 2.

The mother was a 37 year old woman who was married to a 60 year old man. She attended school for 5 years and he had no formal schooling. They live in their own home with a protected well and a pit latrine. The woman was a housewife and the man farmed his own land. The woman had 2 previous pregnancies ending in 2 live born children, both of whom are still alive. Her last delivery; was in June 1974. During that pregnancy she had had 4 prenatal visits with a TBA but received no tetanus vaccination. The woman's LMP was 25 May 1987. She weighed 56 kg at 28 weeks. She had 4 prenatal visits during

the index pregnancy, including ones with a TBA, a midwife at the health center and the private midwife. She received 2 doses of tetanus vaccinations. Her weight increased between the 28th week and her delivery.

At 36 1/2 weeks she complained of fever and gastroenteritis and received medicine at the health center. On February 12, 1988 at 37 1/2 weeks, she was examined by the midwife who found the fetus to be in a transverse position. The midwife performed an external version. On February 14, at 38 weeks she went into labour. During her labour which lasted <24 hours, she had fever and a foul smelling discharge. She delivered at home by the TBA. The infant was a macerated stillborn male infant which was not weighed. There were no gross anomalies.

Cause of death: Premature placental separation due to version of transverse presentation.

Performance problems : The woman was well aware that she is a high risk case and went regularly to the midwife, who failed to observe and monitor the woman's condition especially after an external version. According to the field physician, the woman was referred by the TBA to the health center because of an abnormal pregnancy history and delivered at the health center. The health personnel lacked the knowledge and skills to conduct external version and monitor the patients condition.

Case no. 3.

The mother was a 23 year old woman, she was married twice and her husband was 39 years old. Both had attended school for 6 years. They lived in their own home, their source of water is pipe water collected from a natural well and they used the pond as latrine. The woman was housewife and the man farmed their land. Her LMP was 20 February 1987. She had one live born child from her first husband and a stillborn infant from her second husband. She had 6 antenatal visits, 3 times with a midwife and 3 times with a nurse midwife, she received 2 tetanus vaccinations. Her records from the M&C card showed her weight at 28 weeks to be 50 kg, her weight continued increase until before delivery. She was >145 cm tall and her MUAC was ≥22 cm. She had no complains during her pregnancy. At 38 weeks of gestation she went into labour, the delivery was uneventful and she delivered a stillborn male infant with a birthweight of 2500 gram with a TBA. There was no gross malformation. She remembered that during the last days before delivery there was less movement of the infant, but she was not concerned about the baby.

Cause of death: stillborn infant cause unknown.

Performance problems : The mother and the TBA seemed to lack knowledge about risk pregnancy (previous stillbirth). The mother placed more validity on her feeling that nothing was wrong and did not seek health care when she felt no fetal movements.

Early neonatal death

Case no. 1.

The mother was a 22 year old nulliparous women who was married to a 24 year old man. They both had attended school for 6 years. They lived in their own home with source of water and used the river for latrine. The woman was a housewife and the man farmed their land. Her LMP was 25 December 1987. During he pregnancy, she had 5 prenatal care visits with the TBA, midwife at the health center and another prenatal care provider. She received 3 tetanus vaccinations. At 28 weeks she weighed 43 kg. She was over 145 cm tall and had a MUAC of over 22 cm. She did gain weight between her 28th week and delivery. At 33 weeks she ruptured her membranes. One hour later she went into labour with the fetus in breech position, Thirteen hours later the TBA arrives. On 11 August 1988 after a labor of over 24 hours, the TBA delivers a 2200 gram female breech infant without gross anomalies at the woman's home. It took the TBA 5 minutes to extract the head. The infant was born cyanotic, with difficult grunting respirations and no cry. Time of death was not stated.

Cause of death: premature labor and birth asphyxia due to difficult breech delivery.

Performance problems : The woman and her family seemed to lack the knowledge about the dangers of premature labour and premature rupture of the membrane although the woman was well aware of the importance of prenatal visits. Lack of recording resulted that the woman was vaccinated for tetanus 3 times. The TBA found the woman already in labor with the infant in breech position. Due to lack of transportation and communication to call a midwife, the TBA tried to deliver the infant by herself with resulted in birth asphyxia.

Case no. 2.

The woman was a 21 year old nulliparous woman who was married to a 23 year old man. She had attended school for 5 years and the husband for 6 years. They lived in their own home with a water source coming from the ricefields, they used a pond latrine. The woman was a housewife and the man farmed their land.

Her LMP was 15 March 1988. During her pregnancy she had 3 prenatal visits with the midwife at the health center and received 2 tetanus vaccinations. At 28 weeks she weighed 40 kg. She was over 145 cm tall but her MUAC was under 22 cm. She did gain weight between her 28th week and delivery. Her pregnancy was complicated by cough and dyspnea.

On September 18th at 27 weeks she went into labour. Because the fetus was breech position the TBA referred the mother to the health center for delivery. The mother went to the health center where she was delivered by the TBA because the health center doctor and midwife were not available. The infant was a liveborn male weighing 1500 grams and 39 cm in length. He was pale but cried and moved. He was not breast fed until after 24 hours. The infant continued to be weak, lethargic and to feed poorly. At 24 hours he was hypothermia. The field doctor who came on the second day found the infant to be hypothermia and lethargic and suggested that the baby be taken to the hospital, but the mother refused because she didn't have the money. On the 6th day the baby died at home.

Cause of death: preterm delivery, delayed feeding, hypoglycemia and hypothermia.

Performance problems : The woman and the TBA had done what was expected for them to do, except that the woman refused to refer the baby to the hospital because lack of money. There was lack of knowledge for early feeding, breastfeeding and thermocontrol for small premature infants. The health center doctor and health center midwife were not available when the TBA brought the patient to the health center where she delivered the baby. The medical staff of the health center lacked skill in accurately managing very small infants.

Case no. 3.

The woman was a18 year old nulliparous woman who was married to a 25 year old man. Both had attended school for 6 years. They lived in their own home, water for drinking was collected from a nearby natural well and they used a pond latrine. Her LMP was 30th October 1988. During her pregnancy she had 2 times prenatal visits with a nurse midwife and 2 times with a TBA and received 2 shots of tetanus vaccinations. She had a M&C card but the TBA did not record her condition. Her weight, height and MUAC were unknown. At 24 weeks of gestation she had an accident and 7 days before delivery she had another accident. On July 1988 she went into labour and the TBA was called who delivered a male infant with a birth weight of 1500 gram. The infant was born in toto with the placenta and the amnion was still intact. The placenta was dark red with bloodcloths, there was no foul smell. The infant was lethargic, grunting, he was not

breastfed and had respiratory problems. The TBA did not refer the infant to the health center and the infant died after 18 hours.

Cause of death: preterm delivery and birth asphyxia due to premature separation of the placenta.

Performance problems: The mother and family seemed to lack knowledge of risk pregnancy, she did not seek health care after her accident. The TBA did not encourage the woman for referral and to give expressed breastmilk to the infant.

Maternal death

Case no. 1.

This 24 year old woman had 6 years of schooling, as did her husband. She had one previous pregnancy, which ended in a hydatiform mole in 1986. She was pregnant with twins, At 40 weeks of gestation, on August 2 1988 she went into labor at 23:00 . On August 3 at 17:00 the TBA referred her to the health center. In turn she was referred to the district hospital in Sumedang and arrived at 21:00. The obstetrician for the hospital was ill and the delivery and postpartum care were done by the GP who was on call.

The mother received pitocin augmentation for labour and on August 4 between 01:00-1:15 had forceps deliveries of 2 liveborn male infants. The first weighted 2600 gram and was 49 cm in length. The second twin was 2700 gm and 49 cm long. Both were pink, move actively and had no gross anomalies. At 01.30 the mother had a postpartum hemorrhage. She was treated with IV fluids, methergine, dexamethasone, blood transfusion, oxygen and sodium bicarbonate. At 03.00 she developed dyspnea and died.

Cause of death: Postpartum hemorrhage, possibly due to intrauterine atony due to overdistended uterus and prolonged labour, possibly due to undetected lacerations.

Performance of problems : At the informal level the family lacked the knowledge that would prompted her to seek care earlier. The TBA had referred her at 18 hours which was in agreement with the recommendation of the research team, but failed to diagnose a twin. Transportation from home to hospital take about 4 hours which was expected considering the difficulty to get transportation in a remote village. At the level of the formal health system two problems existed. First, the doctor in charge did not monitor the woman's problems postpartum and did not response promptly. Second, the obstetric department staff lacked skill in accurately diagnosed and treat postpartum hemorrhage.

Case no.2.

This 19 year old woman lived with her 21 year old husband in their own house. She had 6 years of primary education and was a housewife. He had 2 years of schooling and work as a laborer. They used an unprotected well as a water source and a pond latrine.She had been pregnant one time previously. During that pregnancy she had 2 visits antenatal visits and received one dose of tetanus vaccination. On August 18(16 weeks) she went into labour. That pregnancy ended in a spontaneous abortion in September 1987.

Her last pregnancy period of current pregnancy began on 1 May 1988. She had 3 antenatal care visits with a TBA who referred her to the health center for 2 doses of tetanus vaccinations. On August 18 (16 weeks) she went into labor. After 1 1/2 hour she had a spontaneous vaginal delivery of a normal stillborn male infant attended by a TBA, at her grandmothers house. The baby was neither weighed nor measured.

On the 2nd day, she developed a high fever along with abdominal pain and bleeding. The TBA was called and referred the patient to the health center, but the patient refused to go. On the 4th postpartum day, the TBA called the nurse to come to see the woman, but when she arrived, she was dead.

Cause of death: infection, postpartum hemorrhage, possible partial retained placenta.

Performance problems : At the informal level, the mother and the family did not have appropriate knowledge that would prompted her to seek care earlier. She did not trust the health care services and refuse referral. The TBA was unsuccessful in motivating the woman to go for referral and probably did not examined the placenta carefully. The hygienic condition at home of the woman probably play a role in the infection.

Case no. 3.

This 18 year old nulliparous woman lived with her 20 year old husband. Both had completed 6 years of school. They live in a family house with a protected well for drinking and an open latrine. She was a house wife and he was a farm laborer. Her last menstrual period was January 5, 1988. She had 6 antenatal care visits, including with a TBA, midwife at the health center, the doctor at the health center and a private doctor. She received 2 shots of tetanus vaccinations. She weighed 45 kg at 28 weeks of gestation . She was >145 cm tall and her mid upper arm circumference was >22 cm. She gained sufficient weight between 28 weeks and her delivery.

At 40 weeks on October 11, 1988 she went into labour, which lasted less than 22 hours. She had massive bleeding in labor and was referred by the TBA to the health center and

the hospital. before this could happen, she had a spontaneous delivery of a liveborn normal female infant weighing 2200 gm at her home. The placenta did not deliver spontaneously. Postpartum she continued to have massive bleeding. She arrived at the health center shortly after delivery. There the midwife attempted unsuccessfully to start an intravenous line. She was taken to the hospital and arrived 4 hours after delivery in shock, with a blood pressure of 50/0. The placenta was manually removed and the patient treated with intravenous fluids and blood. However she developed dyspnea, even after her blood pressure was stabilized. She died on October 14 , 4 days after delivery.

Cause of death: retained placenta, postpartum hemorrhage, shock and adult respiratory distress syndrome (shock lung).

Performance problems: The performance at the informal level, the mother and the TBA was accordance to the recommendations. The health center however did not have capable staff to handle emergencies and was unable to stabilized the patient and conduct manual removal of the placenta.

B. Technical notes

- Growth rate is the rate at which a population is increasing (or decreasing) in a given year and expressed as a percentage of the base population.
- Age Specific Fertility (ASFR) is the number of live births in a year per 1 000 women by certain age.
- Total Fertility Rate (TFR) is the estimated number of children that would be born alive to a woman during her childbearing period, assuming that fertility behaviour of each woman is the same.
- Child ever born (CEB) is average number of children born per ever married woman who has reached the end of her reproductive ages (45-49 years).
- Family Planning clinic is a clinic where women (acceptors) may obtain the family planning services such as contraceptives. This includes hospital, public health centers, maternal and child health centers, medical mobile team and others.
- The Integrated Health Service Post (Posyandu) is a health post conducted and organized voluntarily by village women. Five health programs are carried out, weighing of under fives, nutrition rehabilitation, immunization (by health personnel), family planning, mother and child health care .
- Perinatal mortality rate is the number of late fetal deaths plus early neonatal deaths per thousand total births.
- Early neonatal death rate is the number of infants died between 0-<7 days per thousand liveborn infants.
- Late neonatal death rate is the number of infants died between 7 - 28 days after birth per thousand liveborn infants.
- Low birth weight is the birthweight of a newborn infant less than 2500 grams.
- Low birth weight incidence is the total number of newborn infants less than 2500 grams per hundred births.
- Low birth weight rate, is the total number of liveborn infants less than 2500 grams per hundred livebirths.
- Maternal mortality ratio is the number of pregnancy related maternal deaths per 100 000 livebirths.

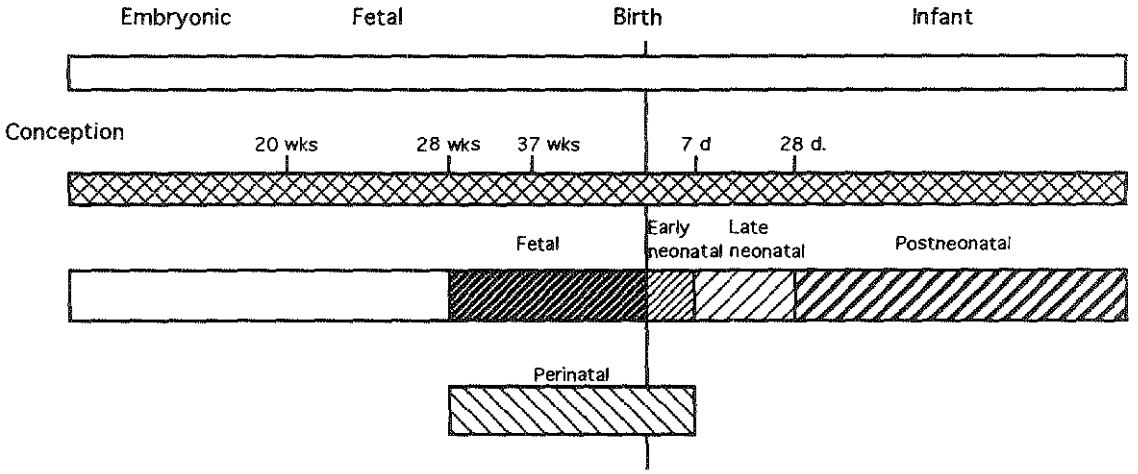
C. Glossary of acronyms

ALRI	Acute lower respiratory infection
ANC	Antenatal care
AGA	Appropriate for gestational age
CPD	Cephalo-pelvic disproportion
CBS	Central Bureau for Statistics
CI	Confidence Interval
CS	Cesarean section
Conv.TBA	Conventional traditional birth attendant
END	Early neonatal death
ENDR	Early neonatal death rate
FP	Family planning
FVHW	Female village health workers
HC	Health center
HDP	Hypertensive disorders in pregnancy
IHSP	Integrated health service post (Posyandu)
IMR	Infant mortality rate
IUGR	Intrauterine growth retardation
KAP	Knowledge, attitude and practice
LMP	Last menstrual period
LNMR	Late neonatal mortality rate
LB	Live birth
LBW	Low birth weight
MCH	Maternal and child health
M&C card	Maternal and child card
MOH	Ministry of Health
MMR	Maternal mortality ratio
NMR	Neonatal mortality rate
OR	Odds ratio
PAR	Population attributable risk
PHC	Primary health care
PMR	Perinatal mortality rate
PPH	Postpartum hemorrhage

PROM	Prolonged rupture of membranes
Ra.TBA	Risk approach trained traditional birth attendant
RR	Relative risk
SB	Stillbirth
SBR	Stillbirth rate
SD	Standard deviation
SE	Standard error
SES	Socioeconomic status
SGA	Small for gestational age
TBA	Traditional birth attendant
TFR	Total fertility rate
TT	Tetanus toxoid
VLBW	Very low birth weight
VHW	Village health worker
WHO	World Health Organization

D. Definition of mortality

DEFINITION OF STAGES AND MORTALITY DURING PREGNANCY AND INFANCY.



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