7.1 BACKGROUND

Most healthcare spending in developing countries is borne by healthcare-seekers out-of-pocket (OOP). India is a good example: 70% of health spending is private, 86% of which is OOP (Karan & Selvaraj 2012, World Bank 2010). Households in India frequently finance such OOP spending, not only for inpatient care but also for outpatient care and even for maternity-related costs, by borrowing money with interest or selling assets (Binnendijk et al. 2012c). This inequitable and inefficient health financing situation persists in other low-income countries as well (Kruk et al. 2009). The solution proposed by WHO and other international bodies has been to strive toward universal health coverage, notably through prepayment and risk pooling mechanisms in lieu of payments at the point and time of service delivery (James & Savedoff 2010, WHO 2010). Yet, penetration of health insurance in most low-income countries remains very low (Staib & Bevere 2011); in India insurance uptake is below 5% (Ma & Sood 2008). One possible explanation for low insurance uptake is that poorer individuals in the informal sector doubt their own ability to enforce contracts with insurance companies. A solution to the problem is for people to own and run community-based health insurance (CBHI) schemes at village level (Dror et al. 2009a, Bhat & Jain 2006, Ahuja 2005, NCMH 2005, Dror & Jacquier 1999).

Typically, CBHI schemes do not benefit from premium subsidy. Therefore, these stand-alone schemes must ensure that benefit expenditures would be limited to premium income (reflecting willingness-to-pay levels). This can be done through the application of a threshold (the predetermined amount above which the insurance reimburses the rest of the bill) and/or a cap (the predetermined amount up to which the insurance reimburses the bill). For premium calculations, information is needed on the probability of healthcare utilization by insured persons and the cost of that utilization. The consequences of applying thresholds and/or caps on the expected average pay-outs of insurance, and thus on the premium, can be calculated only when the distribution of the costs of healthcare utilization is known. It is self-explanatory that when low caps are applied, the effective protection of insured persons for costs above the cap is diminished. The lower the cap, the more likely the situation of reduced insurance cover, which could lead to a perception that insurance will not provide the protection the clients seek. Such perception could greatly dampen willingness to affiliate. It is recalled that the actual assessment of the effects of caps on the protection provided by the insurance can be known in advance only if the distribution of costs is known.

Our study builds on previous research, which confirmed the imperative need to obtain information locally (Dror 2007) because locations differ significantly in the number and type of illness episodes (Dror et al. 2009b), cost of healthcare (Dror et al. 2008) and the willingness-to-pay (WTP) for health insurance (Binnendijk et al. 2013, Dror & Koren 2012, Dror et al. 2007b). Location-specific data cannot be extracted accurately from

national data; one source would be actual claims data (fixing premiums based on such information is called "experience rating"), but this can apply only to schemes already in operation. Projections for new schemes must rely on household surveys. Indeed, a number of experiments with CBHI have relied on baseline data collection (mainly household surveys) to obtain reliable local estimates required for package design and pricing (Mwaura & Pongpanich 2012, Doyle et al. 2011, Onwujekwe et al. 2010b, De Allegri et al. 2008, Dong et al. 2004, AC Nielsen ORG-MARG Pvt Ltd. 2001). However, the time and money required to obtain information through household surveys prior to launching CBHI impede the replication of new CBHIs. To reduce these impediments preceding the launch of CBHI, we have developed faster and cheaper methods to estimate morbidity and healthcare utilization through a quick intervention method we called "Illness Mapping" (Binnendijk et al. 2012a), as well as estimates of WTP (Binnendijk et al. 2013). This article deals with estimating the distributions of healthcare costs, which is the third piece of information needed.

The purpose of this paper is to develop a method for premium calculation of locally relevant health insurance packages that apply a threshold and/or a cap to benefits, and to show that this can be done even without cumbersome and expensive data collection efforts in each location where CBHI is implemented.

7.2 DATA AND METHODS

7.2.1 Setting and sampling

The study is based on data obtained from 11 household surveys conducted in the following periods and locations: 2008, in Warangal and Karimnagar districts, Andhra Pradesh, India; 2009, in Kalahandi, Khorda and Malkangiri districts, Odisha, India; and in Dhading and Banke districts, Nepal; and 2010, in Kanpur Dehat and Pratapgarh districts, Uttar Pradesh, India; and Vaishali and Gaya districts, Bihar, India.

All locations were selected purposively, in agreement with local Non-Government Organizations (NGOs, listed in the acknowledgement) implementing a development project among their members, for which these surveys formed part of the baseline study.

We followed a two-stage sampling procedure: in stage one, villages were selected; 8 were selected in Warangal, 12 in Karimnagar and 42, 15 and 34 villages respectively in Kanpur Dehat, Pratapgarh and Vaishali (from a list given by the local NGO); 27, 22, 31, 9 and 17 villages were randomly sampled in Kalahandi, Khorda, Malkangiri, Dhading and Banke respectively (from lists provided by the local NGOs); and 50 villages were selected randomly in Gaya (from lists provided by the local NGO) plus 50 villages that were selected randomly from the Census 2001 registry of villages. In stage two, households were sampled randomly in each selected village by applying the "four winds" (or "line

sampling") technique (Som 1996) (except in Kanpur Dehat, Pratapgarh and Vaishali). The households were sampled in two cohorts of equal size: member and non-member households. Households were defined as "Members" if at least one person participated in a Self-Help-Group linked to partner-NGOs; other households were "Non-members". We aggregated the two sub-cohorts for the purpose of the analysis reported here. In Kanpur Dehat, Pratapgarh and Vaishali stage two entailed inclusion of all member households, rather than sampling.

Sample sizes were 625 households (2,464 individuals) in Warangal, 1,089 (4,384) in Karimnagar, 1,805 (8,258) in Kalahandi, 1,758 (9,110) in Khorda, 1,597 (7,448) in Malkangiri, 1,000 (5,275) in Dhading, 1,008 (5,741) in Banke, 1,751 (10,220) in Kanpur Dehat, 1,541 (9,374) in Pratapgarh, 1,922 (10,286) in Vaishali and 2,006 households (13,320 individuals) in Gaya. It is noted that sampling was intended to represent the target population for the CBHI programme rather than the entire population in either state or district. 100% of the sampled households were rural. The overall response rate was 100% because there was always a willing adult respondent in the household.

The survey questionnaire was translated from English into the local languages (Telugu, Oriya, Hindi and Nepali, respectively for AP, Odisha, UP and Bihar, and Nepal), back translated for verification, and pre-tested among 80 households per language. Surveyors fluent in local dialects conducted the interviews. We obtained verbal informed consent of the respondents prior to interviews, and kept confidential participants' names in data recording and analysis. Our research tools were reviewed for ethical compliance by an ad-hoc advisory committee composed of scholars and senior scholars from India and other countries that held a two-day workshop in New Delhi in 2006 in preparation of the study, and discussed ethical compliance of the study. It is recalled that at the time of the rollout of the survey there was no local ethics committee in place in India or Nepal.

7.2.2 Data

We queried about general demographics and socio-economic status of households. Respondents to the household survey were asked, among others, to report the age, gender, education and economic activity of every household member. For our "income-proxy" we followed the method as adopted by the Indian National Sample Survey Organization (NSSO 2008) to note expenditures on many items of household consumption. Our income-proxy does not include health expenditure as recommended in previous studies related to determinants of health expenditure (Flores et al. 2008, Wagstaff 2008).

Besides demographics and socio-economic status, we also queried about hospital admissions (exceeding 24 hours) in the year preceding the survey, as well as the direct medical costs related to each admission. These expenditures included the hospital bill, and other consumables from outside sources used during the hospitalization and directly related to it e.g. expenditures for medicines or tests. We also queried about

costs of diagnostic tests performed in an outpatient setting in the month preceding the survey.

7.2.3 Method

We define the following variables:
X = the costs of an insurance benefit, such as hospitalization or tests;
f(x) = the density function of X;
t = threshold value, c = cap value, we assume t<c;
E(X) = the expected costs of an insurance benefit;
$E_{0,c}(X)$ = the expected pay-out by an insurer for a policy covering the costs of an insurance benefit up to cap c;
$E_{t,\infty}(X)$ = the expected pay-out by an insurer for a policy covering the costs of an insurance benefit above threshold t;
$E_{t,c}(X)$ = the expected pay-out by an insurer for a policy covering the costs of an insurance benefit above threshold t and below cap c.
We assume the density function of healthcare expenditures to be a continuous distribution describing the healthcare expenditures among those that had costs (Newhouse & the Insurance Experiment Group 1993, Van der Laan 1988). Previous research has shown that the distribution of positive healthcare expenditures can be approximated by a lognormal model (Van Vliet 2004, Van Vliet 2000, Newhouse & the Insurance Experiment Group 1993, Van der Laan 1988). We therefore also use a lognormal model to approximate the distribution of X. The density function of a lognormal distribution f(x) is:

$$(1) \quad f(x) = \frac{1}{x\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{\ln(x)-\mu}{\sigma}\right)^2}$$

If X follows a lognormal distribution with parameters μ and σ, the natural logarithm of X (ln(X)) follows a normal distribution with parameters μ and σ and consequently, the variable $Y = \frac{\ln(x)-\mu}{\sigma}$ follows the standard normal distribution.
Given a certain sample we first estimate the values for parameters μ and σ of the lognormal distribution. For this we only need the mean costs of the benefit and its standard deviation. We denote the mean costs by $\bar{x}$ and the standard deviation by S. Then the parameters μ and σ of the lognormal distribution are estimated as:

$$(2) \quad \sigma = \sqrt{\ln\left(\frac{s}{\bar{x}}\right)^2 + 1}$$

$$(3) \quad \mu = \ln(\bar{x}) - \frac{1}{2}\sigma^2$$

Insurance companies commonly introduce thresholds and/or caps for reimbursement to assure their long-term survival. We can also calculate the expected pay-out by the

insurer with a certain cap or threshold (or both), after we have estimated the parameters μ and σ. Subsequently $E_{0,c}(X)$, $E_{t,\infty}(X)$ and $E_{c,t}(X)$ would be calculated as follows:

(4) $$E_{0,c}(X) = E(X) \cdot \phi(d - \sigma) + c \cdot (1 - \phi(d))$$

(5) $$E_{t,\infty}(X) = E(X) \cdot (1 - \phi(e - \sigma)) - t \cdot (1 - \phi(e))$$

where $d = \frac{\ln(c) - \mu}{\sigma}$, $e = \frac{\ln(t) - \mu}{\sigma}$ and Φ(z) is the cumulative density function of the standard normal distribution (Van Vliet 2004, Van Vliet 2000).

In formula (4) the first part equals the expected pay-out by the insurer when the costs of the insurance benefit was lower than the cap value; the second part equals the expected pay-out when the costs of the benefit was equal to the cap, or above it. The first part of formula (5) equals the expected pay-out by the insurer when the benefit costs exceed the threshold. The second part of the formula equals the costs that are excluded from the insurance policy.

Subsequently we can calculate $E_{t,c}(X)$ as:

(6) $$E_{t,c}(X) = E(X) - (E_{0,c}(X) + E_{t,\infty}(X))$$

The design of an insurance product with a cap and/or threshold requires understanding of the quantitative consequences of these measures. We use two outcome measures to assess the quantitative consequences of caps and/or thresholds. The first is the percentage of the total costs that is reimbursed by the insurance (Formula 7). This indicates the income required by the insurance company, assuming an actuarially fair premium, in order to break even.

(7) Percentage of costs covered:

a. Situation with only a cap: $\frac{E_{0,c}(X)}{E(X)}$;

b. Situation with only a threshold: $\frac{E_{t,\infty}(X)}{E(X)}$;

c. Situation with both a threshold and a cap: $\frac{E_{t,c}(X)}{E(X)}$.

The second outcome measure is the percentage of bills covered by the insurance (i.e. percentage of bills below cap, above threshold and between threshold and cap in the situation with only a cap, only a threshold and both a threshold and a cap respectively; Formula 8). This second outcome measure can serve as an indicator of the satisfaction of prospective clients.

(8) Percentage of bills covered:

a. Situation with only a cap: ϕ (d) ;

b. Situation with only a threshold: $1 - \phi$ (e) ;

c. Situation with both a threshold and a cap: ϕ (d) – ϕ (e) .

7.2.4 Analysis

The unit of analysis is individual cases of hospitalizations and tests.

The analysis is based on hospitalizations with non-zero costs (95% of all hospitalizations reported) as those are the ones relevant for insurance pay-outs. For the analysis of tests, all outpatient tests had costs and were included.

We used STATA version 11 and MS Excel (version 2010).

All amounts, reported in Indian Rupee (INR) during the surveys were converted into international dollars (purchasing power parity, PPP$) using the exchange rate of PPP$ 1 = INR 16.130 for the survey conducted in 2008, INR 16.692 for the 2009 survey and 18.073 for the 2010 survey (IMF 2012). The amounts reported in Nepalese Rupee (NPR) were converted into PPP$ using the exchange rate of PPP$ 1 = NPR 29.222 (IMF 2012).

7.3 RESULTS

7.3.1 Socio-economic status of studied populations

The studied populations are characterized by low income and low educational levels (Table 7.1). The income-proxy of the population varies from PPP$ 1.0 to PPP$ 2.6 per person per day; and more than 40% of persons aged 15 years or more had no or very little education (below class 5). At the same time, the percentage of people with higher education differed markedly across locations. Most people were engaged in self-employment in agriculture, daily wage labour and self-employment in business/trade.

7.3.2 Reported costs for hospitalizations and tests

Information about expenditures for hospitalizations and tests is self-reported (Table 7.2). The incidence of hospitalizations ranges from 0.02 to 0.15, and for tests the range was between 0.02 and 0.10. The mean costs of hospitalizations and tests also differ markedly across the locations studied: a 6-fold difference in the mean costs of hospitalizations (from PPP$ 109 in Malkangiri to PPP$ 685 in Karimnagar) and a 5-fold difference in mean costs of tests (ranging from PPP$ 6 in Malkangiri to PPP$ 29 in Karimnagar). This large variation in healthcare costs across locations is in line with our previous findings in five other rural locations in India (Dror et al. 2008).

In this study, we want to examine whether the distributions of costs, not just cost levels, differ across locations. This could be done when the mean of the distributions could

Table 7.1 Socio-economic profile of the studied populations

	Warangal	Karimnagar	Kalahandi	Khorda	Malkangiri	Kanpur Dehat	Pratapgarh	Vaishali	Gaya	Dhading	Banke
Income-proxy per person per month (PPP$)[a]											
Mean	77.99	74.49	27.79	33.41	27.98	59.76	47.28	56.58	43.84	70.58	56.87
Standard Error	1.21	0.97	0.22	0.22	0.22	0.67	0.53	0.40	0.28	0.70	0.48
Education of adult population (15 years and older)											
No education	40.1%	42.5%	51.7%	27.4%	68.6%	31.5%	35.2%	45.5%	46.3%	37.5%	34.3%
Class 1-5	9.1%	8.4%	16.8%	20.3%	13.5%	11.8%	12.5%	14.5%	12.3%	18.8%	13.8%
Class 6-10	28.3%	26.8%	25.5%	42.3%	15.9%	41.1%	37.7%	31.2%	33.0%	28.9%	35.6%
Class 11 and higher	22.5%	22.2%	6.1%	10.1%	2.0%	15.6%	14.6%	8.9%	8.4%	14.8%	16.2%
Economic activity of adult population (15 years and older)											
Self-employed in agriculture	9.8%	19.9%	20.6%	10.6%	27.9%	31.0%	10.9%	12.9%	12.3%	31.8%	24.1%
Self-employed in business/trade	10.0%	7.5%	5.4%	17.1%	3.7%	4.0%	7.7%	9.8%	3.6%	14.2%	8.3%
Regular salaried employee	7.0%	4.5%	2.2%	4.2%	2.6%	2.7%	3.8%	1.6%	2.9%	8.4%	11.2%
Casual wage labourer	39.7%	31.5%	26.3%	12.5%	27.5%	8.1%	15.2%	19.5%	33.0%	4.2%	8.9%
Domestic duties	10.9%	10.6%	29.5%	38.3%	28.4%	31.5%	32.7%	35.5%	28.4%	13.6%	21.7%
Not working	22.5%	25.9%	15.9%	17.4%	9.9%	22.7%	29.7%	20.8%	19.9%	27.8%	25.8%

[a] Income is proxied as monthly per capita consumer expenditure through questions on many items of household expenditure and expressed in Purchasing Power Parity International Dollar.

be standardized while maintaining the shape of each distribution. We 'standardized' the costs by dividing reported costs in each location by that location's average cost, obtaining the same mean cost of one in all locations, while the Coefficient of Variation (CV) of each distribution remained unchanged. These standardized distributions are shown in Figure 7.1a (for hospital expenditures) and in Figure 7.1b (for expenditures on tests).

To our surprise, the standardized distributions of hospital expenditures in the 11 locations were really similar; the same clear similarity across locations was also observed with the distributions of expenditures on tests.

We then proceeded to elaborate a model describing the best-fit for all distributions. It is recalled that previous research has successfully used the lognormal distribution as a good approximation for empirical distributions of healthcare costs (Van Vliet 2004, Van Vliet 2000, Newhouse & the Insurance Experiment Group 1993, Van der Laan 1988). We therefore created a theoretical lognormal curve (Equation 1) with mean of one and a CV which is the arithmetic average for the 11 locations (1.65 for hospital costs and 1.53 for tests, table 7.2). The resulting theoretical curve is plotted in Figure 7.1a for hospitalization expenditures and in Figure 7.1b for expenditures on tests.

Table 7.2 Utilization of and expenditures for hospitalizations and diagnostic tests

	Hospitalizations				Diagnostic tests			
	Incidence of cases with cost>0 (n)	Mean costs (PPP$[a])	Standard Deviation (PPP$[a])	Coefficient of Variation (CV)	Incidence of cases with cost>0 (n)	Mean costs (PPP$[a])	Standard Deviation (PPP$[a])	Coefficient of Variation (CV)
Warangal	0.15 (377)	625.49	1267.03	2.03	0.05 (124)	23.12	43.98	1.90
Karimnagar	0.15 (654)	685.52	1414.20	2.06	0.06 (271)	28.86	41.57	1.44
Kalahandi	0.06 (469)	183.34	268.93	1.47	0.10 (799)	5.76	12.41	2.15
Khorda	0.06 (523)	345.71	563.96	1.63	0.05 (490)	9.67	13.77	1.42
Malkangiri	0.06 (468)	108.94	185.62	1.70	0.04 (304)	5.53	5.28	0.95
Kanpur Dehat	0.02 (245)	681.91	1129.76	1.66	0.03 (328)	20.52	31.88	1.55
Pratapgarh	0.02 (143)	356.44	588.56	1.65	0.02 (196)	14.50	24.95	1.72
Vaishali	0.03 (331)	272.92	369.14	1.35	0.06 (605)	18.84	30.01	1.59
Gaya	0.03 (353)	372.10	610.53	1.64	0.02 (272)	13.75	18.00	1.31
Dhading	0.04 (204)	502.31	657.07	1.31	0.03 (139)	23.28	30.40	1.31
Banke	0.04 (218)	437.58	717.58	1.64	0.04 (255)	14.04	21.37	1.52

[a] PPP$ = Purchasing Power Parity International Dollar.

7.3.3 Outcome measures as predicted by the theoretical model

The model needs to predict the financial performance of CBHI schemes functioning with different levels of caps and thresholds. We observed the consequences of different levels of caps and thresholds on (i) the percentage of overall costs that the insurance

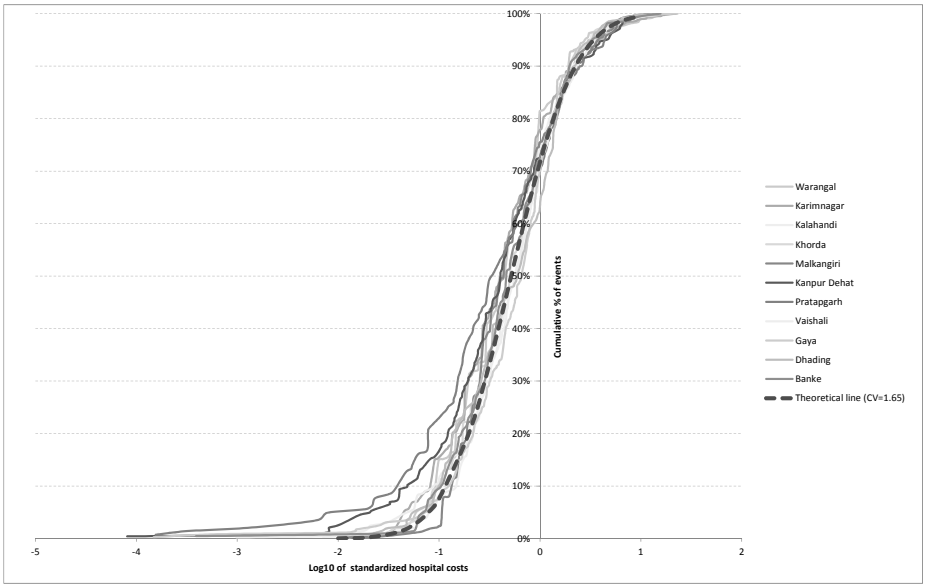

Figure 7.1a Distributions of hospital costs

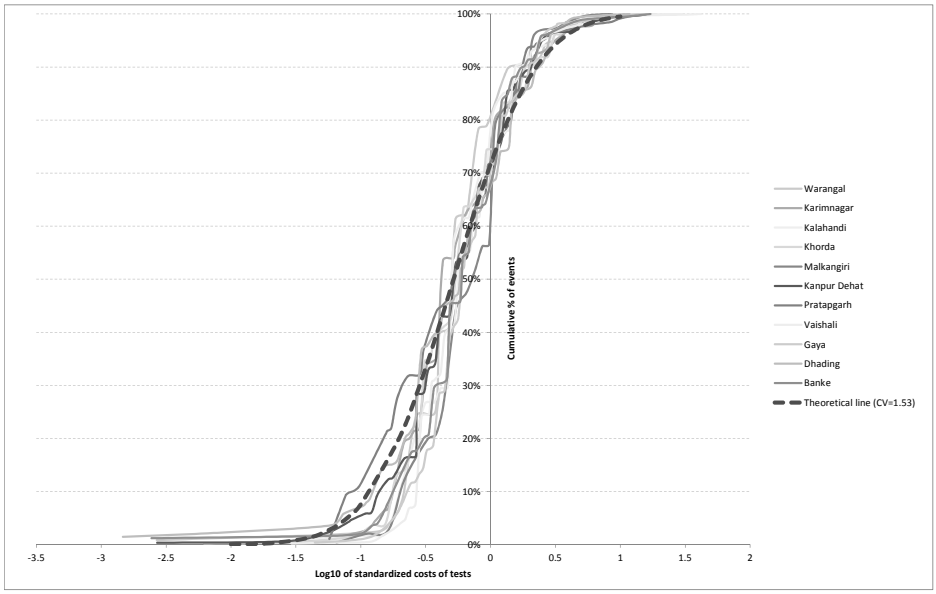

Figure 7.1b Distributions of costs on diagnostic tests

would reimburse; and (ii) the percentage of bills covered by the insurance. The results are shown in Figure 7.2a (for different levels of caps) and in Figure 7.2b (for different levels of thresholds).

As a reminder, all bills and all costs are reimbursable fully only when neither threshold nor cap apply. Moreover, most insured persons do not claim at all (and these would not be shown in the distributions); and many bills entail low costs, with only very few very high cost bills. Both a threshold and a cap will be effective in reducing the average reimbursement per insured. In many cases, the insurance product is limited both by a threshold and by a cap.

In figure 7.2a one can see that a threshold of 20% of the mean would lower insurance pay-out from 100% to 80% of the bills (green line) and from 100% to 82% of the costs (yellow line). When the threshold is increased to 0.5 times the mean, only 51% of the bills will be reimbursable, and the costs payable by the insurance would drop to 62% of total. Thresholds are effective in reducing the number of small claims.

When a cap is set, large bills will be truncated to the predefined maximum, causing a larger reduction in costs than in bills. For example, when the cap is set at 50% of mean hospital costs, 49% of the bills are fully covered (red line) but only about 38% of costs (orange line) are reimbursed (figure 7.2b). The higher the cap, the larger the share of bills and costs covered, but even at an unlikely example of a cap set at 3 times the mean, only 94% of the bills and 84% of the costs would be covered.

The blue and purple lines in Figure 7.2b illustrate the consequences of imposing both threshold (fixed at 20% of the mean) and a cap. Note that the curve describing the effect of the cap alone is parallel to that of the curve describing the effect of both threshold and cap on the percentage of bills covered (figure 7.2b, compare the red and purple lines), i.e. the two curves have the same shape with the notable difference that the threshold of 20% of the mean (purple line) causes the exclusion of 20% of bills (with the lowest amounts) from insurance coverage. Similarly for the curves describing the effect on the reimbursement, which exhibit the same shape, differentiated only by 18% of costs reflecting the threshold of 20% of the mean (see the blue and orange lines).

As the average CVs of hospitalizations and tests are very similar, the theoretical model gives a very similar picture of the financial implications on the reimbursement of tests when applying different levels of thresholds and/or caps (not shown).

7.3.4 Comparison of predictions with empirical data

Tables 7.3 and 7.4 contain both the results obtained by applying our theoretical model and those obtained by applying the same caps/thresholds to the empirical data derived from the household surveys in all 11 locations. It should be noted that these caps/thresholds are per event (i.e. hospitalization or test). As in figures 7.2a and 7.2b, we show here the percentage of bills and the percentage of total costs covered.

We observe marked similarity between the theoretical model and the empirical data in the prediction of the percentage of total costs that the insurance needs to cover. For instance, when the cap is assumed to equal 100% of the mean, the predicted outcome

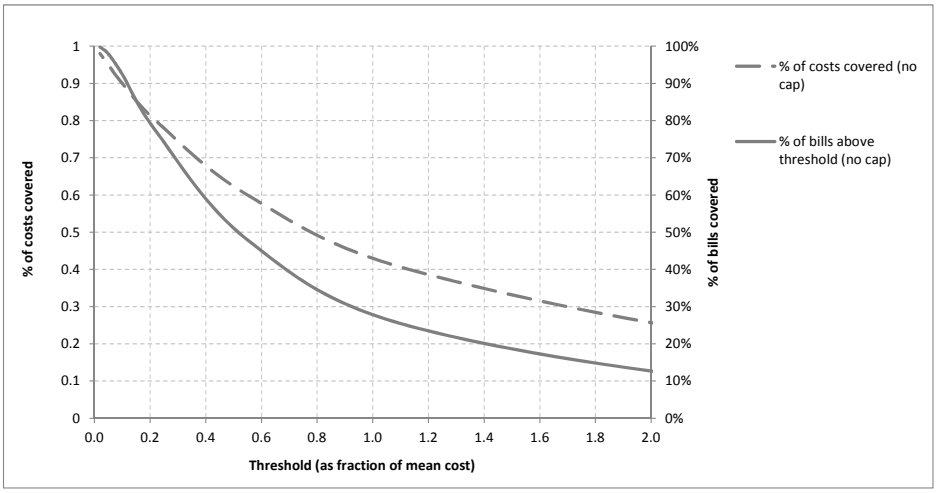

Figure 7.2a Expected impact on reimbursement of hospital costs at different levels of thresholds

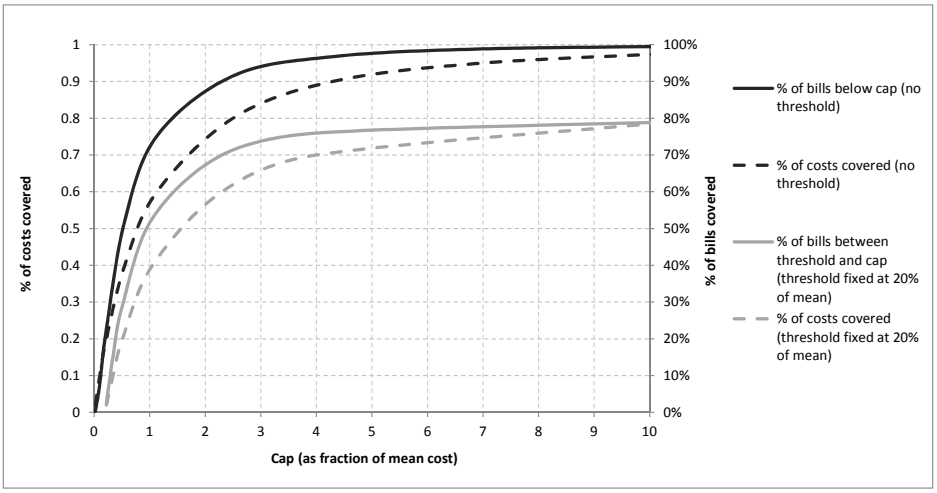

Figure 7.2b Expected impact on reimbursement of hospital costs at different levels of caps

was less than 10% different from the empirical outcome ("good agreement") in 8 out of the 11 locations (table 7.3). In two more examples (when the cap was assumed to be 0.5 times the mean, and when the cap was assumed to be 2 times the mean) we observed good agreement in 9 out of the 11 locations. And, the theoretical and empirical values were in good agreement in all locations when comparing the effect of introducing a threshold without a cap (two examples shown: thresholds of 10% or 20% of the mean).

A comparison of predicted versus empirical data on the % of bills also yielded a marked similarity when the caps were set at 100% or 200% of the mean (good agreement in 9 and 11 cases out of 11, respectively). On the other hand, the agreement was lower, with

only 5 out of 11 locations in good agreement, when the cap was assumed to be 50% of the mean. With a threshold of 10% of the mean, 10 out of 11 cases were in good agreement and a threshold of 20% of the mean 7 out of 11 were in good agreement.

A similar pattern was observed when comparing the theoretical model with the empirical data relating to tests (table 7.4).

7.4 DISCUSSION

This article deals with developing a model to estimate insurance coverage under CBHI. If a threshold and/or a cap limits the pay-out of any benefit then the evaluation of coverage can be done only when the distribution of the expected costs is known. Because thresholds and caps are not rare but a standard feature of benefit packages, we are keen to develop a method to predict the distribution in each case. A predictive method has particularly important ramifications in the context of introducing health insurance to rural poor persons in low income countries, where data is usually missing and collection of the required data entails high cost, which often cannot be borne as part of implementation costs in these settings.

In this study, we examine the distributions of the costs of two benefits (hospitalizations and diagnostic tests) derived from eleven household surveys conducted prior to launching CBHI schemes (nine in India and two in Nepal). As the mean cost of the benefits differed significantly across the locations, we wished to study the shape of the distributions independently of the mean costs. The shape of the distribution is determined by the relative frequency of small bills versus high / outlier bills: for two data series with the same mean costs but with very different ratios of small bills to large bills, the consequences of applying the same threshold and/or cap could be completely different in terms of insurance coverage.

We were not surprised to find in this study large differences across locations in incidence/prevalence of illness, utilization of healthcare, its cost and different levels of WTP for health insurance (table 7.2), as this corroborated previous relevant research (Dror et al. 2009b, Dror et al. 2008, Dror et al. 2007b). On the other hand, when – in our search for a theoretical model of the distributions – we 'standardized' the eleven data series by dividing costs reported in each location by that location's average cost (a practice common in natural sciences) we were surprised to see that the shape of the distributions was remarkably similar. This led us to develop a theoretical model based on the assumption that the distributions are lognormal (Van Vliet 2004, Van Vliet 2000, Newhouse & the Insurance Experiment Group 1993, Van der Laan 1988) and its shape is determined by the Coefficient of Variation (CV=standard deviation/mean). The CV of the theoretical model was assumed to be the arithmetic average of the CVs of the eleven locations.

Table 7.3 Theoretical model vs. empirical data for hospitalizations

		Cap			Threshold	
Theoretical model	Fraction of mean	0.5	1.0	2.0	0.2	0.1
(Assumed CV[a] =	% of cost covered	38%	57%	75%	82%	90%
1.65)	% of bills covered[b]	49%	72%	88%	80%	92%
Warangal	Cap/threshold (PPP$[c])	*313*	*625*	*1250*	*125*	*63*
	% of cost covered	35%	53%	67%	82%	90%
	% of bills covered[b]	57%	81%	93%	69%	85%
Karimnagar	Cap/threshold (PPP$[c])	*343*	*685*	*1371*	*137*	*69*
	% of cost covered	34%	50%	66%	83%	90%
	% of bills covered[b]	58%	78%	89%	69%	85%
Kalahandi	Cap/threshold (PPP$[c])	*92*	*183*	*366*	*36*	*18*
	% of cost covered	39%	59%	77%	82%	90%
	% of bills covered[b]	46%	74%	89%	82%	92%
Khorda	Cap/threshold (PPP$[c])	*173*	*346*	*691*	*69*	*35*
	% of cost covered	37%	56%	75%	82%	90%
	% of bills covered[b]	46%	71%	88%	78%	90%
Malkangiri	Cap/threshold (PPP$[c])	*54*	*109*	*218*	*22*	*11*
	% of cost covered	36%	53%	71%	81%	90%
	% of bills covered[b]	56%	75%	87%	78%	98%
Kanpur Dehat	Cap/threshold (PPP$[c])	*341*	*682*	*1364*	*136*	*68*
	% of cost covered	33%	50%	69%	83%	91%
	% of bills covered[b]	57%	72%	89%	69%	84%
Pratapgarh	Cap/threshold (PPP$[c])	*178*	*356*	*713*	*71*	*36*
	% of cost covered	31%	50%	69%	84%	91%
	% of bills covered[b]	57%	70%	87%	62%	77%
Vaishali	Cap/threshold (PPP$[c])	*136*	*273*	*546*	*55*	*27*
	% of cost covered	38%	58%	77%	82%	91%
	% of bills covered[b]	46%	70%	87%	80%	89%
Gaya	Cap/threshold (PPP$[c])	*186*	*372*	*744*	*74*	*37*
	% of cost covered	39%	61%	79%	82%	90%
	% of bills covered[b]	42%	70%	90%	82%	92%
Dhading	Cap/threshold (PPP$[c])	*251*	*502*	*1005*	*100*	*50*
	% of cost covered	36%	59%	80%	82%	90%
	% of bills covered[b]	48%	63%	87%	75%	91%
Banke	Cap/threshold (PPP$[c])	*219*	*438*	*875*	*88*	*44*
	% of cost covered	37%	56%	74%	82%	90%
	% of bills covered[b]	51%	72%	90%	77%	91%

[a] CV = Coefficient of Variation.

[b] Percentage of bills covered by the insurance: percentage of bills below cap or above threshold in the situation with only a cap or only a threshold respectively.

[c] PPP$ = Purchasing Power Parity International Dollar.

Table 7.4 Theoretical model vs. empirical data for outpatient diagnostic tests

		Cap			Threshold	
Theoretical model	Fraction of mean	0.5	1.0	2.0	0.2	0.1
(Assumed CV[a] =	% of cost covered	39%	58%	77%	80%	90%
1.53)	% of bills covered[b]	47%	71%	88%	80%	94%
Warangal	Cap/threshold (PPP$[c])	*11.6*	*23.1*	*46.2*	*4.6*	*2.3*
	% of cost covered	42%	58%	72%	80%	90%
	% of bills covered[b]	41%	79%	90%	94%	99%
Karimnagar	Cap/threshold (PPP$[c])	*14.4*	*28.9*	*57.7*	*5.8*	*2.9*
	% of cost covered	40%	58%	76%	80%	90%
	% of bills covered[b]	54%	70%	86%	92%	99%
Kalahandi	Cap/threshold (PPP$[c])	*2.9*	*5.8*	*11.5*	*1.2*	*0.6*
	% of cost covered	44%	62%	75%	79%	90%
	% of bills covered[b]	30%	71%	91%	88%	98%
Khorda	Cap/threshold (PPP$[c])	*4.9*	*9.7*	*19.3*	*1.9*	*1*
	% of cost covered	41%	60%	77%	81%	90%
	% of bills covered[b]	43%	74%	90%	87%	98%
Malkangiri	Cap/threshold (PPP$[c])	*2.8*	*5.5*	*11*	*1.1*	*0.6*
	% of cost covered	45%	70%	89%	80%	89%
	% of bills covered[b]	26%	57%	88%	97%	98%
Kanpur Dehat	Cap/threshold (PPP$[c])	*10.3*	*20.5*	*41*	*4.1*	*2.1*
	% of cost covered	40%	60%	77%	81%	90%
	% of bills covered[b]	43%	70%	89%	86%	95%
Pratapgarh	Cap/threshold (PPP$[c])	*7.3*	*14.5*	*29*	*2.9*	*1.4*
	% of cost covered	37%	57%	75%	82%	91%
	% of bills covered[b]	48%	72%	93%	72%	89%
Vaishali	Cap/threshold (PPP$[c])	*9.4*	*18.8*	*37.7*	*3.8*	*1.9*
	% of cost covered	42%	64%	81%	80%	90%
	% of bills covered[b]	40%	69%	91%	97%	100%
Gaya	Cap/threshold (PPP$[c])	*6.9*	*13.7*	*27.5*	*2.7*	*1.4*
	% of cost covered	44%	65%	84%	81%	90%
	% of bills covered[b]	39%	68%	85%	96%	99%
Dhading	Cap/threshold (PPP$[c])	*11.6*	*23.3*	*46.6*	*4.7*	*2.3*
	% of cost covered	38%	60%	81%	81%	90%
	% of bills covered[b]	45%	66%	86%	84%	94%
Banke	Cap/threshold (PPP$[c])	*7*	*14*	*28*	*2.8*	*1.4*
	% of cost covered	43%	64%	80%	81%	90%
	% of bills covered[b]	45%	67%	91%	95%	98%

[a] CV = Coefficient of Variation.

[b] Percentage of bills covered by the insurance: percentage of bills below cap or above threshold in the situation with only a cap or only a threshold respectively.

[c] PPP$ = Purchasing Power Parity International Dollar.

When we compared the theoretical model against the predications based on empirical data we obtained satisfactory predictions of the consequences of applying thresholds and/or caps on the expected financial performance of CBHI, both in the case of hospitalizations and tests (tables 7.3 and 7.4). The outcome measures were the percentage of bills covered and the percentage of costs reimbursed by the insurance under different assumptions for caps and/or thresholds. Given this satisfactory comparison between empirical data and the theoretical model we were strengthened in our belief that the lognormal model can provide a good approximation for this data.

The arithmetic averages of the CVs of the two benefits under study were remarkably similar even though one benefit was related to inpatient care and the other to a component of outpatient care. We do not know if this similarity might apply also to other benefits, or is a coincidence. This would have to be examined against the distributions of additional cost components of outpatient care.

Applying the theoretical model requires an estimate of the mean cost of the benefit(s) in question. We believe that it should be easy enough to obtain mean costs in each new location as part of the investigation to estimate the probability of healthcare utilization based on facilitated interactive group discussions which we developed, called "Illness Mapping" (Binnendijk et al. 2012a).

In designing health insurance there is always the tension between the desire to include more benefits and the wish to keep the premium amount affordable. The reasons for introducing a threshold and/or a cap seem rather straightforward: thresholds can reduce the administrative burden of many small claims, caps can protect the insurance from very high outlier bills. However, both measures could reduce the willingness to join, especially when insured persons must still borrow money or sell assets to pay for healthcare bills (Binnendijk et al. 2012c). Setting caps and/or thresholds is therefore a delicate issue. The percentage of bills covered can be used as an outcome measure that could serve as an indicator of the expected satisfaction of prospective clients.

The theoretical model developed in this paper is based on nine Indian and two Nepalese locations. These eleven locations are very different in mean cost and probability of healthcare utilization of the studied benefits (table 7.2). The satisfactory fit of the empirical distributions with the distributions derived on the basis of the theoretical model supports the notion that the model could be applicable for all Indian and Nepalese rural poor cohorts. More generally, the theoretical model presented here makes it possible to simulate the expected performance of the CBHI in the local context at the stage of package design, and determine not only which components should be included but also the optimal level of threshold and cap that would meet the expressed levels of WTP best. To the best of our knowledge, this has never before been done in development projects aiming to develop CBHI with suitable health insurance coverage under severe rationing rules.

A look at the distributions in the eleven locations studied (both of hospitalizations and tests) makes clear that the distributions are less similar at the left tail. This scattering in the range of the small bills may reflect a variation in health seeking behaviour in less severe illnesses (due to healthcare availability/proximity and/or education). It may also be caused by recall bias which can be expected to be more pronounced in the case of small bills (Harel et al. 1994). This problem could be reduced by applying a threshold.

It would be interesting to replicate this research in other developing countries where CBHI schemes are implemented or considered, in order to establish whether the distributions of costs follow a similar pattern.

7.5 CONCLUSIONS

The analysis in this paper has shown that a theoretical model of healthcare costs based on a lognormal distribution can be used to calculate the impact of thresholds and caps on the share of costs and bills that would be reimbursable. This information, hitherto ignored, can be used to refine premium calculations of community-based health insurance schemes in low income countries and foretell expected client satisfaction with locally relevant health insurance packages that define a threshold and/or a cap. Application of the model makes it possible to obtain the local data required faster and cheaper than by conducting household surveys.

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Chapter 8

Eliciting health insurance benefit choices of low income groups

Based on: Danis, M., Binnendijk, E., Vellakkal, S., Ost, A., Koren, R., Dror, D.M. Eliciting health insurance benefit choices of low income groups. Economic and Political Weekly 2007, 42(32):3331-3339.

ABSTRACT

An appropriate scheme of health insurance must respond to clients' priorities, yet cover a finite and affordable benefit package. A variety of methods have been developed so far to engage the public in prioritising services. This paper deals with a plan that allows variably educated populations who are inexperienced with health insurance to pick health benefits. The decision exercise reported here enhances popular understanding (1) that even within a limited premium there is a choice of different package compositions; and (2) that the level of the premium determines the expectation of coverage by health insurance.

8.1 BACKGROUND

There is a growing awareness that access to healthcare cannot be free-of-charge, due to the low level of government spending on health (Banerji 2005), nor funded mainly out-of-pocket by care-seekers, due to the regressive effect of this financing mode (James et al. 2006, O'Donnell et al. 2005). Notwithstanding the view that health insurance is the viable solution (Churchill 2006, O'Donnell et al. 2005), health insurance is nearly non-existent in poor communities in rural India. One way of promoting the supply of health insurance for rural persons has been the Insurance Regulatory and Development Authority (IRDA) requirement that commercial insurers should satisfy rural and social quotas; another way to encourage the development of community-based micro health insurance units (MIUs) has been to include it under the government's national rural health mission (GOI 2005c), where the grassroot schemes are expected to offer essentially a complementary coverage additional to the existing government health services delivered free of charge. This would be possible, of course, only in such places where the public system is both present and trusted by the local population. In other places, the MIUs serve as substitutive schemes. Be the micro schemes complementary or substitutive, they are based on voluntary affiliation, and we assume that their main long-term source of financing is premium income. To make such programmes financially feasible, they must cover a finite benefit package that is affordable by the poor.

We evoke an underlying assumption that responsiveness of health insurance to prospective clients' perceived priorities would be positively associated with willingness to join such a system and pay for it (De Allegri et al. 2006, Schone & Cooper 2001). Responsiveness of the system refers, in this context, to the ability of clients to become involved in selecting the services that they will access (Murray & Frenk 2000). Therefore, a method is needed to allow variably educated, poor populations who are inexperienced with health insurance, to ascertain their collective priorities for insured benefits.

While a variety of methods have been developed to engage the public in prioritising services (Mullen 2004, Ryan et al. 2001, Mullen 1999) few are designed or applied to resource-poor populations; and never before has this been done in the context of health insurance in India. We developed a modified version of the Choosing Healthplans All Together (CHAT) exercise (Danis et al. 2006, Goold et al. 2005, Danis et al. 2004, Danis et al. 2002), and tailored the underlying metrics to the reality of several rural and semi-urban (slum) locations in India. The purpose of this paper is to describe the major features of group process revealed in the simulation exercise conducted to test this tool, through which illiterate and innumerate persons in India were engaged in priority-setting regarding the composition of a health insurance benefit package.

8.2 DATA AND METHODS

8.2.1 Setting and sampling

The experiment was conducted in 17 locations where community-based MIUs agreed to recruit both insured and uninsured participants for the exercise: (i) Karnataka: seven locations linked to the Karuna Trust, (ii) Maharashtra: four slum areas around Pune and six other locations in rural Maharashtra, linked to "Uplift Health"[8].

The MIUs that operate in locations where the experiment was conducted cover a partial benefit package and the premiums are partially subsidised (Radermacher 2006, Radermacher et al. 2005b, Radermacher et al. 2005a, Devadasan et al. 2005, Radwan 2005, Ranson 2003).

To ensure optimal conditions for constructive group discussions during the sessions, groups were composed of 10 to 15 participants. We attempted to ensure gender parity, but in fact, more women than men participated[9]. We cannot exclude the possibility of some resulting bias on the choices recorded.

8.2.2 CHAT decision tool

The decision tool used in India was developed as part of the EU-India Economic Cross-Culture Programme (ECCP) project "Strengthening micro health insurance units for the poor in India" (www.microhealthinsurance-india.org). The tool is a game-like exercise facilitating group discussion of the decision-making process, involving many choice options and trade-offs within a limited budget. The exercise is built around a circular board which displays insurance benefit options as slices of a pie chart (see Figure 8.1). The CHAT board had 10 slices. The CHAT exercise is designed to make complex decisions more feasible by incorporating complicated data such as actuarial costs into a simply presented exercise board. The decision process is also guided in that the options offered to participants are determined prior to their participation.

Participants are given stickers representing the monetary amount of their insurance premium, to place on the benefits they wish to include in their insurance package. The cost of these benefits was based on actuarial calculations.

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8. Villages that participated in Karnataka (total 11 sessions): V P Hundi (1 session), Madavadi (2 sessions), Kiragasur (2 sessions), Banave (1 session), Hiriyuru (1 session), Beedanahalli (2 sessions), Kempaiahnahundi (2 sessions). Villages in Maharashtra (total 13 sessions): Slum areas Pune: Gokhale Nagar (1 session), Karve Nagar (2 sessions), Janata Vasahat (2 sessions), Kashewadi (2 sessions), district Osmanabad: Ter (1 session), Wakerwadi (1 session), district Latur: Dhanegaon (1 session), Chata (1 session), district Solapur: Boramani (1 session), Musti (1 session).

9. One reason for this uneven number could be that the exercises, at least in some places, took place during the day.

Most benefit types are offered for selection at basic, medium or high coverage levels, some benefits are offered at basic and high levels only. The distinction between basic, medium and high coverage is the amount of co-payment payable by the participant. At the higher benefit level the out-of-pocket co-payment is lower. Participants have the option to forgo a benefit altogether. The sticker requirements are additive; stickers must be assigned to the basic level before they can be used to choose the medium level and so on.

The game board is accompanied by a CHAT manual that provides simple descriptions of every benefit, including the difference between coverage levels of each benefit. The exercise is also accompanied by a facilitator's guide that provides detailed instructions so that the exercise can be facilitated in a standardised approach by a group leader with minimal practice.

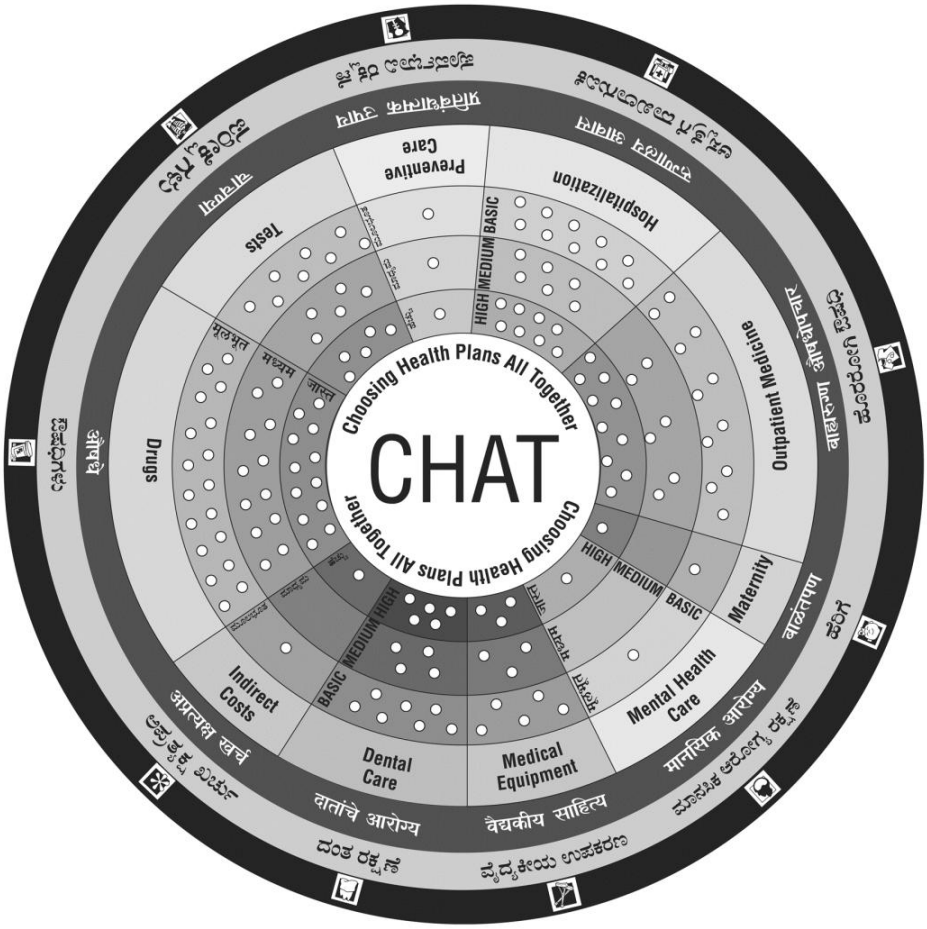

Figure 8.1 CHAT board for India

The decision-making process: The CHAT exercise involved two rounds of decision-making. In the first round, participants are instructed to choose benefit packages to meet their and their families' needs; in the second round, the facilitator leads the whole groups in an exercise similar to focus group discussions (FGD) technique (Steward et al. 2006, Morgan 1996) in choosing a benefit package for a larger unit such as their community. Such decisions were reached by consensus, reflecting the local cultural setting that unfolded during the field experiment.

To help participants appreciate the consequences of their choices and make them more prudent as they progress through the exercise, they are given, at the end of the first round, randomly assigned health event cards that contain stories of illness episodes and explain the consequences of the benefit choices in relation to these events.

Pre-exercise and post-exercise questionnaires are used to collect socio-demographic information and attitudinal information of the particular population being surveyed. Survey items used to measure participant assessment of the exercise have been tested previously (Goold et al. 2005).

Determination of benefit options: The 10 benefit types that were included in the CHAT board reflect a synthesis of three sources of information: (i) published sources regarding health insurance in India (ILO 2005, Radwan 2005, Gumber 2002, Peters et al. 2002, WHO 2001, Normand & Weber 1994), (ii) utilisation data from the household survey described below, and (iii) knowledge of the team regarding available health services in India.

To identify illness frequency in the absence of prior insurance utilisation, we used the results of a random household survey conducted in the initial phase of the ECCP project, in 243 villages in seven purposively selected locations in Maharashtra, Karnataka, Bihar and Tamil Nadu (Dror et al. 2007b). The survey included questions on care-seeking episodes in the last three months, hospitalisation episodes in the last two years, and maternity episodes in the last five years as well as information about OOP costs of these episodes.

Actuarial estimates of costs: The incidence and unit costs of hospitalisations, consultations, diagnostic tests and prescribed drugs were estimated based on the reported incidence and costs in the household survey, reflecting respondent's actual utilisation in the public and/or private sector. An actuary with field experience in India adjusted the data as necessary. The incidence and unit costs of preventive care, dental care, mental care, medical equipment, indirect costs and maternity was estimated by the actuary[10].

The actuarial calculations that determine the cost of the benefits were expressed in monetary terms, which were converted into stickers. The number of stickers required for each benefit was proportional to its actuarial estimate; each sticker represents a value of INR 10.

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10. The exact definitions of what is included in each benefit type are provided in Table 8.1.

8.2.3 Algorithms for the calculation of coverage levels

Basic level of coverage: covers 50 per cent of all costs; 50 per cent is paid out-of-pocket
High level of coverage: 100 per cent of all costs; zero out-of-pocket payment
Medium level of coverage: benefit increases as the bill increases, according to the following formula:

(a) Bill under median cost: insurance pays 50 per cent of bill
(b) Bill between median and 70th percentile: insurance pays (Median/2) + (bill-median*0.9)
(c) Bill higher than 70th percentile: insurance pays: (Median/2) + (p70-median)*0.9 + (bill - p70)*0.95.

In the CHAT manual these algorithms were described as illustrative examples, without formulas. The explanation of medium level of coverage given to respondents was as follows: "Insurance pays for half the cost of inexpensive cost in hospital (example: when your bill is INR 1,000 you pay INR 500); when treatment costs are more than INR 1,500, your insurance pays more than half (for example, when your bill is INR 10,000, you pay only INR 1,275)". The list of benefit types and the sticker-value of each level of coverage are shown in Table 8.1.

Table 8.1 Description and sticker prices of benefits offered in the CHAT exercise in India

Benefit description	Level of benefit coverage		
	Basic	Medium	High
Outpatient medicine Insurance pays for treatment by a registered health worker (physicians, specialists, nurses) outside of the hospital	*11 Stickers* Insurance pays for half the cost of services	*11 + 6 Stickers* Insurance pays for half the cost of inexpensive treatments (for example, when your bill is INR 50, you pay INR 25) When treatment costs are more than INR 60 your insurance starts paying more than half (for example, when the bill is INR 300 you pay only INR 45)	*11 + 6 + 10 Stickers* Insurance pays for all the cost of services
Hospitalisation Insurance pays for hospital bills except for mental illness and childbirth	*10 Stickers* Insurance pays for half the cost of services	*10 + 6 Stickers* Insurance pays for half the cost of inexpensive stays in the hospital (for example, when your bill is INR 1,000, you pay INR 500) When treatment costs are more than INR 1,500 your insurance starts paying more than half (for example, when the bill is INR 10,000 you pay only INR 1,275)	*10 + 6 + 8 Stickers* Insurance pays for all the cost of services

Table 8.1 Description and sticker prices of benefits offered in the CHAT exercise in India (continued)

Benefit description	Level of benefit coverage		
	Basic	Medium	High
Maternity Insurance pays for the mother's care before, during and after delivery Insurance pays for delivery in the hospital Insurance pays for the child's care until 1 year Insurance pays for family planning	*1 Sticker* Insurance pays for half the cost of services		*1 + 1 Stickers* Insurance pays for all the cost of services
Drugs Insurance pays for medicines, bandages and other consumable medical supply prescribed by a registered healthcare worker in or out of the hospital but used in an outpatient setting	*18 Stickers* Insurance pays for half the cost of services	*18 + 12 Stickers* Insurance pays for half the cost of inexpensive drugs (for example, when your bill is INR 100, you pay INR 50) When treatment costs more than INR 175, your insurance starts paying more than half (for example, when the bill is INR 1,000 you pay only INR 140)	*18 + 12 + 12 Stickers* Insurance pays for all the cost of services
Tests Insurance pays for lab tests and x-rays ordered by a registered healthcare worker and used in an outpatient setting	*8 Stickers* Insurance pays for half the cost of services	*8 + 5 Stickers* Insurance pays for half the cost of inexpensive tests (for example, when your bill is INR 80, you pay INR 40) When treatment costs more than INR 150, your insurance starts paying more than half (for example, when the bill is INR 500 you pay only INR 100)	*8 + 5 + 5 Stickers* Insurance pays for all the cost of services
Dental care Insurance pays for the necessary care of your teeth	*7 Stickers* Insurance pays for half the cost of services	*7 + 4 Stickers* Insurance pays for half the cost of inexpensive dental care (for example, when your bill is INR 50, you pay INR 25) When treatment costs are more than INR 50, your insurance starts paying more than half (for example, when the bill is INR 400 you pay only INR 50)	*7 + 4 +5 Stickers* Insurance pays for all the cost of services

Table 8.1 Description and sticker prices of benefits offered in the CHAT exercise in India (continued)

Benefit description	Level of benefit coverage		
	Basic	Medium	High
Mental healthcare Insurance pays for treatment of mental illness Insurance pays for treatment of alcohol or drug abuse	*1 Sticker* Insurance pays for half the cost of services		*1 + 1 Stickers* Insurance pays for all the cost of services
Preventive care Insurance pays for preventive services, mainly annual health check-ups, for household members older than one year	*1 Sticker* Insurance pays for half the cost of services	*1 + 1 Stickers* Insurance pays for half the cost of inexpensive treatments (for example, when your bill is INR 30, you pay INR 15) When treatment costs are more than INR 60, your insurance starts paying more than half (for example, when the bill is INR 150 you pay only INR 35)	*1 + 1 + 1 Stickers* Insurance pays for all the cost of services
Medical equipment Insurance pays for equipment such as eye glasses, hearing aids, wheel chairs, crutches Insurance pays for an ambulance to take you to the hospital	*5 Stickers* Insurance pays for half the cost of services	*5 + 3 Stickers* Insurance pays for half the cost of inexpensive treatments (for example, when your bill is INR 40, you pay INR 20) When treatment costs more than INR 40, your insurance starts paying more than half (for example, when the bill is INR 1,000 you pay only INR 75)	*5 + 3 + 3 Stickers* Insurance pays for all the cost of services
Indirect costs Insurance pays for wage loss and transportation costs due to hospitalization Insurance pays for continued health insurance coverage in case of death or permanent disability of the head of the household	*1 Sticker* Members requiring inpatient treatment are paid INR 50 per day to cover lost wages Health insurance coverage is continued for three months in case the head of the household dies or gets permanently disabled		*1 + 1 Stickers* Members requiring inpatient treatment are paid INR 100 per day to cover drugs not included in hospital costs as well as lost wages Health insurance coverage is continued for six months in case the head of the household dies or gets permanently disabled

Note: Each sticker has a value of INR 10.

Determination of the insurance premium: The insurance premium was determined based on the insights gained from the bidding game method used to elicit willingness to pay (WTP) for health insurance, conducted along with the household survey referred to above (Dror et al. 2007b, Dong et al. 2003b). This WTP study suggested that median WTP was around 1.3 per cent of annual household income. We checked the median household income of the populations in the areas where the CHAT experiment unfolded; as found in the household survey, in Maharashtra, median income from all sources for the comparable cohort was INR 48,000 (1.3 per cent = INR 624); and in Karnataka, median income from all sources was INR 39,800 (1.3 per cent = INR 517). These results are comparable to the data published in the 60th round of the National Sample Survey Organization (NSSO) regarding consumer expenditure[11].

We retained a premium amount of INR 500 per household per year as the benchmark for health insurance. Thus, the value of each sticker was set at INR 10, and participants received 50 stickers as the budget with which they could prioritise benefits for health insurance. Incidentally, the premium amount could cover 34 per cent of the total cost of all options available on the CHAT board reflecting the severe rationing that was called for. Thus by giving stickers that could cover less than the total value of services offered, the process involved an exercise in priority setting.

It should be noted that in the testing of the tool prior to the field experiment we also tested a version in which participants were offered only 35 stickers (representing a premium level of INR 350). This pre-test led to extreme frustration among the participants, who were unable to compose any benefit package acceptable to them within the cost limitations of the benefits as defined in the current version of the CHAT tool. This option was therefore abandoned.

Introducing the concept of insurance: Since health insurance is rare in India, but life insurance much more prevalent, many people associate the term insurance with life insurance (Mladovsky & Mossialos 2006, Presswala 2004). We attempted to overcome this lack of familiarity with health insurance by adding a short explanation that conveyed the message that illness can cause financial losses due to costs of medical care and loss of ability to earn. The statement also conveyed that insurance allows a community to collectively pool funds to pay for those costs either by paying the provider or repaying out-of-pocket spending. The explanation was incorporated into the facilitator's guide

11. In this sample, INR 48,000 per household per year equals INR 833 per person per month; and INR 39,800 per household per year equals INR 800 per persons per month. The corresponding average monthly per person consumer expenditure figures (MPCE) published in the 60th round of NSS (Table P3-2) are comparable: for Karnataka the rural amount was INR 587 and the urban was INR 1,066; and for Maharashtra the rural figure was INR 672 and the urban was INR 1,369 (NSSO 2005).

to ensure that it is read aloud by the facilitator everywhere to assure the same basic understanding about health insurance among all participants.

Translation into local languages: All materials including the CHAT exercise board, the facilitator's text, user manual, health events, and questionnaires were translated into Kannada and Marathi, with back translation into English for validation purposes.

Special facilities for non-readers: Anticipating that many participants would be challenged in reading, we printed icons on the CHAT board representing the benefit types, next to the alphabetic descriptors. In addition, we engaged an assistant-facilitator for every three participants, to help participants respond to questionnaires, read benefit descriptions if desired from the user's manual, and demonstrate how to make choices by placing stickers on the CHAT board. However, due attention was taken by the team members to ensure that the assistance rendered by the assistant facilitators did not sway the choices and decisions of the participants during the exercise.

8.2.4 Human subjects protection

This study was reviewed by the office of human subjects research at the clinical centre of the National Institutes of Health and was exempted from Institutional Review Boards' (IRB) review. Data were collected anonymously and participants were informed that their participation was voluntary and that they could leave the study at any time.

8.2.5 Analysis

Participant socio-demographic characteristics and the items assessing the exercise were analysed using descriptive statistics. Individual and group choices were compared using paired sample t-test and Wilcoxon Signed-ranks test. The effect of group process on choice of benefit types was analysed by the non-parametric sign test.

8.3 RESULTS

8.3.1 Survey population

Three hundred and two individuals in 24 groups participated in the exercise during November and December 2005 (Table 8.2). There was an average of 12.6 participants per session. The majority of participants were female, married and from rural areas. One-third of the participants were illiterate and those with schooling were at lower grades. Approximately, 40 per cent of the participants were insured members of MIUs. The majority of the participants reported that family members had illness episodes in the prior three months and 37.7 per cent claimed at least one hospitalisation in their

Table 8.2 Characteristics of study participants (N=302)

Characteristic	n	Mean ± SD[a]	%
Age (years)	-	32.7 ± 9	
Female	241		79.8%
Rural	220		72.8%
Insured	125		41.4%
Household size	-	5.6 ± 2.27	
Between 1 and 2	5		1.7%
Between 3 and 4	98		32.5%
5 and above	199		65.9%
Religion			
Hindu	286		94.7%
Muslim	13		4.3%
Christian	1		0.3%
Other	2		0.7%
Marital status			
Single	26		8.6%
Married	260		86.1%
Widowed	15		5.0%
Separated	1		0.3%
Educational level			
None	98		32.8%
1^{st}-4^{th} grade	28		9.4%
5^{th}-7^{th} grade	49		16.4%
8^{th}-10^{th} grade	86		28.8%
11^{th} or 12^{th} grade	31		10.4%
12^{+} to graduate	7		2.3%
Source of household income			
Own farm	85		28.4%
Farm labourer/daily wages	65		21.7%
Service holders	41		13.7%
Wage earners	62		20.7%
Trade/business	35		11.7%
Other[b]	11		3.7%
Recent morbidity			
Member of household ill in the last three months	216		72.5%
Member of household hospitalized in the last year	113		37.7%
Hospital service used			
Public	107		35.5%
Private	191		63.5%
Charitable	3		1.0%

[a] SD = Standard Deviation.

[b] Other can mean domestic duties, going to school, being unemployed, disabled or pensioned.

household in the prior year[12]. When seeking health care, 63.5 per cent of the participants reported normally going to private hospitals[13].

8.3.2 Effect of group process on the number of benefit types

The 302 participants, who formed 24 groups (with minimum 10 participants per group; maximum 17; median 12) were invited in the 1st round, to choose the benefits they would like to include for their family; and in the 2nd round, to reach consensus on a health insurance plan that would suit their whole community. The choices of rounds one and two are shown next to each other in Table 8.3.

We are interested in the impact of group process, manifested in the shift of the average choice in rounds one and two. This shift is described in Table 8.4. As can be seen there, in 17 out of the 24 cases (or 70 per cent), the number of benefit types included in the packages of groups was significantly higher than the average number of benefit types included in the packages chosen by the same individuals in round one (Wilcoxon Signed-ranks test; $-3.13<Z<-2.12$; $p<.05$). Interestingly, there is not a single case in which a group chose significantly fewer benefit types than its members chose in round one. In the aggregated sample, groups included more benefits in their packages (mean = 7.26) than did individuals (mean: 6.23), (paired samples t-test, $p<.001$).

8.3.3 The effect of group process on coverage levels

Recalling that CHAT is played with a fixed budget, there is a trade-off between the level of coverage and the number of benefits included. It has been shown above that most groups preferred a wider range of benefits. The two options open to respondents are either to downgrade coverage levels (from high or medium to basic level) while retaining benefit types or to retain the high coverage level, but replace expensive benefit types with cheaper ones. We checked the prevalence of the first option by examining the effect of group process on the ratio between choices of benefit types covered at basic level and the total number of benefit types included in the package. The aggregated

12. When normalised for the number of persons in the household (average of 5.6 in this group), the rate of hospitalisations is around 67/1000, which is much higher than the figures reported in the 60th round of NSS (20/1000 for Karnataka and 30/1000 for Maharashtra (NSSO 2006)) and those we obtained from our household survey in locations with micro health insurance schemes (about 30/1000 in Maharashtra and in Karnataka). We cannot say whether this large difference is explained by recall bias or by another reason.

13. According to 60th round of NSS, around 30 per cent of hospitalisations in Karnataka and Maharashtra (both rural and urban) occur in public hospitals; and in rural Karnataka, about 35 per cent use public facilities for non-institutionalised ailments (in urban Karnataka and Maharashtra this rate is around 15 per cent) (NSSO 2006). So, the reported rate of 35.5 per cent that we recorded seems comparable, all the more so as the CHAT exercise was conducted mostly in rural areas.

Table 8.3 Benefit types chosen by respondents in rounds one and two

Type of benefits	Nothing				Basic				Medium				High			
	r1[a]		r2[b]		r1[a]		r2[b]		r1[a]		r2[b]		r1[a]		r2[b]	
	n	% of total	n	% of total	n	% of total	n	% of total	n	% of total	n	% of total	n	% of total	n	% of total
Outpatient medicine	99	34.4%	131	43.4%	166	57.6%	171	56.6%	15	5.2%	0	0.0%	8	2.8%	0	0.0%
Hospitalization	87	30.2%	54	17.9%	167	58.0%	225	74.5%	21	7.3%	13	4.3%	13	4.5%	10	3.3%
Preventive care	88	30.6%	67	22.2%	93	32.3%	105	34.8%	34	11.8%	12	4.0%	73	25.4%	118	39.1%
Tests	80	27.8%	49	16.2%	171	59.4%	231	76.5%	26	9.0%	12	4.0%	11	3.8%	10	3.3%
Drugs	36	12.5%	22	7.3%	222	77.1%	280	92.7%	23	8.0%	0	0.0%	7	2.4%	0	0.0%
Indirect costs	42	14.6%	29	9.6%	114	39.6%	130	43.1%					132	45.8%	143	47.4%
Dental care	151	52.4%	175	58.0%	113	39.2%	115	38.1%	12	4.2%	12	4.0%	12	4.2%	0	0.0%
Medical equipment	201	69.8%	164	54.3%	76	26.4%	138	45.7%	9	3.1%	0	0.0%	2	0.7%	0	0.0%
Mental healthcare	153	53.1%	133	44.0%	67	23.3%	87	28.8%					68	23.63%	82	27.2%
Maternity	150	52.1%	0	0.0%	65	22.6%	144	47.7%					73	25.4%	158	52.3%

[a] *r1 = round 1.*

[b] r2 = round 2.

Table 8.4 Comparison of Number of Benefits Chosen Per Package (at Rounds 1 and 2)

		Round 1		Round 2		
Group number	Respondents	Mean No. of benefits	Standard Deviation	No. of benefits	Z[a]	Sig. (2-tailed)
1	13	5.69	1.03	6	-1.100[b]	0.271
2	9	6.67	1.12	9	-2.751[b]	0.006
3	12	5.50	0.80	7	-2.994[b]	0.003
4	13	6.31	1.03	6	-1.100[c]	0.271
5	13	6.92	1.26	8	-2.449[b]	0.014
6	10	6.70	0.67	8	-2.739[b]	0.006
7	11	6.73	1.49	8	-2.263[b]	0.024
8	11	6.64	1.12	8	-2.549[b]	0.011
9	11	6.73	0.79	7	-1.134[b]	0.257
10	11	6.45	1.04	7	-1.613[b]	0.107
11	12	7.08	0.90	7	-333[c]	0.739
12	12	5.17	1.27	7	-2.971[b]	0.003
13	10	5.70	1.49	6	-0.776[b]	0.438
14	12	5.33	1.61	8	-2.871[b]	0.004
15	12	5.42	0.79	8	-3.134[b]	0.002
16	13	6.08	1.55	8	-2.980[b]	0.003
17	12	5.75	1.29	7	-2.511[b]	0.012
18	11	6.55	1.04	8	-2.636[b]	0.008
19	17	6.00	0.94	7	-3.002[b]	0.003
20	12	6.25	0.87	7	-2.310[b]	0.021
21	13	6.38	0.77	7	-2.309[b]	0.021
22	13	6.31	1.03	7	-2.124[b]	0.034
23	12	6.83	0.83	7	-0.707[b]	0.480
24	13	6.54	0.66	7	-2.121[b]	0.034

[a] The significance of the difference in the number of benefits-per-package chosen in round 1 and round 2 was tested with Wilcoxon Signed-ranks test.

[b] Based on negative ranks.

[c] Based on positive ranks.

results display a modest but significant increase in the ratio of benefit types chosen at basic level (from 0.68 to 0.75, paired samples t-test, $p<0.001$). This increase represents the trade-off between the larger number of benefits and the lower level of coverage.

8.3.4 The effect of group process on benefit types chosen

In the first round, the 302 participants tended to choose benefits in the following descending order of preference: drugs (87.5 per cent), indirect costs (85.4 per cent), tests (72.2 per cent), hospitalization (69.8 per cent), preventive care (69.4 per cent), outpatient

medicine (65.6 per cent), maternity (47.9 per cent), dental care (47.7 per cent), mental healthcare (46.9 per cent) and medical equipment (30.3 per cent) (Table 8.3). In the second round, when individual choices were replaced by group choices, two changes were possible: no-to-yes or yes-to-no. As can be seen in Table 8.5, in eight of the 10 benefit types, the number of no-to-yes changes exceeds the number of yes-to-no, and the difference is significant. This finding is consistent with the previous observation that the group process results in a more holistic benefit package. The only benefit type where the yes-to-no prevailed was outpatient care. And the change in dental care was not significant.

The benefit types that were chosen by fewer than half the respondents in round one (maternity, mental healthcare, dental care and medical equipment) are of special interest here: the group process was most influential in swaying no-to-yes votes in favour of these three benefit types. Considering that, with the exception, perhaps of dental care, these less-chosen benefits are relevant for weaker segments of the community: pregnant women, physically challenged and mentally ill persons. The groups seem willing to protect their weaker segments through this choice.

8.3.5 Respondents' satisfaction with the CHAT elicitation method

At the end of the elicitation process, respondents were asked to complete an exit survey. In response to the question "would you recommend CHAT to others?" Ninety-eight per cent of the respondents answered affirmatively; and in response to the question "would you be willing to accept the group's choice of a plan?" Ninety-nine per cent said, yes. When asked "how much would you trust a group of consumers using CHAT to design a

Table 8.5 The effect of group process on the choice of benefit types

Benefit type	No change	Yes-to-no change	No-to-yes change	Significance[a]	Notes
Outpatient medicine	62.2%	24.0%	13.9%	0.007	
Inpatient	72.9%	7.3%	19.8%	<0.0001	
Preventive care	59.7%	16.0%	24.3%	0.03	
Tests	67.7%	10.4%	21.9%	0.0008	
Drugs	83.7%	5.2%	11.1%	0.02	
Indirect costs	82.6%	5.9%	11.5%	0.03	
Dental care	56.1%	25.4%	18.5%	0.11	NS[b]
Medical equipment	53.3%	16.0%	30.7%	0.0003	
Mental health	49.0%	20.8%	30.2%	0.03	
Maternity	47.9%		52.1%	<0.0001	

[a] Significance of the difference between Yes-to-no and No-to-yes change, tested with non-parametric sign test.

[b] NS = not significant.

Table 8.6 Respondents' satisfaction with the CHAT elicitation method

	Survey Item	Strongly Disagree	Disagree	Agree	Strongly Agree
1	I learned a lot playing the CHAT game	2%	6%	35%	56%
2	The information presented in CHAT was clear	6%	2%	29%	63%
3	The way the group reached its decision was fair	2%	2%	31%	65%
4	I was satisfied with the group's decision	1%	2%	29%	68%
5	We had enough information to make good decisions	1%	3%	26%	70%
6	The way the group reached its decision was equally fair to each member of the group.	0%	1%	27%	72%
7	Health care choices offered in the game were realistic	0%	1%	22%	77%
8	During the game, I was treated with respect	0%	0%	17%	82%
9	We had enough time to make good decisions	0%	0%	24%	76%
10	The group tried to be fair	0%	0%	27%	73%
11	Discussion during the game was open and honest	1%	1%	16%	83%

health insurance plan for you or your family", 67 per cent said "a great deal" and 28 per cent said "somewhat", while only 4 per cent said "very little" or "not at all". This is corroborated in 12 additional questions on different aspects of the elicitation process, mainly its fairness, clarity and relevance. The answers are overwhelmingly positive (Table 8.6).

8.4 DISCUSSION

This study suggests that it is possible to create decision tools that allow rural and poor communities to participate in the design of insurance benefit packages. This experiment was conducted in the areas where health insurance is present, and it is likely that all participants, the uninsured included, had some knowledge about health insurance. However, the explanations given during the exercise on the concept of health insurance (founded on the better-known concept of life insurance), and the learning process which occurred with the aid of the health event cards, created some familiarity with the decision process even among people who are unfamiliar with health insurance. Participants found the process easy to follow, informative and fair.

This study provides evidence that participants in the CHAT exercise were able to address the main problem of composing a health insurance package within a severe resource limitation. We found the method reasonably easy to administer and analyse.

The responses of participants in this field experiment suggest that when the problem of selecting healthcare benefits is presented in easily understandable terms, and the

decision process is simple, communities show interest and capacity to make choices. This finding challenges the views of Lomas (1997).

Some insights can be derived from the choices themselves. Participants frequently chose benefit types that represent better access to health services that are neither catastrophic nor rare, but can accumulate to prohibitive financial burden; these benefits include drugs, tests and preventive care. This challenges a commonly-held view that much of the health-related impoverishment is due to low-frequency and high unit-cost events, such as hospitalisations (World Bank 2001). Another striking finding is the high frequency of choice of indirect costs; respondents are no doubt aware that indirect costs of illness can equal or surpass the cost of treatment. This is one of the defining characteristics of living and working in rural areas and in the informal sector, without any institutional protection against the loss of income or transactional costs due to illness. The frequent selection of the benefit "preventive care", which was clearly defined narrowly within terms of the benefit that would be payable, suggests that their low educational level notwithstanding, participants are aware of the value of preventive medicine in improving protection against severe illness and its consequences. The judiciousness of choices, when juxtaposed with actual health expenditures, has been confirmed through analysis published in detail elsewhere (Dror et al. 2007a).

The CHAT experience included both individual and group choices. Whereas the individual ("I") choice focuses on the priorities of one respondent and his/her family, the group ("we") choice focuses on the needs of an entire community, determined by consensus. The clearest insight on the transition of choices is that group consensus-building leads to a wider and more holistic benefit package, at the expense of depth of coverage. The same persons who excluded maternity, medical equipment and mental care when acting on their "I" choice included these benefits when called upon to act on the "we" choice. Thus, one can observe a willingness to choose services that are most beneficial to the weaker segments of the community, as the "we" benefits are traded-off against a reduction in the frequency of choice of a typical "I" benefit, namely, outpatient care. This change in perceived priorities suggests that the group dynamics bring to the fore the declared values and goals of the community, thus enhancing social capital (Mladovsky & Mossialos 2006).

Participation in the CHAT simulation exercise offers an additional value of enhancing the understanding among participants of how health insurance works, and the link between what people pay and the benefits they can realistically expect in return. This awareness can enhance both willingness to join health insurance and willingness to pay for it among communities in rural India.

A model that uses a method akin to FGDs obtains its data from small groups, and therefore, the statistical results could lack robustness. Nor would one be able to generalise

the relevance of findings in specific locations to apply for as large and heterogeneous a country as India.

Another limitation is inherent to the tool itself. While participants have the opportunity to prioritise the benefits that they wish to retain in their benefit package, they cannot add other benefits that were not included. Nor can participants select to pay a higher price for more choice (e g, for the right to select the specific surgeon that would operate them in a hospital). This more elaborate choice could not be translated into monetary terms in the context of rural India, even though such choices are commonplace in health insurance plans in rich countries. On the other hand, benefits were not limited to public or private provision, as the actuarial calculations were based on actual reported utilisation and out-of-pocket cost data, which aggregated both public and private facilities available locally. We should also note that the concept of preventive care that we used in the exercise was narrowly defined to include those services commonly offered in the medical setting although we recognise that prevention generally involves a broad array of public health measures. We expect that many of such interventions would be offered through public authorities who are responsible for such things as clean potable water, sewage management and other measures to prevent communicable diseases.

8.5 CONCLUSIONS

This experiment with the CHAT tool reveals the important influence of group dynamics on resource allocation decisions of clients in selecting a health insurance benefit package. Challenges such as limited literacy or numeracy of group members, or lack of prior experience with health insurance were not detrimental to a successful deliberation. The cultural setting brought to light prior experience of the groups in negotiating consensus. This skill was instrumental in simplifying the groups' ability to deal with a new topic – health insurance – while retaining a balance between individual priorities and collective responsibility.

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Chapter 9

Health insurance benefit packages prioritized by low-income clients in India: Three criteria to estimate effectiveness of choice

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ABSTRACT

We applied a decision tool for rationing choices, with a predetermined budget of about US$ 11 per household per year, to identify priorities of poor people regarding health insurance benefits in India in late 2005. A total of 302 individuals, organized in 24 groups, participated from a number of villages and neighbourhoods of towns in Karnataka and Maharashtra. Many individuals were illiterate, innumerate and without insurance experience. Involving clients in insurance package design is based on an implied assumption that people can make judicious rationing decisions. Judiciousness was assessed by examining the association between the frequency of choosing a package and its perceived effectiveness. Perceived effectiveness was evaluated by comparing respondents' choices to the costs registered in 2049 illness episodes among a comparable cohort, using three criteria: 'reimbursement' (reimbursement regardless of the absolute level of expenditure), 'fairness' (higher reimbursement rate for higher expenses) and 'catastrophic coverage' (insurance for catastrophic exposure). The most frequently chosen packages scored highly on all three criteria; thus, rationing choices were confirmed as judicious. Fully 88.4% of the respondents selected at least three of the following benefits: outpatient, inpatient, drugs and tests, with a clear preference to cover high aggregate costs regardless of their probability. The results show that involving prospective clients in benefit package design can be done without compromising the judiciousness of rationing choices, even with people who have low education, low-income and no previous experience in similar exercises.

9.1 BACKGROUND

The purpose of this article is to draw policy insights from the analysis of choices made by prospective clients among the poor in India on benefit-package composition for health insurance.

Many authors agree that if the poor are to accept insurance, it must respond to their needs (Leftley 2005, Radwan 2005, Ahuja & Jütting 2004, Gumber 2002). However, these authors advocate that the industry design different insurance products for the poor, but do not refer to perceived priorities of the clients themselves. The literature on consumer-driven healthcare has so far dealt mainly with the situation in rich countries. Coast (2001) investigated whether citizens want to make rationing decisions in healthcare in the context of universal coverage in the UK. Her findings suggest inter alia that the potential distress that denying care may cause increases citizens' desire to be directly involved in such decisions. Following this logic, poor population segments in low-income countries, who can at best buy only severely rationed health insurance packages, would presumably be exposed to high potential distress due to limited access to healthcare, and would therefore wish to be involved in rationing decisions. In developing countries, there is a general shortage of information and data about the preferences of households (Asfaw 2003). Specifically, there is very little literature on the preferences of prospective clients of health insurance who personify simultaneously low-income, low-education, low-numeracy and low- or no experience with insurance. The few studies we were able to identify concluded that 'groups of low-income uninsured individuals (in the USA) are able to identify acceptable benefit packages that are comparable in cost but differ in benefit design from managed care contracts offered to many US employees' (Danis et al. 2002); that clients' satisfaction with benefit-package design in a community-based health insurance scheme in West Africa contributed to a higher willingness to enrol (De Allegri et al. 2006); and that in the same area, there were strong preferences for inclusion of high-cost health services such as operation, essential drugs and consultation fees in the benefit package (Dong et al. 2004). Finally, one study, carried out in India on a somewhat related topic, suggested that most households would prefer a comprehensive benefit package over partial coverage (Mathiyazhagan 1998). However, this falls short of evidence-based reporting of the preferences of such population segments in India. Thus, our article offers new information on the expressed priorities of households that were asked to compose the health insurance package of their choice.

In India today, out-of-pocket spending by households for healthcare represents about 73% of total health expenditure (WHO 2006); another estimate puts that rate at more than 80% (Devadasan et al. 2006). This high rate exposes many households to unexpected and unaffordable healthcare costs for which insurance can be an attractive and cheaper alternative (Ray et al. 2002). However, at present only about 3% of India's population,

mostly in the formal sector, benefit from some form of health insurance and the role of grassroots community-based schemes is prominent in the informal economy relative to the alternatives offered by the public sector or by commercial insurers (Devadasan et al. 2006, Tabor 2005).

Furthermore, community-based health insurance schemes in India cover a partial benefit package that reflects the assumption that premiums are the main source of financing. If the poor are to pay for insurance, the package must be attractive in two regards: it must meet clients' perceived needs and be affordable to them (Radwan 2005, Wiesmann & Jütting 2000). Since affiliation to grassroots schemes is voluntary, and considering that willingness to join such schemes may increase when prospective clients are satisfied with the benefit package and identify with it (De Allegri et al. 2006, Schone & Cooper 2001, Fleck 1994), it is important to develop a tool to assess prospective clients' priorities.

The novelty of the experiment described in this article is that it divulges information on the rationing choices of low-income, low-education population segments in India who were given the opportunity to compose an affordable benefit package.

9.2 DATA AND METHODS

9.2.1 Study design

The 'Choosing Healthplans All Together' (CHAT) experiment described here is based on a modified version of an original CHAT tool developed and tested in the USA (Goold et al. 2005, Danis et al. 2004, Keefe & Goold 2004, Danis et al. 2002). Around 302 individuals organized in 24 groups participated in the exercise. The exercise was carried out in November–December 2005, in Karnataka and Maharashtra. Selection of the villages or neighbourhoods of towns where the interviews were conducted was purposive, based on contacts the research group established through a household survey conducted earlier in 2005. Participation in the groups was voluntary, and depended on availability of persons at the day and time of assembly rather than on sampling techniques. In reality, most people in the locations wanted to participate. The material was translated into several local languages; local facilitators were trained to read out instructions and provide explanations so that illiterate persons could nevertheless participate. We saw no evidence that illiterate persons were less intelligent or less capable of making choices once they were given help to overcome the objective limitation of illiteracy.

The CHAT exercise enabled participants to choose from 10 benefit types; for most benefit types, participants could choose three coverage levels: basic, medium and high. The choice was limited to basic or high coverage level for three benefit types (see Table 9.1 for benefit types; and see algorithms of coverage levels below).

Table 9.1 Sticker cost of benefits

Benefit types	Coverage level		
	Basic	Medium	High
Drugs (D)	18	18 + 12	18 + 12 + 12
Outpatient medicine (OP)	11	11 + 6	11 + 6 + 10
Hospitalization (IP)	10	10 + 6	10 + 6 + 8
Tests (T)	8	8 + 5	8 + 5 + 5
Dental care (DEN)	7	7 + 4	7 + 4 + 5
Medical equipment (ME)	5	5 + 3	5 + 3 + 3
Preventive care (P)	1	1 + 1	1 + 1 + 1
Maternity (M)	1		1 + 1
Indirect costs (IC)	1		1 + 1
Mental health care (MH)	1		1 + 1

If the most expensive options were selected for all benefits, the estimated actuarial cost of the package would have been INR 1470 per household. This amount is far too high for most low-income households in India. We set the predetermined budget of the package at INR 500 (≈US$ 11) per household per year, which approximates the level of willingness-to-pay (WTP) obtained from a survey conducted by the same research group simultaneously and reported elsewhere (Dror et al. 2007b). This WTP study suggested that about half the sampled population was willing to pay around 1.35% of annual household income. We also checked the median household income of the populations in the areas where the CHAT experiment unfolded; in Maharashtra, median income for the comparable cohort was INR 48,000; and in Karnataka, median income was INR 39,800. By determining a premium of INR 500 for this CHAT experiment, we ensured that it did not exceed 1.3% of income for 50% of the target population, i.e. within the range of the expressed WTP values. This estimate is also supported by the findings of Gumber (2002) that annual WTP in rural areas in India ranged from INR 80 to 95 per person per year for hospitalization, chronic care, specialist consultations; and that WTP was some 10% higher if medicines, diagnostic tests and transportation were added.

We would have liked to examine the judiciousness of rationing decisions of CHAT participants by applying actual reimbursement decisions. As the CHAT packages were not part of an insurance contract, we used as proxy the data of utilization and cost obtained from a household survey conducted by the same research group in 2005 in India (and which was also the source of data for the WTP study mentioned above). The utilization data originate from 2049 households that reported at least one illness episode during 3 months prior to the survey (out of 3531 households where we could obtain valid answers for the set of questions on spending on illness). This dataset is relevant for the CHAT experiment because the socio-economic- demographic characteristics of the cohorts were comparable. We applied the CHAT business rules to this proxy.

9.2.2 Algorithms for the calculation of coverage levels

Basic level of coverage: covers 50% of all costs; 50% is paid out-of-pocket

Medium level of coverage: benefit increases as the bill increases, according to the following formula:

a. bill under median cost:
Insurance pays 50% of bill,
b. bill between median and 70th percentile:
Insurance pays (median/2) + (bill – median) * 0.9
c. bill higher than 70th percentile:
Insurance pays (median/2) + (p70 – median)*0.9 + (bill – p70)*0.95.

High level of coverage: 100% of all costs; zero out-of-pocket payment.

We did not expect the participants to understand these complex algorithms, and explained the reimbursement rules using easy-to-understand examples. For instance, the explanation for hospitalization was as follows: '*Basic level*: Insurance pays half your bill. *Medium level*: You pay half the cost of low amounts, but as your bill increases your insurance payments increase even more. For example, when your bill is INR 1000 you pay INR 500, but when the bill is INR 10,000 you pay only INR 1275. *High level*: Insurance pays your entire bill'.

9.2.3 Definitions of what is included under the various benefit types

The cost of drugs (D) includes only prescribed allopathic drugs but excludes the cost of traditional (homeopathic or ayurvedic) drugs and unprescribed drugs.

The cost of outpatient care (OP) includes payments for consultations with a general practitioner, paediatrician and with specialists, but excludes consultations with traditional practitioners.

Inpatient care (IP) costs reflect all out-of-pocket costs that are required during periods of IP, including surgery in hospital (note: antenatal, postnatal care and confinement for delivery are categorized as maternity benefits, not IP).

The cost of diagnostic tests (T) includes lab tests and medical imaging.

The cost of dental care (Den) includes all care given by a dentist.

The cost of medical equipment (ME) includes eye glasses, hearing aids, wheelchairs, crutches and ambulance.

The cost of preventive care (P) includes preventive services for household members older than 1 year.

The cost of maternity (M) includes mother's care before, during and after delivery in hospital, and child's care until 1 year; also includes family planning.

The cost of indirect costs (IC) covers INR 50 or INR 100 (for basic or high levels of coverage, respectively) per day of hospitalization (compensating wage loss and transportation of patient and care giver). IC also covers the cost of continuing the health insurance

coverage if the household head died or is permanently disabled (3 months coverage at basic level and 6 months' extension at high level).

The cost of mental health (MH) covers treatment for mental illnesses, alcohol or drug abuse.

9.2.4 Actuarial estimates of costs

The incidence and distribution of unit costs of hospitalizations, consultations, diagnostic tests and purchase of prescribed drugs was estimated based on the household survey, and adjusted as necessary by an actuary with field experience in India. The incidence and distribution of unit costs of P, Den, mental care, ME and M was estimated by the same actuary. The estimated incidence of IC was established by the actuary. The adjustments made to the data were based on actuarial experience with various insurance schemes in India and other countries considering the overall national household expenditures for health in India.

The actuarial calculations that determine the cost of the benefits were expressed in monetary terms, which were converted to stickers. Respondents received a budget of 50 stickers (each sticker reflected the value of INR 10). The 'sticker values' of each benefit type and each level of coverage that was available in this experiment are shown in Table 9.1.

9.2.5 The choices that clients could make

The version of the CHAT exercise consisted of two rounds. In the first round, each participant composed a benefit package that met his/her and her/his families' priorities separately, by selecting benefit types and the level of coverage (basic, medium or high). Players indicated their choices by gluing stickers on circles drawn on a board. In the second round of the game, the whole group (group sizes ranged from 10 to 17 respondents) composed a benefit package that reflected the choice of the entire group; at this stage, group discussions continued until a consensus had been reached. During the discussions, the facilitator mediated the process to ensure that preferences of all participants were considered. In cases when facilitators noted attempts of certain respondents to dominate the discussion, they intervened and requested those individuals to respect the feeling of others. The opinions of all participants on the fairness of the process were solicited through an exit questionnaire; 72% strongly agreed and 27% agreed with the statement: 'the way the group reached its decision was equally fair to each member of the group'. More details on the group dynamics and participants' satisfaction with the process are provided elsewhere (Danis et al. 2007).

The process of choice offered in the CHAT exercise obliged respondents to make a yes–no choice first; if respondents did not choose a particular benefit, the outcome was

termed 'nothing'. For every benefit chosen, participants had to select the basic level of benefits first, and add stickers for the choice of a higher level of coverage thereafter.

At the end of round one, players picked health event cards that contain a scenario/story of an illness episode and what it costs. Participants could then estimate what they would have received from the insurance according to the coverage level they selected (basic, medium or high) if they had experienced the same scenario. The validation of choices against a concrete scenario was read out aloud and thus enabled participants to assess their choices, or change them in the next round.

9.2.6 Data

The choices noted by players on the CHAT boards were uploaded to an electronic file. The dataset retained the identification of each group of players, as well as a separate record of replies in round one and in round two. The structure of the record ensured confidentiality, as replies were not traceable back to any specific respondent.

9.2.7 Analysis

Statistical analysis of the data was performed by using SPSS statistical software.

9.3 RESULTS

9.3.1 Choices made by participants

The choices of respondents (the number of replies and percent of total population that selected the benefit types, as well as levels of service) are recorded in Table 9.2.

The number of positive replies (including basic, medium or high levels) is significantly higher (chi-square test) than the negative ones (who preferred excluding that benefit), for all benefits except Den and ME. We observe more choices at the basic level (1626), followed by high level (521) and fewest choices of medium level of coverage (49). If benefit types are ranked according to the frequency of positive replies, the ranking is as follows: M (100% positive replies); drugs (92.7%); IC (90.4%); tests (83.8%); IP (82.1%); P (77.8%); OP (56.6%); MH (56.0%); ME (45.7%); and Den (42.1% positive replies).

9.3.2 Major benefits

The facilitators who observed the entire experiment reported that most respondents started the selection process by choosing two, three or four of the following: D, OP, IP and T. Non-access to these four benefits can spell disaster in case of illness, and paying for this access out-of-pocket could significantly deplete household finances because they represent the highest aggregate expenses. The high cost of these services was also reflected in the high sticker cost (shown in Table 9.1). They were thus denoted here as 'major benefits'.

Table 9.2 Choices of the participants

Type of benefits	Nothing		Basic		Medium		High	
	Replies	% of total	Replies	% of total	Replies	% of total	Replies	% of total
Drugs (D)	22	7.28%	280	92.72%	0	0.00%	0	0.00%
Outpatient medicine (OP)	131	43.38%	171	56.62%	0	0.00%	0	0.00%
Hospitalization (IP)	54	17.88%	225	74.50%	13	4.30%	10	3.31%
Tests (T)	49	16.23%	231	76.49%	12	3.97%	10	3.31%
Dental care (DEN)	175	57.95%	115	38.08%	12	3.97%	0	0.00%
Medical equipment (ME)	164	54.30%	138	45.70%	0	0.00%	0	0.00%
Preventive care (P)	67	22.19%	105	34.77%	12	3.97%	118	39.07%
Maternity (M)	0	0.00%	144	47.68%	0	0.00%	158	52.32%
Indirect costs (IC)	29	9.60%	130	43.05%	0	0.00%	143	47.35%
Mental health care (MH)	133	44.04%	87	28.81%	0	0.00%	82	27.15%
Totals	*824*		*1,626*		*49*		*521*	

In Table 9.3 we show the combinations of major benefits that respondents selected in this CHAT experiment. The cost of the combination including all four major benefits at basic level of coverage was 47 stickers of the available 50. This leaves very few stickers for other benefit. Participants were thus confronted with the question whether to select all four major benefits at basic level or to forego one or more of the 'major four' in order to buy higher coverage levels for the remaining major benefits and/or include minor benefits in their package. Participants chose only eight combinations that include one or more of the four major benefits, described in Table 9.3. Many other permutations were theoretically possible.

The data in Table 9.3 show that 88.4% of the participants chose a package that includes at least three of the 'major benefits' and all choices are at the basic level of coverage. The remaining 11.6% of the participants chose only two of the major benefits, but at coverage levels that were sometimes higher than basic.

Table 9.3 Packages chosen

	Choice	No. of groups	No. of individuals	% of all individuals	Sticker-cost	Stickers left for minor benefits
1	OP(b)+IP(b)+T(b)+D(b)	6	81	26.8%	47	3
2	IP(b)+T(b)+D(b)	8	96	31.8%	36	14
3	OP(b)+T(b)+D(b)	3	42	13.9%	37	13
4	OP(b)+IP(b)+D(b)	3	36	11.9%	39	11
5	OP(b)+IP(b)+T(b)	1	12	4.0%	29	21
6	IP(m)+D(b)	1	13	4.3%	34	16
7	T(m)+D(b)	1	12	4.0%	31	19
8	IP(h)+T(h)	1	10	3.3%	42	8

OP = outpatient; IP = inpatient; T = tests; D = drugs; (b) = basic; (m) = medium; (h) = high.

9.3.3 Criteria to determine the perceived effectiveness of benefit packages

The entire proposition of involving clients in benefit-package design is based on an implied assumption that a group of people acting as a cohesive social unit can relate, better than any outsider, needs and priorities to the location-specific conditions, prevalent activities and level of resources (Dror & Jacquier 1999). It also implies that people are capable of judicious rationing decisions. We propose that a positive association between the frequency of a choice of a package and its perceived effectiveness would signify a 'judicious rationing decision'.

We define the following criteria as the quantitative expressions of the 'perceived effectiveness of a benefit package':

The reimbursement criterion: suggests that insured wish to be reimbursed some part of every bill, regardless of whether the absolute level of expenditure is low or high. This attribute is important for people who perceive insurance as useless when there is no reimbursement in case of an illness episode (Gumber 2002, Insure.com). This criterion can be gauged by the mean reimbursement rate.

The fairness criterion: postulates that the insured would like insurance to pay a small part when the bill is small and a big part when the bill is big (Toth 2005). This criterion can be gauged by the extent and direction of the correlations between expenditures and the rate of reimbursement.

The catastrophic protection criterion: states that the insured wish to be covered against catastrophic exposure (Radermacher 2006); this criterion can be measured by the extent of compensation of the outlier cases.

It has been explained under the 'Methods/Study design' section that utilization and cost data obtained in the household survey were used to evaluate the effectiveness of the CHAT choices. For each illness episode we summed the costs related to the 'major benefits' and these sums were considered as the total expenditure. We then applied the CHAT business rules to each expenditure item, and obtained the estimated reimbursable amount for each package. This was repeated for all eight packages and for each of the 2049 episodes. The details of expenses and reimbursements are shown in Table 9.4.

9.3.3.1 Examining the reimbursement criterion

Table 9.4 provides the reimbursement levels of healthcare expenses both in INR and in percentages (the rates were shown relative to the total expenditure of each episode). The mean and maximum rates of reimbursement for the first five packages cannot exceed 50%, as the applicable business rule is that reimbursement at the basic level of coverage is 50% of expenses.

In looking at the mean percent of reimbursements, it is clear that selecting all four 'major benefits' at the basic level (package 1) yielded the best returns. Interestingly, the mean reimbursement rate per illness episode was very similar to package 4, in which T

Table 9.4 Hypothetical reimbursements for the different packages

		Reimbursed (in INR)			Reimbursement % of expense[a]		Percentile of reimbursements			
No.	Combination	Mean	± SE	Median	Mean[b]	± SE	10th	25th	Median	90th
1	OP + IP + T + D	489	± 30	125	46.80%	±0.27%	50.0%	50.0%	50.0%	50.0%
2	IP + T + D	393	± 26	90	30.72%	±0.38%	0.0%	20.0%	35.7%	50.0%
3	OP + T + D	322	± 15	115	41.97%	±0.34%	12.5%	41.7%	50.0%	50.0%
4	OP + IP + D	447	± 28	120	44.26%	±0.30%	28.5%	47.8%	50.0%	50.0%
5	OP + IP + T	305	± 26	40	23.46%	±0.37%	0.0%	10.0%	21.7%	50.0%
6	IP(m) + D(b)	432	± 38	75	22.72%	± 0.37%	0.0%	7.6%	22.6%	45.3%
7	T(m) + D(b)	225	± 12	60	19.41%	±0.34%	0.0%	4.7%	18.8%	41.7%
8	IP(h) + T(h)	418	± 45	0	11.10%	± 0.46%	0.0%	0.0%	0.0%	42.9%

OP = outpatient; IP = inpatient; T = tests; D = drugs; (b) = basic; (m) = medium; (h) = high.
[a] Expenses per illness episode were calculated on the basis of responses to the household survey. Of the 2,049 illness episodes, 131 cases did not report any expenses for any of the major benefits benefit types. The nominal values of all illness episodes were: mean INR 1,045, (±63) and median INR 290.
[b] Household that reported zero expenditure for the 'major benefits' benefit types were considered as obtaining zero reimbursement (and zero %); this explains why the mean reimbursement figures (calculated for the entire population) are lower than 50% of expenses, even for package 1.

was dropped. Surprisingly, when IP is dropped (package 3) the mean level of reimbursement is lower by less than 5%; a likely explanation for this small reduction is the low probability of being hospitalized. On the other hand, dropping OP (package 2) caused a dramatic drop in mean reimbursement rate. And giving up D (package 5) caused a drop of about half the mean reimbursement rate. Similar results were noted when OP and T are dropped, even though IP coverage was increased to medium level (package 6). Finally, when both OP and D were dropped (package 8), mean reimbursement was only 11.1% of expenses during an illness episode, even though IP and T were covered at high level.

The strong impact of dropping either OP (package 2) or D (package 5) on reimbursement rates, and the minor impact of dropping IP (package 3) or T (package 4) is even more apparent when looking at median levels of reimbursement: whereas 50% of those who chose packages 3 or 4 received the same reimbursement level that they would have received had they chosen package 1, half the people who chose packages 2 or 5 obtained considerably lower reimbursements. Choosing packages 6 or 7, which included only two of the major benefits, resulted in median reimbursement of less than half the percentage payable for package 1. The most dramatic effect is observable with package 8, where the reimbursement rate was zero in half the illness episodes. It is noteworthy that 10% of the episodes would not generate any reimbursement at all under packages 2 or 5 or 6 or 7; and 10% of those who selected packages 3 or 4 would have been entitled to much lower reimbursement than under package 1.

9.3.3.2 Examining the fairness criterion

The situation whereby 10% of the population is getting low or no reimbursement may be acceptable when it applies to inexpensive episodes. However, such an outcome would be unsatisfactory if it caused low reimbursement rates to those who incur high healthcare costs. From the data presented so far it is not clear which illness episodes received low reimbursement when respondents forego one or more of the 'major benefits'. The answer to this question can be found by looking at the correlations between the level of reimbursement and the absolute level of expenses. A positive correlation means that people who incur higher expenses are entitled to higher compensation (in %); and a negative correlation means that those with higher expenses are entitled to lower compensation, which is an undesirable outcome.

In package 1 there is no correlation between expenses and reimbursement (expressed as % of total costs) because the rule is to always reimburse 50%, regardless of cost. As can be seen in Table 9.5, the coverage of IP is associated with significant and positive correlations (packages 8, 6, 2, 5). Dropping IP from the benefit package resulted in a negative correlation (which is strong for package 3, but much weaker for package 7). An interesting case is package 4, which contains IP at the basic level of coverage but does not include T; it is associated with a significant negative correlation which is however much weaker than package 3.

9.3.3.3 Examining the catastrophic protection criterion

So far, the calculations were based on the entire sample. We now wish to examine which package would yield the highest reimbursement when the most expensive episodes occur. This question was analysed by reference to the most costly decile, i.e. 195 illness episodes that cost more than INR 2400. The results are shown in Table 9.6.

Table 9.5 Correlations between expenses and reimbursement levels (in %)

No.	Combination	Correlation coefficient (Pearson)	Significance
1	OP + IP + T + D	0.0	
2	IP + T + D	0.1766	$P<0.0001$
3	OP + T + D	–0.3947	$P<0.0001$
4	OP + IP + D	–0.0801	$P<0.0005$
5	OP + IP + T	0.1431	$P<0.0001$
6	IP(m) + D(b)	0.2848	$P<0.0001$
7	T(m) + D(b)	–0.0598	$P<0.001$
8	IP(h) + T(h)	0.4081	$P<0.0001$

OP = outpatient; IP = inpatient; T = tests; D = drugs; (b) = basic; (m) = medium; (h) = high.

Table 9.6 Expenses and reimbursement levels—outlier cases

		Reimbursed		Reimbursement % of expense[a]	Percentile of reimbursements			
No.	Combination	Mean (± SE) (INR)	Median (INR)	Mean (± SE) (%)	10th	25th	Median	90th
1	OP + IP + T + D	3,298 (± 226)	2,125	50.0% (± 0.0%)	50.0%	50.0%	50.0%	50.0%
2	IP + T + D	2,765 (± 209)	1,725	41.7% (± 0.7%)	26.9%	37.7%	45.8%	50.0%
3	OP + T + D	1,761 (± 100)	1,425	31.7% (± 1.1%)	10.3%	17.0%	34.4%	50.0%
4	OP + IP + D	2,990 (± 213)	1,950	44.3% (± 0.6%)	37.1%	42.9%	46.8%	50.0%
5	OP + IP + T	2,377 (± 219)	1,500	32.4% (± 1.0%)	10.0%	22.2%	35.9%	50.0%
6	IP(m) + D(b)	3,312 (± 337)	1,700	34.9% (± 1.3%)	14.3%	20.9%	32.3%	61.3%
7	T(m) + D(b)	1,261 (± 86)	1,000	18.4% (± 1.1%)	2.1%	5.8%	14.2%	41.4%
8	IP(h) + T(h)	3,688 (± 406)	2,300	38.9% (± 2.0%)	3.4%	13.8%	36.4%	78.1%

OP = outpatient; IP = inpatient; T = tests; D = drugs; (b) = basic; (m) = medium; (h) = high.

[a] Expenses per illness episode were calculated on the basis of responses to the household survey, based on 195 illness episodes that represented the top 10%. The values of all illness episodes were: mean (INR 6,595), SE (±452) and median (INR 4,250).

The package including all 'major benefits' secured the highest mean reimbursement rate in the case of outliers as before, followed by package 4, with packages 2 and 8 tagging closely behind. The difference between the packages is more pronounced when one looks at the lowest 10th percentile of reimbursement: whereas package 4 guarantees up to 37.1% reimbursement, package 2 provides only up to 26.9% and package 8 (composed only of IP and T at high coverage level) a mere 3.4% reimbursement. The explanation for this low reimbursement rate under Package 8 is found in its composition: high coverage level for IP and T offers no protection for high expenses due to D or OP. And, contrary to what one might have expected, outlier cases (top 10% of expenses) cannot automatically be assumed to involve hospitalizations, even if it is true that the highest outlier cases do involve IP.

9.3.4 Comparing the effectiveness of benefit packages according to the three criteria

We wish to compare the effectiveness of the different benefit packages in the light of the three criteria elaborated earlier. For this purpose, we developed a ranking system whereby the package that scores highest under each criterion was assigned the score of 1 and the package that scored lowest was assigned the value of zero. All other packages were assigned a value between zero and one, reflecting their relative position on a linear scale. For the reimbursement criterion, packages were scored according to the mean reimbursement rate (in %)—values noted in Table 9.4 column 6—and package 1 was assigned the score of 1, while package 8 scored zero. For the fairness criterion, packages were scored according to the correlation coefficients—noted in Table 9.5 column 3—and package 8 was assigned the score of 1, while package 3 was assigned the score of zero. For the catastrophic protection criterion, packages were scored according to the

mean reimbursement of outlier cases (in %)—values noted in Table 9.6 column 5—and package 1 was assigned the score of 1, while package 7 was assigned the score of zero. As we have no information on the relative value that clients attach to the three criteria, we consider them to be of equal importance. Figure 9.1 shows the scores for all three criteria, as well as the average score for each package.

Figure 9.1 shows that the three packages with the highest average score were 1, 2 and 4. These packages include IP and D, plus at least one other major benefit. Package 1 had the highest average score, yet package 2 was the most popular, maybe because the latter left a balance of 14 stickers with which to buy 'minor' benefits compared to only 3 stickers for package 1 (Table 9.3). Packages 2 and 4 have similar average scores, but the former scored above average on all three criteria, whereas the latter scored above average on two criteria but below average on the fairness criterion. Another explanation for the difference in the popularity between packages 2 and 4 might be that the former included T (but not OP), while the latter included OP but not T. Indeed, the facilitators who accompanied the experiment reported that the respondents explained their preference for T by saying they were much less sure of the cost of tests, some of which could be very expensive, but knew the expected costs of OP.

Packages 3 and 5 also include three of the four major benefits, but unlike packages 2 and 4, did not include one of the critical components: IP or D. They scored below average. Packages 6, 7 and 8 are composed of only two major benefits, which prevented them from scoring high (except on the fairness criterion); these packages were selected by only one group each.

In summary, the analysis shown in Figure 9.1 helps distil an important insight on the effective composition of the benefit packages: IP and D have a higher significance than the other major benefits. And a composition of three major benefits that includes these two and that scores well on all three criteria is the most interesting for the clients.

Table 9.7 The number of possible combinations and the number actually chosen

	Package	Stickers left for minors	Possible combinations	Combinations chosen	No. of Groups
1	OP(b) + IP(b) + T(b) + D(b)	3	17	3	6
2	IP(b) + T(b) + D(b)	14	52	4	8
3	OP(b) + T(b) + D(b)	13	48	2	3
4	OP(b) + IP(b) + D(b)	11	55	3	3
5	OP(b) + IP(b) + T(b)	21	53	1	1
6	IP(m) + D(b)	16	48	1	1
7	T(m) + D(b)	19	53	1	1
8	IP(h) + T(h)	8	21	1	1

OP = outpatient; IP = inpatient; T = tests; D = drugs; (b) = basic; (m) = medium; (h) = high.

Table 9.8 The choices recorded for the various minor benefits

	Package	Group	*n*	Medical equipment	Dental care	Preventive care	Indirect cost	Mental care	Maternity
1	OP(b) + IP(b) + T(b) + D(b)	1	12	0	0	1	1	0	1
		2	17	0	0	1	1	0	1
		3	12	0	0	1	1	0	1
		4	13	0	0	0	1	1	1
		5	13	0	0	1	1	0	1
		6	14	0	0	1	1	0	1
2	IP(b) + T(b) + D(b)	7[a]	12	0	0	3	3	3	3
		8	12	0	1	3	1	1	3
		9	12	1	0	3	3	3	3
		10	12	1	1	0	1	0	1
		11	12	0	1	2	3	1	3
		12	12	1	0	3	3	3	3
		13	13	1	0	3	3	3	3
		14	11	1	0	3	3	3	3
3	OP(b) + T(b) + D(b)	15	16	1	1	0	0	0	1
		16	13	1	1	0	0	0	1
		17	13	0	1	1	3	1	3
4	OP(b) + IP(b) + D(b)	18	12	1	0	1	3	1	3
		19	12	0	1	1	3	0	1
		20	12	1	0	3	1	0	3
5	OP(b) + IP(b) + T(b)	21	12	1	1	3	3	3	3
6	IP(m) + D(b)	22	13	1	1	0	1	1	3
7	T(m) + D(b)	23	12	0	2	3	3	1	3
8	IP(h) + T(h)	24	10	0	0	3	3	3	1
	Weighted average score			0.46	0.46	1.60	1.85	1.10	2.05
	±SE[b]			0.104	0.12	0.24	0.22	0.24	0.19

OP = outpatient; IP = inpatient; T = tests; D = drugs; (b) = basic; (m) = medium; (h) = high.

[a] This group decided not to use all their stickers and to stop the game when they had five stickers left.

[b] SE = Standard Error.

9.3.5 Minor benefits

The balance of the sticker-budget after the major benefits are chosen determines the choices of minor benefits. The balance of sticker-budget and the number of possible combinations to select minor benefits are shown in Table 9.7 for each of the packages. The large gap between the number of possible combinations and the number of the combinations actually chosen indicates a coherent set of priorities rather than random distribution of choices.

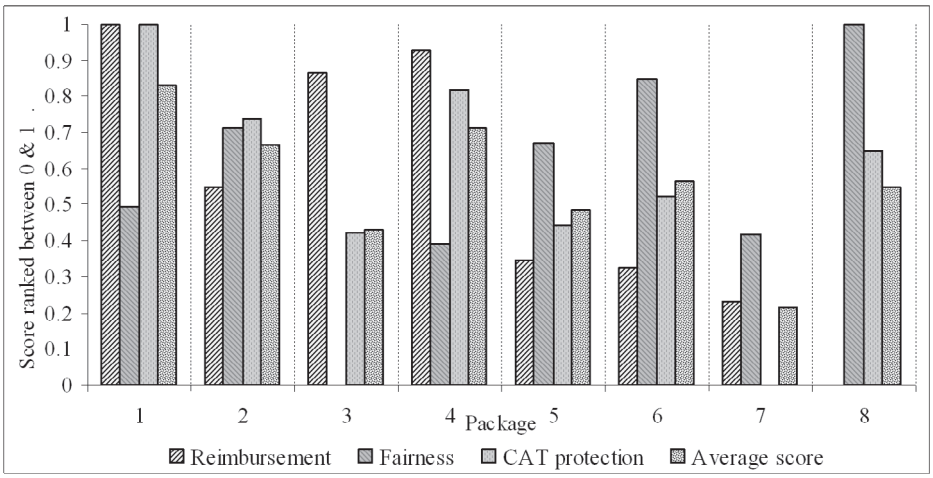

Figure 9.1 Weighted ranking of benefit packages according to the three criteria

It should be noted that two of the minor benefits (ME and Den) are more costly than the other four which offer basic coverage with one sticker and high coverage with 2 or 3 stickers only (Table 9.1). This price difference has an impact on the possible choices. For instance, respondents with a balance of less than five stickers must buy the cheap minor benefits. And respondents who have more than nine stickers must buy at least one of the costly minor benefits, because the cost of buying all the cheap minor benefits at the high level is exactly nine stickers.

Table 9.8 presents the choices of minor benefits that were recorded during the experiment. The choices are represented here as scores, where '0' means that the benefit was not chosen, and '1', '2' and '3' that the benefit was chosen at the basic, medium and high level of coverage, respectively.

The average scores shown at the bottom of Table 9.8 are weighted according to the number of respondents in each of the 24 groups. As can be seen, in the choice between the two costly minor benefits (Den and ME) the score was the same for both. And in the choice of the less costly minor benefits, groups consistently favoured M, followed by IC, followed by P, and mental care came last.

9.4 DISCUSSION

The main finding of this study is that rural, poor, predominantly illiterate and innumerate groups in India, many of whom have little experience with health insurance, have been able to compose benefit packages for health insurance with a limited budget of INR 500 (≈US$ 11) per household per year.

The study shows that about 88% of respondents chose at least three out of four benefits that are directly related to vital care in case of illness and which also cost the most: D, IP, OP and T (denoted here as 'major benefits'). 92.7% of the respondents chose to cover D, and 82.1% chose IP. 70.5% of the respondents chose benefit packages that included both IP and D (Table 9.3). Interestingly, these choices echo findings from Africa that people clearly preferred a benefit package that included high-cost health services, e.g. operations, drugs and consultation fees (Dong et al. 2004).

This pattern of choices reflects the reality whereby the aggregate cost of drugs is higher than the aggregate cost of IP, even though the average cost of drugs per illness is much lower than the average cost of an IP episode. We note that the respondents, that were poor, prioritized protection against the aggregate costs of illness as much as protection against rare and costly medical events. This observation is consistent with experience in other areas of insurance where WTP for rare catastrophic events (e.g. life insurance) is often significantly reduced in comparison with readiness to pay for coverage of events that are more likely to happen with greater frequency (e.g. crop insurance) (Preker et al. 2002). It also fits with the finding that it is harder to sell only catastrophic coverage to clients who do not fully understand the value of insurance, and covering only common health events raises the question of whether the poor would be better off with a flexible savings account rather than insurance. The solution is to provide coverage for a mix of hospitalization and primary healthcare services— this helps make the insurance service more desirable to target beneficiaries since all are likely to make some use of the scheme during the course of a year (Tabor 2005).

In exercising choices, the respondents had to trade off a diversity of benefit types against levels of coverage. The respondents have shown clearly that they prefer a wide range of benefits at basic levels of coverage over a narrow choice of benefit types with higher coverage levels (Table 9.2). The paradigm emerging from these findings is that respondents seek coverage for expensive care, regardless of whether the expense is generated by a few rare and costly events or by frequent events bearing each a moderate cost. This pattern of choice suggests that health insurance covering only low-probability-&- high-cost care would probably not be attractive to this target population. On the other hand, benefit packages that also include high-probability-&-low-cost care would find takers.

As this benefit-package composition challenges the prevailing thought that health insurance can be operated for low-probability-&-high-cost care but less so for high-probability-&-low-cost care (Morduch 2006, Churchill et al. 2003), we examined the judiciousness of the choices people make.

The literature on public involvement in healthcare priority setting cites a range of methods to elicit people's preferences regarding rationing priorities within a fixed budget (Coast 2001, Ryan et al. 2001, Mullen 1999). However, we have been unable to find

reports using quantitative methods to examine the judiciousness of choices made, let alone in a relevant context. Hence, the exercise of simulating the impact of different rationing choices on household expenditure for healthcare, and the criteria we formulated to evaluate different choices, are novel to the best of our knowledge.

We juxtaposed the choices respondents made with costs related to actual illness episodes that were registered within a comparable cohort among poor people in India. Three criteria were employed for the assessment of the results: the 'reimbursement criterion' (which is based on the assumption that respondents will reject insurance when costs that they associate with the insurance are not reimbursed, regardless of the absolute level); the 'fairness criterion' (the underlying assumption of which is that people prefer a higher share of reimbursement when higher costs are incurred, even when costs are not catastrophically high); and the 'catastrophic protection criterion' (which is based on the concept that insurance should provide adequate protection against catastrophes).

The results confirm that the packages chosen most frequently satisfied all three criteria. Including IP contributed most to protection against catastrophic costs and to fairness, and including drugs was critical for the reimbursement criterion.

The analysis also showed that respondents were willing to trade off optimal coverage of major benefits (package 1) in return for coverage of minor benefits. The choice of minor benefits in lieu of major benefits reflects a wish to improve quality of life (by including ME) and prevent situations of severe morbidity (by including P). This trade off also reflects the ability of the respondents to address their long-term needs as well as the needs of entire communities, rather than the needs of people with acute illnesses only.

However, one should recall that contributory health insurance schemes depend on a broad-based willingness to affiliate, which is presumably associated with clients' satisfaction with the composition of the benefit package. Hence, there would be a strong case for considering the choices of prospective clients as a basis for benefit-package design. And this experiment provides encouraging proof that the CHAT method offers a workable way to elicit respondents' choices effectively.

The CHAT decision tool imposes the rule that respondents must choose benefits until they exhaust a predetermined sticker budget; respondents can neither buy additional stickers nor forego stickers in exchange for a premium reduction. Nor can respondents negotiate the prices of the benefits in the setting of the game. This double inflexibility could bias the choices of benefits when respondents are left with a small number of stickers that they must 'get rid of'. The bias occurs when respondents select benefits they do not really prioritize because this is their only option to dispose of the residual stickers ('the residual sticker bias'). For instance, 77.8% of the respondents chose P, but would as many have made the same choice if P had cost more than 1 to 3 stickers, or if they could have obtained a premium reduction in lieu of the residual stickers?

9.5 CONCLUSIONS

In conclusion, the results of this analysis demonstrate that respondents can participate actively in the design of their health insurance packages; that they make judicious choices even at their present level of literacy and numeracy; and that the CHAT exercise provides a means to identify clients' perceived priorities. Therefore, it seems an attractive tool for engaging potential clients in the launch of voluntary health insurance. This tool opens up options for policy makers in resource-poor countries wishing to encourage the successful implementation of contributory health insurance among low-income populations by supporting benefits that the clients prioritize through a subsidy of medium cover at the cost of basic cover. Such policy choice would have the added advantage that it does not dampen the willingness to affiliate and to pay, and limits the subsidy to those who commit their own resources in improving their access to healthcare through health insurance.

Chapter 10

Discussion

10.1 DISCUSSION

This thesis deals with the design of Community-Based Health Insurance (CBHI) schemes for rural poor populations, based on evidence from and experimentation in rural India. We follow the mutual CBHI model of implementation, operated on a not-for-profit basis, as a stand-alone scheme covering a small group (community) which also takes responsibility for the operations, notably the long-term solvency of the scheme (Radermacher & Dror 2006). The term 'Communities' in this context includes not merely geographical units but also those that are connected by other mutual interests such as self-help groups, cooperatives, etc. This intergroup connection (often called 'social capital') usually promotes reciprocity between members, and trust and confidence in the process.

A key step in preparation of implementing a CBHI scheme is to obtain the data needed for the design and pricing of the scheme. This includes information on morbidity, healthcare utilization, cost of healthcare and Willingness-To-pay (WTP) for health insurance. Research has shown that different locations, even within the same state in India, differ in these aspects (Dror et al. 2009b, Dror et al. 2008, Dror et al. 2007b, Dror 2007). Existing data sources (such as the National Sample Survey organization, NSSO) do not collect data at density lower than district, making it necessary to obtain this information for each location through a household survey on location to ensure context-relevance of design and pricing. Such surveys are however costly and time-consuming, and in some cases implementation of CBHI schemes occurs without adequate data or is abandoned altogether. This thesis provides a solution to this problem: alternative methods for data collection that are cheaper and faster than a household survey, without loss of quality.

Health insurance should reduce financial exposure of the insured due to OOP expenditure. It is self-explanatory that OOP expenditure reflects what was paid to healthcare providers, and indeed the two definitions of "catastrophic costs" (Van Doorslaer et al. 2005, Russell 2004, Xu et al. 2003) offer two ways to represent direct payments to providers as a share of income. It is less self-explanatory, and less studied, that people (especially rural poor) seeking care must first arrange to have the money to pay OOP, and often this entails borrowing with interest or selling assets. That cost of financing OOP expenditures is additional to the direct costs charged by providers of care. Chapter 2 deals with quantifying this cost, which is called "Hardship financing". The method for quantification of hardship financing takes account of multiple sources of funds, e.g. current income, savings, and different rates of interest payments according to the source of loans taken to pay healthcare costs. The empirical investigation of this issue showed that many households experienced hardship financing and, contrary to what is commonly thought, such hardship financing occurs not only for inpatient care but also for outpatient care and even for maternity-related costs. Considering that most health insurance schemes in India offer a solution only for inpatient care (most notably the national

health insurance scheme for person below the poverty line RSBY) (Dror & Vellakkal 2012, Reddy et al. 2011b), it is important to note that in addition to being frequent, outpatient costs are also far from negligible.

Communicable diseases (CDs) represent the largest cause of morbidity (life years lost) in rural India, as in most developing countries (WHO 2011b). However, non-communicable diseases (NCDs) are on the rise, making it necessary to evaluate the financial ramifications of NCDs. This is reported in chapter 3; as can be seen there, patients with NCDs in rural India pay for treatment considerably more than patients with CDs. This was found to be true both for inpatient and outpatient care. For NCD cases that are chronic, i.e. with recurring costs, the level of hardship financing would be further aggravated. An aggravation of this problem can be foreseen because incidence and prevalence of NCDs, notably the chronic ones, are expected to increase with changes in lifestyle and extension of life-expectancy. In the literature, most often the burden of NCDs is measured in terms of number of deaths and Disability-adjusted Life-years (DALYs). In this thesis, the burden of NCDs is analysed based on prevalence and costs (chapter 3). This approach revealed that the most prevalent types of NCDs differed from those flagged by WHO (on a global count) as most burdensome. Taken together with the findings in chapter 2, it is expected that that hardship financing due to outpatient care will increase with time, and this will have to be taken into account by policy makers engaged in designing health insurance for the rural poor.

Chapter 4 of this thesis showed that rural poor people in India chose their first contact providers primarily by how near the provider was. In most cases, Rural Medical Providers (RMPs), who are non-degree practitioners practising western (allopathic) medicine, were most proximate. The fundamental issue this finding raises is whether the CBHI can or should (dis)allow insurance cover of these providers, considering their qualifications; stated differently, should the CBHI be held responsible for vouching for the quality of consultations that are provided when the CBHI reimbursed the cost? Another design issue is that these informal providers often dispense medicines during a consultation but charge an all-included price, making it impossible to separate the cost of consultations from the cost of medicines, and therefore devise two separate benefits under the health insurance package. Design of benefits for health insurance in the context of rural India should take into account measures to reduce this problem. Field experience has shown that some community leaders suggest that consultations should only be covered if given by qualified specialists, and tests should be reimbursed only when prescribed by qualified medical doctors. However, such restriction may run counter to one of the objectives of the mutual model, which is to involve the clients in benefit package design in order to ensure that what the scheme actually covers reflects as much as possible the perceived priorities of premium payers.

Even more important than the question of including or excluding a specific benefit type, is the question of willingness-to-pay (WTP) for their health insurance among the target population. Unlike commercial health insurance, where the underwriter determines the insurance package and then fixes the price accordingly before taking the package to market, in CBHI the package is designed around the estimated amount that households are willing to pay for health insurance, as this is the only way for the CBHI scheme to ensure that the cost of benefits would match expected income. The investigation described in chapter 5 of this thesis, and previous research, has shown that WTP for health insurance decreased as income increased, when expressed as percentage of income, in every location tested (Dror & Koren 2012). Such relationship is reminiscent of Engel's Law, which expresses the same kind of relationship between food expenditures and income (Perthel 1975, Engel 1957). This led us to develop a novel model of estimating WTP, assuming that the target population considers health insurance as a necessity good rather than a normal or luxury good, even though their experience with health insurance was really minimal. This interpretation of the evidence led us to formulate an assumption that the expenditure for food (another essential good) could serve as an anchor for WTP for health insurance. Compared to income and non-food expenditures indeed food expenditure turned out to be the most robust anchor. In chapter 5 it is shown that on average WTP for health insurance can be estimated at around 4.5% of food expenditure in the same community, at least among rural communities in India. As food expenditures are everyday recurring expenditures, information about the food cost is more readily available than that of an unfamiliar commodity such as WTP for health insurance among this target population. We therefore believe that expenditures on food can be obtained relatively easily from existing data sources or through focus group discussions in the community similarly to the illness mapping technique.

One of the major challenges in the design of health insurance is to obtain reliable data for actuarial calculations that will ensure the solvency of the CBHI. In the illness mapping method as described in chapter 6, this information is obtained from 'experts' in the target community in a more cost- and time-effective manner than the conventional household survey without loss of quality of data. The 'experts' in question are community members that are knowledgeable about daily life in their community. It is shown that the information provided by these experts is robust enough to obtain reliable estimations of the number and types of illnesses in the community and the healthcare utilized by the ill members. Besides the prevalence/incidence of diseases, it is also possible to obtain the relative incidence of chronic vs. acute diseases by applying the illness mapping technique. The agreement between results obtained through this method and those derived from the household survey was indeed surprisingly good. It should be noted however that the success of such group methods depends on the presence of knowledgeable facilitators who are fluent in the local language.

In designing health insurance there is always the tension between the desire to include more benefits and the wish to keep the premium amount affordable. Among the rural poor, and in CBHI schemes that rely entirely on premium income, this rationing exercise is severe. The limits of each benefit type are determined by thresholds and caps applied for the purpose of reimbursement. Setting caps and thresholds is a sensitive issue which can influence client-satisfaction and trust in the scheme. At the same time, the consequences of these coverage conditions can be assessed only when the distribution of the costs is known. With the view to developing a theoretical model to simulate the distribution of healthcare costs, the first step was to analyse known distributions (obtained through household surveys) in different locations. At first sight, these distributions seemed very different. However, when normalized to the mean cost of the healthcare benefit in each location, the distributions appeared to be very similar across locations. This very surprising finding (discussed in chapter 7) provided the handle to create the model used to develop a general expression. With this model plus an estimation of the mean cost of the specific healthcare benefit in the target community, the full distribution of the cost of the healthcare benefit can be known, and it becomes therefore also possible to estimate the consequences of setting different caps and/or thresholds on the benefit pay-out. In view of the results obtained in chapter 6, it seems plausible that it will be possible to also obtain mean costs of the benefit(s) when applying the 'illness mapping' method. It may also be possible to obtain this information through key informant interviews with local providers of care. This model will considerably refine the ability of CBHI schemes to design not only optimal combinations of benefit types, but also optimal levels of coverage under each benefit type within given levels of premiums.

Some might argue that the rural poor are insufficiently aware of their needs and unable to understand the complex interplay between the health insurance premium, the number of benefits and the depth of coverage. This was the subject of the last topic covered in this thesis. The CBHI implementation model that we followed uses a simulation exercise, called CHAT (Choosing Healthplans All Together) to elicit the choices of the prospective members regarding their preferences for inclusion of benefits in the package. This CHAT tool does not require players to understand the underlying actuarial calculations. One of the important insights gained from experimenting CHAT with a large number of groups has been that people want a benefit package composed of several benefit types (both inpatient and outpatient), rather than a package that would cover only inpatient care (chapter 8 & 9). This seems consistent with the results described in the previous chapters, highlighting the importance of including outpatient cost in the package. As already mentioned, most health insurers in India currently cover only hospitalizations (Dror & Vellakkal 2012, Reddy et al. 2011b). This finding also shows that people have very clear ideas what they need, and what they would agree to pay for. Moreover, analysis of effectiveness of choice based on three criteria (see chapter 9)

has shown that the respondents are capable of making judicious choices, despite their illiteracy, innumeracy and lack of knowledge about health insurance. Analysis of the results also showed that participants can consider the needs of the whole community as they were willing to choose services that are most beneficial to the weaker segments of the community when designing a package for the entire community.

An important insight that can be derived from chapters 8 and 9 is that, on balance, prospective clients can be engaged in priority-setting regarding the composition of a health insurance benefit package using the CHAT tool. Moreover, this tool enhances understanding of health insurance, and specifically the understanding that the premium amount determines coverage, and that even within a limited premium there is choice between several relevant package options. This awareness can enhance both willingness to join health insurance and willingness to pay for it among communities in rural India.

10.2 FROM KNOWLEDGE TO ACTION: CREATING A MANUAL TO APPLY THE KNOWLEDGE WITHIN STANDARD OPERATING PROCEDURES FOR THE DESIGN OF HEALTH INSURANCE

Based on the results presented in this thesis it is now possible to develop a manual to guide communities implementing their CBHI on the step-by-step sequence to follow when designing health insurance, and/or to assist providers of technical assistance in this task.

The first step is to get an idea about the level of WTP for health insurance of the target population. This can be done by using the spending on food as an anchor. About 4.5% of the average amount spent by the target population on food provides a good first estimate of their average WTP for health insurance. Information on food expenditures can be obtained through existing data sources or focus group discussions, in a manner similar to the one described earlier and called 'illness mapping'.

The next step would be to collect data on healthcare utilization and the cost of that utilization. The illness mapping method can be used to obtain the data on incidence/prevalence of illness, related healthcare utilization, and data on location-specific mean cost of that healthcare utilization.

In order to convert this data into CHAT options, the theoretical model of the distribution of healthcare costs is needed, as it allows understanding the consequences of setting different caps and/or thresholds for the different benefit types.

Now, the CHAT tool is ready for use by community members to engage in an exercise of composing a package reflecting their preferred benefit types within their WTP level. The community needs some professional help to facilitate the interaction. The methods developed as part of this thesis, and described in this report can facilitate the (otherwise

costly and time-consuming) data collection and analysis needed for location-relevant design of CBHI schemes for rural poor. While the data for this thesis was collected in India, the methods developed were test-used, at least partly, also in implementing two CBHI schemes in Nepal, and were successful. We see no reason why the same methods could not be used in other states of India and probably in other countries as well, and provide the validation that they can be assumed to apply anywhere. By using these cost- and time-effective methodologies, penetration of health insurance can be upscaled among those populations.

10.3 LIMITATIONS

The purpose of the study is to facilitate pre-implementation work towards actual coverage under CBHI. At the theoretical and methodological level, this study has offered several ground-breaking innovations (WTP à la Engel, Illness Mapping, method to estimate the impact of caps and threshold etc.). However, until and unless we gain hands-on experience with the use of these methods, we cannot know that they have worked on the ground. The limitation is therefore that validation of the methods can occur when they will be used, and evaluated on the ground.

Another limitation is that the findings of this study were obtained in India. We expect they may also be relevant to rural poor in other developing countries; perhaps not quantitatively identical but at least qualitatively. This however needs to be verified in the field.

Summary

Samenvatting (Dutch summary)

SUMMARY

Rural poor populations in India have infrequent, insufficient and inconsistent access to formal health insurance as the vast majority works and lives in the informal sector (Devadasan 2006, NCMH 2005). More than 60% of total health expenditures is paid out-of-pocket (OOP) (World Bank 2012). For these populations the most viable option to get health insurance is through Community-Based Health Insurance (CBHI – a.k.a. health micro insurance) (Bhat & Jain 2006, Ahuja 2005, Ahuja 2004, Gumber 2002). The focus in this thesis is on the mutual CBHI model, operated on a not-for-profit basis by small local groups (communities) that are responsible for all aspects of the implementation and operation of the insurance, including the long-term solvency of the insurance (Radermacher & Dror 2006).

Previous research has shown that locations differ significantly and materially from each other in the relevant information needed for the launch of an insurance scheme: willingness-to-pay for health insurance, health status of the target population, its healthcare utilization, healthcare costs applying locally, and perceived priorities of the target population (Dror et al. 2009b, Dror et al. 2008, Dror et al. 2007b, Dror 2007). Therefore data is needed at the local level. The usual practice to collect such local data is to conduct a baseline household survey (Mwaura & Pongpanich 2012, Doyle et al. 2011, Onwujekwe et al. 2010b, De Allegri et al. 2008, Dong et al. 2004, AC Nielsen ORG-MARG Pvt Ltd. 2001). However, such baseline studies take much time and are expensive, entailing the risk that in some cases plans to launch CBHI schemes are abandoned, or are launched without adequate data. The purpose of this thesis is therefore to contribute to the knowledge that can facilitate pre-implementation activities aimed at upscaling penetration of health insurance among rural poor in India by developing a cost- and time-effective methodology to design health insurance products better, cheaper and faster, and contextualized to local situations.

The need for health insurance (and more specifically health insurance covering outpatient and maternity-related costs in addition to inpatient costs) is clearly attested by the high OOP health expenditures (World Bank 2012) and the burden of NCDs the rural poor in India face (WHO 2011a, WHO 2008). The current situation of high health-related OOP expenditures causes financial hardship for the rural poor. "Hardship financing" is defined based on the quantitative consequence of having had to borrow money with interest or sell assets in order to pay for healthcare. In other words, for the first time, indirect costs due to the financing of OOP expenditures (e.g. interest on borrowed money or losses due to the involuntary or suboptimal sale of assets) are considered, while previous definitions of catastrophic health costs looked only at the share of income spent on health care (Van Doorslaer et al. 2005, Russell 2004, Xu et al. 2003). These indirect costs

are non-negligible, faced by many households, and occur not only for inpatient care but also for outpatient care and even for maternity-related costs.

When analysing the illnesses underlying these health expenditures, it becomes clear that patients with non-communicable diseases (NCDs) in rural India pay considerably more for treatment than patients with communicable diseases (CDs), both for inpatient and for outpatient care. Considering the chronicity of NCDs (and thus recurring costs) and the expected increase of incidence/prevalence of NCDs (epidemiological transition) (WHO 2011a, WHO 2008, Lopez et al. 2006), an aggravation of hardship financing can be foreseen.

In India many different types of providers exist (public, private, charitable) practising different types of medicine (allopathic, Ayurveda, Unani, Sidha, homeopathic, traditional, etc.). Analysis of the preferences of rural poor communities in India regarding first contact for curative healthcare revealed that they choose a provider mainly based on proximity. In the case of rural communities these preferred providers mostly were Rural Medical Providers (RMPs) practicing allopathic (western) medicine. These informal practitioners do not hold an official degree in medicine and usually dispense medicines during a consultation but charge an all-inclusive price. In the context of designing CBHI, this health-seeking practice raises the issue that such local providers cannot probably be covered in the scheme as their quality cannot be guaranteed. It also makes clear that the separate calculation of the actuarial costs of consultation and medicines may be problematic as these costs cannot be separated because these local providers often group the two benefits together under one fee.

When designing a CBHI scheme the first essential piece of information is the willingness-to-pay (WTP) for health insurance. As affiliation to CBHI schemes is voluntary and such schemes usually operate without external funding, the level of WTP determines the width and depth of the health insurance benefit package. Analysis of expressed WTP for health insurance by rural poor populations in India through a contingent valuation technique (descending bidding game) revealed a relationship with income remindful of Engel's Law (Perthel 1975, Engel 1957). We deduce that rural poor populations, even though their experience with health insurance was really minimal, considered health insurance to be a necessity good like food, rather than a normal or luxury good. In our attempt to find a cost- and time-effective methodology to estimate WTP for health insurance, indeed food expenditures turned out to be a good anchor: average WTP for health insurance can be estimated at around 4.5% of food expenditures in the same community. Food expenditures, being everyday recurring expenditures, we believe can be obtained more easily (i.e. cheaper and faster) than an unfamiliar commodity such as WTP for health insurance among this target population, for instance through existing data sources or focus group discussions.

The next step when designing a CBHI scheme is the actuarial calculation of the different benefits covered. For the premium calculation information is needed on (i) the probability of healthcare utilized under the different insured benefits, and (ii) the cost of that utilization. CBHI schemes usually rely entirely on premium income payable by rural poor communities. As the communities bear the risk of the insurance, the scheme has to ensure that insurance pay-outs do not exceed the premium income. This can be secured through offering finite coverage determined by a threshold (the predetermined amount above which the insurance reimburses the rest of the bill) and/or a cap (the predetermined amount up to which the insurance reimburses the bill) applied on the benefits. The actuarial consequences of these coverage conditions can be assessed only when the full distribution of the costs are known. The first piece of information can be collected with the use of a newly developed cost- and time-effective method from community experts knowledgeable about the happenings in the community. This method is called "Illness Mapping" and is a combination of two non-interactive consensus group methods (Delphi and Nominal Group Technique) transformed into an interactive method. The second piece of information, the distribution of the costs, can be predicted with the use of the theoretical model developed together with an estimate (through the illness mapping technique) of the mean cost of the specific healthcare benefit in the target community.

The last issue related to the design of the CBHI scheme is the design of the health insurance benefit package. The preferences of prospective clients regarding their benefit package can be established through a method called Choosing Healthplans All Together (CHAT). Rural poor participants, despite their illiteracy, innumeracy and lack of knowledge about health insurance, have very clear ideas what they need and what they would agree to pay for and are able to express this through the CHAT methodology. This is corroborated by several findings: (i) the participants were found to be capable of making judicious choices (analysed through three criteria: reimbursement criterion, fairness criterion, and catastrophic protection criterion); (ii) they were found to be able to consider the needs of the whole community when designing a package for the entire community; and (iii) consistent with the finding that rural poor face hardship financing not only for inpatient care but also for outpatient care and maternity-related care, participants want a benefit package composed of several benefit types (both inpatient and outpatient), rather than a package that would cover only inpatient care.

SAMENVATTING (DUTCH SUMMARY)

De arme plattelandsbevolking van India heeft nauwelijks toegang tot een formele vorm van ziektekostenverzekering mede omdat het overgrote deel in de informele sector werkt en leeft (Devadasan 2006, NCMH 2005). Meer dan 60% van de ziektekosten wordt betaald via eigen betalingen (World Bank 2012). Voor deze bevolkingsgroepen is Community-Based Health Insurance (CBHI ook wel bekend als micro health insurance) de meest voor de hand liggende mogelijkheid om ziektekostenverzekering te verkrijgen (Bhat & Jain 2006, Ahuja 2005, Ahuja 2004, Gumber 2002). In dit proefschrift ligt de nadruk op het wederzijdse CBHI model, georganiseerd zonder winstoogmerk door lokale groepen (gemeenschappen) die gezamenlijk verantwoordelijk zijn voor alle aspecten van de opzet en uitvoering van de verzekering met inbegrip van de lange termijn solvabiliteit (Radermacher & Dror 2006).

Eerder onderzoek heeft laten zien dat er substantiële verschillen bestaan tussen verschillende locaties in India wat betreft de relevante informatie die nodig is om een verzekering te starten: de bereidheid tot betaling voor ziektekostenverzekering, de gezondheidstoestand van de populatie, het gebruik van gezondheidszorg door de populatie, de lokale kosten van de gezondheidszorg en de prioriteiten van de doelgroep (Dror et al. 2009b, Dror et al. 2008, Dror et al. 2007b, Dror 2007). Daarom zijn gegevens nodig op lokaal niveau. De gangbare praktijk is dat deze gegevens worden verzameld via een enquête onder huishoudens (Mwaura & Pongpanich 2012, Doyle et al. 2011, Onwujekwe et al. 2010b, De Allegri et al. 2008, Dong et al. 2004, AC Nielsen ORG-MARG Pvt Ltd. 2001). Het afnemen van een dergelijke enquête is echter een tijdrovende en dure aangelegenheid. Dit brengt het risico met zich mee dat plannen voor de introductie van CBHI niet worden uitgevoerd of dat de CBHI wordt opgezet zonder adequate gegevens. Het doel van dit proefschrift is daarom een bijdrage te leveren aan de kennis die behulpzaam kan zijn bij voorbereidende activiteiten gericht op het vergroten van de penetratie van ziektekostenverzekering onder de arme plattelandsbevolking in India. In het bijzonder ligt de nadruk op de ontwikkeling van een goedkopere en snellere methode voor het ontwerpen van ziektekostenverzekeringsproducten toegespitst op de lokale situatie.

De behoefte aan ziektekostenverzekering (en meer specifiek ziektekostenverzekering die naast ziekenhuiskosten ook andere kosten dekt zoals die van huisarts, medicijnen, verloskunde en kraamzorg) wordt duidelijk gemaakt door de hoge eigen betalingen (World Bank 2012) en de ziektelast van degeneratieve (niet besmettelijke) ziekten onder de arme plattelandsbevolking van India (WHO 2011a, WHO 2008). In deze situatie krijgt menigeen te maken met financiële tegenspoed als gevolg van ziekte. In dit proefschrift wordt financiële tegenspoed gedefinieerd als een situatie waarin geld moet worden geleend tegen rente en/of goederen moeten worden verkocht om ziektekosten te kun-

nen betalen. Met andere woorden, voor het eerst worden ook indirecte kosten om eigen betalingen te financieren in beschouwing genomen (zoals de rente op een lening of de verliezen als gevolg van de onvrijwillige of niet-optimale verkoop van goederen). Eerder onderzoek definieerde financiële tegenspoed doorgaans uitsluitend op basis van het deel van het inkomen dat aan gezondheidszorg wordt besteed (Van Doorslaer et al. 2005, Russell 2004, Xu et al. 2003). Dit proefschrift laat zien dat de indirecte kosten niet verwaarloosbaar zijn, dat veel huishoudens er mee te maken krijgen en dat zij niet uitsluitend voorkomen in geval van een ziekenhuisopname maar ook voorkomen bij eerstelijnsgezondheidszorg en zelfs bij zorg gerelateerd aan zwangerschap en bevalling.

Wanneer gekeken wordt naar de ziekten die het zorggebruik en de bijbehorende kosten veroorzaken, wordt het duidelijk dat patiënten met degeneratieve ziekten aanzienlijk meer voor de behandeling hiervan betalen dan patiënten met besmettelijke ziekten voor hun behandeling betalen. Dit geldt zowel voor de kosten van ziekenhuiszorg als voor de kosten van zorg buiten het ziekenhuis. Met inachtneming van de chroniciteit van veel degeneratieve ziekten (en dus terugkerende kosten) en de verwachte toename van de incidentie/prevalentie van degeneratieve ziekten (epidemiologische transitie) (WHO 2011a, WHO 2008, Lopez et al. 2006), mag een toename worden verwacht van het aantal huishoudens dat te maken gaat krijgen met bovengenoemde financiële tegenspoed als gevolg van ziekte.

In India bestaan verschillende klassen zorgaanbieders (publiek, privaat, liefdadig) die verschillende vormen van zorg aanbieden (allopathisch/Westers, Ayurveda, Unani, Sidha, homeopathisch, traditioneel, etc.). Een analyse van de voorkeuren van de arme plattelandsbevolking in India ten aanzien van hun eerste contact met een aanbieder van curatieve zorg laat zien dat hun keuze van zorgaanbieder hoofdzakelijk wordt gemaakt op basis van afstand (nabijheid). Voor de plattelandsbevolking betekende dit in de meeste gevallen een Rural Medical Provider (RMP) die de westerse geneeskunde beoefent. Deze informele zorgaanbieders hebben geen officiële bevoegdheid voor het uitoefenen van de geneeskunde en geven vaak tijdens het consult medicijnen waarbij ze dan één totaalprijs rekenen voor consult en medicijnen samen. In verband met het ontwerpen van de CBHI is dit relevant omdat dit erop wijst dat er in een lokale situatie zorgaanbieders werkzaam kunnen zijn waarvan de kosten waarschijnlijk niet gedekt kunnen worden door een CBHI mede omdat de kwaliteit van de door hun verleende zorg niet kan worden gegarandeerd. Ook maakt dit duidelijk dat er bij de premiecalculatie voor een ziektekostenverzekering mogelijk geen onderscheid gemaakt kan worden tussen de kosten van consultaties en de kosten van medicijnen omdat er in de praktijk door zorgaanbieders geen onderscheid gemaakt wordt tussen deze kosten.

Bij het ontwerp van een CBHI is inzicht in de bereidheid tot betaling voor de ziektekostenverzekering een eerste vereiste. Omdat de deelname aan een CBHI vrijwillig is en omdat de CBHI normaal gesproken zonder vorm van externe financiering opereert,

bepaalt de bereidheid tot betaling de omvang van het verzekeringspakket. Een analyse van de geuite bereidheid tot betaling voor ziektekostenverzekering onder de arme plattelandsbevolking van India met de "contingent valuation"-techniek ("descending bidding game") laat een relatie met inkomen zien die doet denken aan de Wet van Engel (Perthel 1975, Engel 1957). Er kon worden afgeleid dat de arme plattelandsbevolking, ondanks hun minimale ervaring met ziektekostenverzekeringen, een ziektekostenverzekering als een noodzakelijk goed beschouwen (net zoals eten) en niet als een normaal goed of een luxe goed. In onze poging om de bereidheid tot betaling voor ziektekostenverzekering te schatten via een kosten- en tijds-effectieve methode bleken de uitgaven aan eten inderdaad een goed houvast te bieden: de gemiddelde bereidheid tot betaling voor ziektekostenverzekering in een gemeenschap blijkt geschat te kunnen worden als 4,5% van de uitgaven aan eten binnen dezelfde gemeenschap. Omdat uitgaven aan eten nagenoeg elke dag terugkomen menen wij dat deze uitgaven eenvoudiger (goedkoper en sneller) achterhaald kunnen worden in een gemeenschap dan een onbekende grootheid als de bereidheid tot betaling voor ziektekostenverzekering via bijvoorbeeld bestaande gegevensbronnen of focus groep discussies.

De volgende stap in het ontwerpen van een CBHI is de actuariële premiecalculatie voor de verschillende vormen van zorg die onder de verzekering vallen. Voor deze premiecalculatie is informatie nodig over (i) de kans op het gebruik van de betreffende vormen van zorg en (ii) de kosten die horen bij het gebruik van de betreffende vormen van zorg. De premie-inkomsten van de gemeenschap vormen normaal gesproken de totale inkomsten voor de CBHI. Omdat de gemeenschap het financiële risico draagt van de verzekering, dient het pakket zodanig te worden ontworpen dat de kosten die naar verwachting vergoed worden door de verzekering gelijk zijn aan de premie-inkomsten. Dit kan worden gegarandeerd door de dekking van de verschillende vormen van zorg te beperken. Deze beperking vindt doorgaans plaats door het hanteren van een eigen betaling (de kosten beneden een van te voren bepaald drempelbedrag worden niet vergoed door de verzekering) al dan niet in combinatie met een maximum vergoeding (de kosten worden vergoed tot een van te voren bepaald maximumbedrag). De consequenties van deze beperkingen voor de te verwachten uit te keren vergoedingen door de verzekering kunnen worden berekend wanneer de volledige verdeling van de kosten bekend zijn. Informatie over de kans op het gebruik van verschillende vormen van zorg kan worden verkregen door een nieuwe kosten- en tijds-effectieve methode te gebruiken met mensen uit de gemeenschap die de gemeenschap goed kennen. Deze methode hebben wij "Illness Mapping" genoemd en bestaat uit een combinatie van twee niet interactieve consensus groepsmethoden ("Delphi" en "Nominal Group Technique") die omgevormd worden tot een interactieve methode. Een goede schatting van de verdeling van de kosten die horen bij het gebruik van de betreffende vormen van zorg kan verkregen worden door het veronderstellen van een theoretische kansverde-

ling in combinatie met een schatting (met behulp van de Illness Mapping techniek) van de gemiddelde uitgaven aan de betreffende vorm van zorg door de doelgroep.

Het laatste aspect van het ontwerpen van een CBHI is het kiezen van een verzekeringspakket. De voorkeuren van potentiële deelnemers ten aanzien van hun verzekeringspakket kunnen worden achterhaald door een methode genaamd CHAT ("Choosing Healthplans All Together"). Arme plattelandsbewoners in India blijken, ondanks dat zij vaak analfabeet zijn en nauwelijks bekend met het fenomeen ziektekostenverzekering, duidelijke ideeën te hebben over hun behoeften en waar zij bereid zijn voor te betalen en dit duidelijk te maken via de CHAT methode. Verschillende bevindingen ondersteunen dit: (i) de deelnemers waren in staat onderbouwde keuzes te maken (geanalyseerd met behulp van drie criteria: het "reimbursement criterium", het "fairness criterium" en het "catastrophic protection criterium"); (ii) zij waren in staat de behoeften van de gehele gemeenschap in beschouwing te nemen bij het kiezen van een verzekeringspakket voor de gemeenschap; en (iii), in overeenstemming met de bevinding dat de arme plattelandsbevolking niet alleen met financiële tegenspoed wordt geconfronteerd als gevolg van kosten van ziekenhuiszorg maar ook van eerstelijnszorg, selecteerden de deelnemers een verzekeringspakket dat de kosten vergoed van verschillende vormen van zorg en dus niet uitsluitend ziekenhuiszorg.

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Curriculum Vitae

PhD portfolio

CURRICULUM VITAE

Erika Binnendijk was born in Benthuizen, the Netherlands, in 1978. She graduated in 1996 from her Atheneum education at the "Oranje Nassau College" in Zoetermeer. She then obtained a Bachelor's degree in nursing sciences in 2001 from The Hague University of Professional Education. For six years she worked as a registered nurse in the Netherlands. In 2006, she received her M.Sc. degree in Health Economics, Policy and Law at the Erasmus University Rotterdam (the Netherlands), Institute of Health Policy and Management; her graduation thesis topic was "Cost analysis of health care provision in the Dangme West district of Ghana" based notably on a three months field study in situ in Ghana.

From 2005 until 2012 she has worked for the Institute of Health Policy & Management at the Erasmus University Rotterdam (from 2008 onwards as PhD student) within the framework of several research projects led by Prof. D. Dror (notably the ECCP 2005-06 and NWO/WOTRO 2008-13). Field of interest is micro insurance for rural poor in India. Her research focus has been on understanding priorities for health insurance coverage among low-income persons in the informal sector in rural India (notably by conducting field experiments with the CHAT tool 2005, 2006). She was instrumental in planning and supervising three waves of household surveys in various locations in India (2008, 2009 and 2010), and gained considerable experience in coordinating the field research, and in training and educating local interviewers. She was also involved in developing the CHAT tool (2007, 2010) and several survey instruments. Moreover she built a dataset containing survey information from different locations in India totalling almost 45,000 individuals and more than 200 variables.

She has published papers in peer-reviewed journals and presented research results at several conferences of the International Health Economics Association (iHEA).

PHD PORTFOLIO

PhD student : Erika Binnendijk
Department : Institute of Health Policy and Management
PhD period : 2008 – 2013
Promotor : Prof.dr. Frans Rutten
Copromotor : Prof.dr. David Dror

Data collection at location in India

- Organization and supervision of data collection through a household survey:
- among about 2,000 households (about 13,000 individuals) in Bihar in India, May-June 2010
- among about 5,000 households (about 25,000 individuals) in Odisha in India, January-February 2009
- among about 1,800 households (about 7,000 individuals) in Andhra Pradesh in India, June 2008
- Organization and supervision of data collection through the CHAT methodology:
- among about 70 groups in Rajasthan in India, September-October 2006
- among about 50 groups in Maharashtra in India, Augustus-September 2006
- among about 20 groups in Karnataka and Maharashtra in India, December 2005

Teaching experience

- Giving lectures as part of the course Health Insurance and Re-insurance in Low- and Middle-income countries at the Institute of Health Policy & Management (Erasmus University Rotterdam, the Netherlands) 2008 – 2011
- Supervision of a graduation student in writing her thesis for the master Health Economics Policy and Law 2011

Presentations

- Predicting Willingness-To-Pay for health insurance among rural poor in India. International Health Economics Association 8th World Congress 2011
- What share of illness-related costs is financed by borrowing among rural poor in India? International Health Economics Association 7th World Congress 2009

Publications

- Binnendijk, E., Koren, R., & Dror, D. M. (Submitted for publication). A model to estimate the impact of thresholds and caps on coverage levels in community-based health insurance schemes in low-income countries.

- Binnendijk, E., Koren, R., & Dror, D. M. (2013). Estimating willingness-to-pay for health insurance among rural poor in India by reference to Engel's Law. Social Science & Medicine, 76(1):67-73.
- Binnendijk, E., Gautham, M., Koren, R., & Dror, D. M. (2012). Illness Mapping: A time and cost effective method to estimate healthcare data needed to establish community based health insurance. BMC Medical Research Methodology, 12(153).
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