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## HEALTH WORKER PREFERENCES FOR COMMUNITY-BASED HEALTH INSURANCE PAYMENT MECHANISMS: A DISCRETE CHOICE EXPERIMENT

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### ABSTRACT

#### Background

In 2004 a community-based health insurance scheme (CBI) was introduced in Nouna district, Burkina Faso. Since its inception, coverage has remained low and dropout rates high. Health workers remain particularly dissatisfied with the current CBI payment scheme, leading to poor perceived quality of care by CBI enrollees and lack of support for the scheme by local health workers.

#### Methods

A discrete choice experiment (DCE) was used to examine CBI provider payment attributes that influence healthcare workers' stated preferences for an insurance payment mechanism. Conditional logit models with main-effects and interactions terms were used for analysis.

#### Results

Reimbursement of service fees (adjusted odds ratio (aOR) 1.49,  $p < 0.001$ ) and CBI contributions for medical supplies and equipment (aOR 1.47,  $p < 0.001$ ) had the strongest impact on whether the health workers chose a given payment scenario. The odds of selecting payment scenarios decreased significantly if the scenarios included results-based financing (RBF) payments made through the local health management team instead of directly to health workers (aOR 0.86,  $p < 0.001$ ), or included RBF payments based on CBI coverage outcomes relative to other facilities, rather

than on independent evaluations for each facility (aOR 0.86,  $p < 0.001$ ).

#### Conclusions

Provider payment mechanisms can crucially determine CBI performance, and should be designed taking into account health worker preferences, as done in our study, in order to ensure that CBI objectives are met. Based on the results from this DCE, a revised CBI payment system will be introduced in Nouna district in January 2011, taking into consideration health worker preferences on how they are paid.

### BACKGROUND

In early 2004, a community-based health insurance (CBI) scheme, *Assurance Maladie à Base Communautaire (AMBC)*, was introduced in Nouna district, Burkina Faso. CBI is a common term used for voluntary, not-for-profit health insurance schemes, organized at the level of the community [1, 2]. Under CBI schemes, members of a community, often defined by geographical proximity or through employment-based relationships, pool resources in order to provide support for covering health expenditures [3]. CBI has been seen as an attractive solution to the challenge of generating financial resources for healthcare in developing countries, because they are designed to assist the many people in those countries who work in rural and informal sectors and thus rarely have access to other types of health insurance, which are based on formal, taxed income [2, 4-8]. The development of CBI programs in sub-Saharan Africa has garnered substantial interest by both researchers and policymakers alike, as an instrument to reduce financial barriers to care where other types of health insurance schemes cannot be implemented [7, 9-17]. Two important challenges in establishing and sustaining CBI schemes are low rates of community member enrollment and high dropout rates, which lead to low CBI coverage. Low CBI coverage in turn results in low levels of revenue and limited risk-pooling, which can leave CBI schemes financially and organizationally vulnerable to unexpected changes in incomes or disease incidence.

#### Study setting

This study took place in the Nouna health district in northwest Burkina Faso. This is a predominantly rural area where the majority of the population depends on subsistence agriculture as their primary livelihood. The city of Nouna, approximately 300 km from Ouagadougou (the capital of Burkina Faso) and approximately 100 km from the border with Mali, is both the headquarters of the Health District of Nouna

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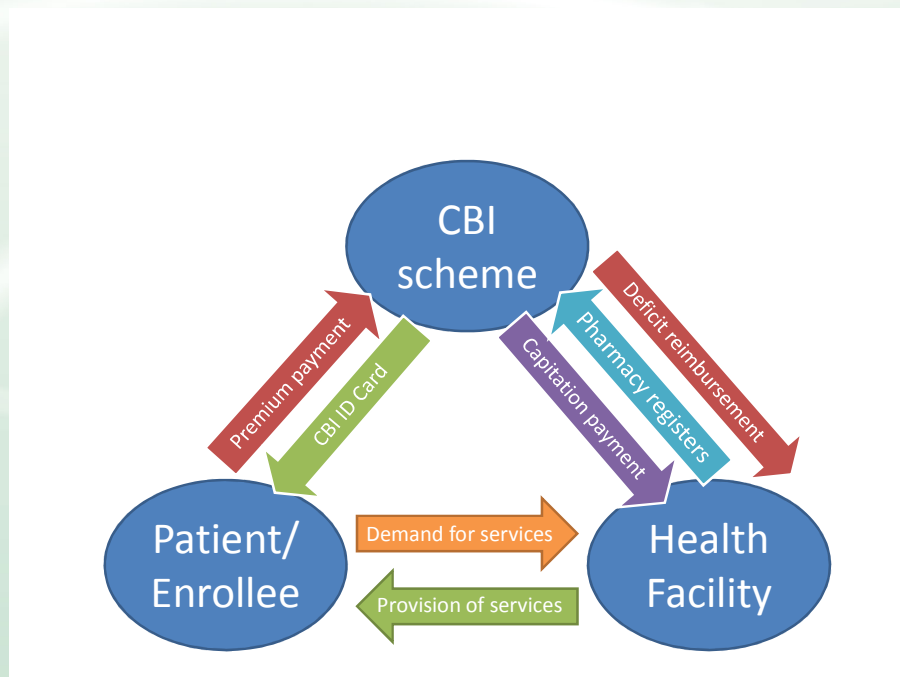
as well as the administrative center of the province of Kossi.

The details of the implementation of the *AMBC* scheme and benefit package are described elsewhere [18-20]. The participation of health workers in the scheme depends on whether they are employed in the CBI implementation zone or not. Facilities that operate within the CBI implementation zone sign two-year contracts with the insurance scheme, in which the method and schedule for provider payments for coverage of enrollees' expenses are defined. In 2010, all 13 primary-care facilities and the one secondary-care facility (the district hospital) within the zone, in which the CBI has been implemented, contracted with the scheme. Currently 21 primary-care facilities operate within Nouna district but lie outside of the CBI scheme's implementation zone.

#### AMBC Nouna's method of provider payment

At the time of the study (April/May 2010), AMBC Nouna used a third-party payment system to finance care provided to the scheme's enrollees (see Figures 1 and 2). Within this payment system, primary- and secondary-care facilities contracted with the scheme are paid by the CBI on an annual capitation basis, i.e., the facilities receive a flat payment per individual enrolled in the CBI. These payments are only intended to cover the cost of drugs prescribed to enrollees by health facility personnel. Premiums paid by households who enroll are collected during the annual enrollment campaign (January-June each year). If individuals are enrolling for the first time, they must adhere to a three-month waiting period before receiving their CBI ID card, which grants them access to services and drugs included in the scheme's benefit package. If individuals enrolled during the previous year, their ID card is automatically updated and no waiting period is enforced.

Figure 1: AMBC Nouna financing and payment model



Once the campaign closes at the end of June, the CBI Management Unit calculates the level of capitation payments that will be made to primary care facilities and the district hospital. Health facility payments are based on the number of individuals who enroll in the catchment areas of each primary care facility. Once the total premium revenue for each facility is calculated, 10% of funds are set aside for operational costs of the scheme. For the remaining 90%, 75% is

allocated to the associated primary care facility and 25% to the district hospital.

Pharmacy registers are provided to each primary care facility and the district hospital, and are used to track drugs prescribed to CBI enrollees over the length of the calendar year. The pharmacy manager of each facility is given the task to update registers as enrolled patients are provided drugs. At the end of each calendar year, the total costs incurred through enrollee prescriptions are calculated. If the annual

total exceeds the sum allocated through the initial capitation payments, the financial deficit is reimbursed by an external fourth party (since 2005, a philanthropic German foundation) during the first quarter of the following year. Service fees, such as

consultation and medical service fees are not included in this reimbursement, nor are they paid by enrolled patients. Further details of the current CBI payment system are shown in Table 1.

**Table 1: CBI payment mechanisms during 2004-2010**

Number	Payment attribute	Current payment attribute mechanism
1	Capitation payment level	The enrollment premium is 500 FCFA (\$1 USD) for children under 15 years of age and 1500 FCFA (\$3 USD) for adults 15 years of age and older. 10% of the total of capitation payments is reserved for the CBI management, and the remaining 90% is split between primary- (3 quarters) and secondary-care (1 quarter) facilities. The capitation payment is meant to cover all drug costs for enrollees during the calendar year.
2	Capitation payment schedule	The capitation is paid once a year, normally in July or August, after the annual enrollment campaign closes (end of June each year).
3	Allocation of medical supplies and equipment	Neither medical supplies (cotton, alcohol, Bétadine, Sparadrap, etc.) nor medical equipment (tension meter, stethoscope, thermometer, scale, height gauge) are paid for by the CBI scheme.
4	Reimbursement of consultation and service fees	None. The capitation paid to facilities covers only the cost of drugs prescribed to enrollees. Fees for consultations and services consumed by enrollees are not covered by the annual capitation, nor calculated for the annual deficit reimbursement (see below), and are not paid by CBI enrollees.
5	Capitation deficit reimbursement	If the total costs of drugs prescribed to enrollees exceeds the capitation, the resulting deficit for each calendar year is reimbursed (by external financial partners) during the first quarter of the following calendar year.
6	Results-based financing (RBF) provider payment mechanism	Currently there exists no results-based financing provider payment mechanism (financial or non-financial) linked to CBI coverage.

FCFA: franc CFA, the local currency used in Burkina Faso. 500 FCFA = \$1 USD

CBI: Community-based health insurance

The payment system introduced by AMBC Nouna is somewhat of a radical departure from the traditional approach to financing public sector health facilities in Burkina Faso. In general, health facilities acquire funds through two general sources: (i) input-based financing provided by the Ministry of Health, and (ii) revenue generated from service fees and drug sales. The

second source of revenue is used for minor facility investments and the restocking of drugs and supplies. A significant proportion of service fee revenue (20-22%) is reserved for health worker bonuses (known as *ristournes*) that are paid on a quarterly basis. Individual health workers have two primary sources of income: (i) a monthly salary and (ii) the abovementioned quarterly

bonus, which can be a significant source of income for health workers stationed in facilities with high utilization rates. Within AMBC Nouna's method of provider payment, enrolled patients do not pay service fees, and capitation payments are only used to cover the cost of drugs prescribed to enrollees. For

health facilities where a significant proportion of patients are CBI enrollees, the fact that service fees are not paid by enrollees (nor reimbursed at the end of years), constitutes a significant loss in revenue for the health facility and the workers employed there.

Figure 2: AMBC Nouna payment schedule

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan
<b>Premium collection</b>	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow							Yellow
<b>Access to care</b>	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
<b>Pre-financing by health centers</b>	Orange	Orange	Orange	Orange	Orange	Orange							
<b>Capitation payment</b>							Blue						
<b>Potential deficit</b>							Red	Red	Red	Red	Red	Red	Red
<b>Facility register evaluation</b>												Purple	
<b>Deficit reimbursement</b>													Blue

Previous unpublished studies on the *AMBC* scheme in Nouna have found wide-spread health-worker dissatisfaction with the current CBI payment scheme, noting their particular dissatisfaction with various payment attributes [21, 22]:

- The low overall level of capitation paid (which in the past has led to budget deficits that needed to be covered by an external donor)
- The payment schedule (once per year in July, leading to facilities pre-financing enrollee medical costs during the first six months of the budget cycle)
- The fact that capitation is the only payment mechanism used by the CBI (when additional payment mechanisms could possibly improve health-worker motivation and the financial situation of facilities).

Low health-worker satisfaction, inappropriate incentive structures, and fear of facility bankruptcy have led to health worker resistance to provide friendly, comprehensive, and high-quality care to CBI enrollees

[21, 22]. In turn, the perception in the community that CBI enrollees receive worse-quality care than other patients (e.g., less friendly reception by health workers and lower quantities of drugs) is likely to have been a major cause of the low CBI coverage [21, 22]. Studies in other settings have also shown that provider payment mechanisms are indeed an important factor affecting CBI coverage, because they crucially determine health-worker satisfaction and support for a CBI [13, 23].

Since the inception of *AMBC*, CBI coverage has remained low, despite an upward trend over time [24, 25]. During the first year of operation (2004) coverage was 5%; by 2010, coverage had merely increased to 9%. Enrollee drop-out rates have also been high throughout the existence of the CBI, despite a decline over time (the annual drop-out was 32% in 2004 and 16% in 2010). A study in 2006 found that the most common reasons for dropping out of coverage included several that were linked to health-worker attitudes and behaviors, such as "I didn't like medical staff behavior" (19%), "Not satisfied with services received" (7%), and "I was not given good

drugs" (6%) [26], suggesting that improved health-worker support of the CBI could reduce drop-out. Again, based on previous studies, it seems likely that health-worker support for the CBI could be substantially improved through changes in payment mechanisms, which in turn would reduce drop-out rates [21, 22].

Provider payment can not only improve CBI coverage indirectly through influence on health-worker satisfaction and motivation, but also directly. Results-based financing (RBF) linked to CBI coverage can motivate health workers to increase the number of people enrolled in CBI. In essence, RBF involves the "transfer of money or material goods conditional on taking a measurable action or achieving a predetermined performance target" [27]. Within the context of the *AMBC*, there is substantial capacity for health workers to do more to promote CBI. According to patient exit interviews in 2010, in only 8% of healthcare visits did health workers mention the possibility to enroll in CBI, and in only 3% of healthcare visits of enrollees did they remind patients to re-enroll in the CBI [28]. By introducing an RBF mechanism that is explicitly linked to changes in CBI coverage, health workers could be financially motivated to promote participation in the CBI.

In this study, we investigate health worker preferences for CBI payment mechanisms. We use a discrete choice experiment (DCE) to examine CBI provider payment attributes that influence healthcare workers' stated preferences for an insurance payment mechanism that incorporates not only payment level, timing and reimbursement options, but also a results-based financing mechanism linked to CBI coverage. We test the premise that provider payment mechanisms currently applied by the CBI scheme are poorly aligned with health worker preferences for how they are paid. We hypothesize that the misalignment of incentives has led to poor levels of provider satisfaction, inducing a resistance to support the CBI scheme's efforts to improve enrollment levels. By revising the payment method and aligning provider incentives with CBI objectives, health worker satisfaction may improve, leading to an increase in their support for the scheme and in turn promote enrollment. This study specifically explores payment attributes that are amenable to change to assist policy makers in re-designing a CBI provider payment mechanism, with the aim to increase health workers' motivation to support and promote CBI.

## METHODS

### Study sample

As the insurance scheme aims to extend its zone of operation from 14 to all 34 primary-care facilities in Nouna district by 2013, our study sample included all 185 health workers employed at primary- and secondary-care facilities in the district. Of these health workers, 105 (57%) were currently employed at facilities within the CBI implementation zone at the time of data collection.

### Theories underlying DCE

Several theories underlie DCEs and the analysis of DCE results. DCEs are consistent with Lancaster's theory of consumer demand [29], in which consumers have preferences for and derive utility from the underlying attributes of goods, rather than actual goods per se. DCEs are also consistent with choice-based consumer theory in that they explicitly assume that choices observed reveal the preferences of individuals [30]. Choices made in DCEs are analyzed using random utility theory [31], which asserts that utility ( $U$ ) for individual  $i$  conditional on choice  $j$  can be decomposed into an explainable systematic component  $V_{ij}$  and a random component  $\epsilon_{ij}$  [32]:

$$U_{ij} = V_{ij} + \epsilon_{ij}, j = 1, \dots, J$$

Random components are viewed as being due to unobservable attributes of the goods, unobserved preference variation, systematic error and random measurement error. The systematic component is a function of observed attributes of the good or service and observed characteristics of individuals who make choices, which can be modeled as followed:

$$\begin{aligned} P(Y = 1) &= P(U_{i1} > U_{ij}) \\ &= P(V_{i1} + \epsilon_{i1} > V_{ij} + \epsilon_{ij}) \\ &= P(V_{i1} - V_{ij} > \epsilon_{ij} - \epsilon_{i1}) \forall j \neq 1 \end{aligned}$$

where  $Y_i$  is a random variable denoting the choice outcome. Estimable choice models are then derived by assuming a distribution for the random component [32].

### DCE design

In order to determine how to divide the CBI payment system into coherent attributes that could be easily understood by respondents, preliminary focus-group

discussions and in-depth interviews were conducted with health workers practicing at the primary- and secondary-care facilities within the CBI zone, as well as members of the CBI management team. Based on analyses of these qualitative findings [21], the authors produced a list of candidate attributes which was presented to the CBI management team and district health management team for discussion. The list was eventually narrowed to 6 attributes, which were validated by local stakeholders during a half-day workshop. From the final list, four attributes were related to the provider payment system currently in place and two attributes were related to a proposed RBF mechanism that would pay health facility an additional bonus payment based on achieved CBI coverage levels. The final DCE attributes included: (1) the level of capitation paid, (2) the capitation payment schedule, (3) medical supplies and equipment paid for by the CBI scheme, (4) reimbursement of service fees, (5) the indicator used to determine the size of the RBF payment, and (6) the recipient of the RBF payment. For each attribute, either two or three levels were designed, with the baseline level for the first four attributes being the current payment method (Table 2).

Payment levels for the capitation attribute (#1) were determined based on an ongoing policy debate on whether to subsidize child premiums with an additional 1000 FCFA (\$2 USD), in order to be equal to the 1500 FCFA premium paid by adults. Previous simulations had been run with various subsidy levels and the additional 1000 FCFA was estimated to significantly reduce the recurring annual deficit. Given that health centers were obligated to use service fee and drug sale revenues from uninsured patients to cover short-term deficits created by enrollee drug consumption levels, annual in-kind drug or medical supply contributions from the CBI scheme was included as a provider payment attribute (#3). It was also decided that the mechanism for RBF payments would not replace any existing financing mechanisms, but would act as a top-up for capitation payments and would be directly linked to facility-level CBI enrollment outcomes. The RBF payment levels proposed in attribute #5 were based on the CBI scheme's budget limitations but also took into consideration what would be considered sufficient to motivate health workers given current enrollment rates.

Table 2: DCE insurance payment attributes and levels

Number	Payment element	Level	Payment modality
1	Level of capitation payment per individual	A	500 FCFA per child (under 15 years of age) and 1500 FCFA per adult (current level)
		B	1500 FCFA per child (under 15 years of age) and 1500 FCFA per adult. Children will continue to pay 500 FCFA, while a 1000 FCFA subsidy (financed by external partner) will be added for payment to facilities.
2	Capitation payment schedule	A	Payment one time per year (current schedule)
		B	Payment twice per year (each April and July)
		C	Payment four times per year (each quarter)
3	Annual allocation of medical supplies/equipment	A	None (current allocation)
		B	Basic medical supplies (cotton, alcohol, Bétadine, Sparadrap)
		C	Basic medical supplies (cotton, alcohol, Bétadine, Sparadrap) and medical equipment (tension meter, stethoscope, thermometer, scale, height gauge)

4	Reimbursement of service fees (consultation + medical acts)	A	None (current reimbursement)
		B	Reimbursement at 50% the price of service fees paid by non-enrollees
		C	Reimbursement at 100% the price of service fees paid by non-enrollees
5	Results-based financing (RBF) - indicator to determine size of payment	A	By individual enrolled (500 FCFA for new enrollees and 250 FCFA for re-enrollees)
		B	By household enrolled (2000 FCFA for newly enrolled households and 1000 FCFA for households who renew their membership)
		C	A monetary award for the three best health facilities, based on the increase in CBI coverage between the previous year and current year
6	Results-based financing (RBF) - recipient	A	Individual health agents (distribution of RBF among different team members will be pre-determined and applied district-wide)
		B	Global payment for health worker team (method of RBF distribution among different team members will be decided by the facility team members)
		C	Local health facility management committee will decide on method of RBF distribution among health workers and facility needs

FCFA: Franc Communauté Financière Africaine CFA, the local currency used in Burkina Faso. 500 FCFA = \$1 USD

The six attributes produced a full factorial of 486 possible alternatives. Ten questionnaire versions of 20 choice sets were created, with each choice set including two non-labeled alternatives, with no opt-out option (being able to choose the current payment system) being offered. Given that there were a limited number of health workers employed in Nouna Health District at the time of the survey (less than 200), the authors opted to include a larger number of choice sets than are usually applied in health settings. While health applications generally have used smaller numbers of choice sets; the use of 32 choice sets per respondent have been identified in the broader literature, with as many as 28 used in health applications [32]. Choice sets were selected using an experimental design developed in STATA 11 that was both balanced (i.e., levels of each attribute appear equally often) and orthogonal (i.e., all attributes are statistically independent of one another). The design also minimized overlap among attribute levels (i.e., attribute levels do not repeat themselves within choice

sets) and maximized utility balance (i.e., alternatives within choice sets have similar probabilities of being chosen). These properties are desirable design criteria, allowing for maximum estimation efficiency [32, 33]. A blocked design was applied to create 10 questionnaire versions, where versions were created by randomly assigning choice sets from the design to versions without replacement. Each block version was randomly assigned to 20 respondents, as empirical evidence shows that rarely more than 20 respondents per survey version are needed to estimate reliable models using discrete choice data [32]. Respondents were then asked to select their preferred payment alternative from each of 21 choice sets (20 random and 1 fixed). The fixed choice set offered two alternatives, with one being strictly dominant over the other.

The survey questionnaire included three sections. In the first section, information was collected on respondents' demographic and professional characteristics, including age, sex, ethnicity, current professional title



and qualifications, years worked at current facility and within Nouna district, and current employment at a healthcare facility within the CBI implementation zone. The second section presented the 20 randomized choice sets and 1 fixed task. In the third section, respondents were asked to simply choose their preferred payment option for each attribute included in the DCE.

The full questionnaire was pre-tested with 10 health workers and minor revisions were made. During the data collection process, the research team visited all 34 primary-care facilities and the 10 specialty services at the district hospital. All respondents took part in a detailed presentation on the CBI scheme and its payment system, as well as how to complete the questionnaire. First, the contextual background for the study was presented to participants, noting that the CBI scheme aimed to reform its provider payment system in 2011, and would like to better understand health worker preferences before making any changes. The current CBI payment system, particularly the breakdown of how capitation payments were derived from premiums, was then described in detail, followed by a presentation on the payment attributes and corresponding levels found in the questionnaire. For many participants, it was their first exposure to Results-based Financing, so attention was paid to highlighting the “linking payments to results” approach of RBF. One practice choice set was presented to each participant, who completed it in the presence of an interviewer, who was available to assist if questions arose. Questionnaires were then independently completed and submitted to the District Health Office within 10 days from the research team’s visit.

### Statistical analysis

After data entry, plausibility checks and data cleaning, we estimated sample summary statistics in STATA 11. As the response data was a dichotomous outcome (‘1’ was coded for being chosen and ‘0’ was coded for not being chosen), dummy coding was used to transform the attribute levels into L-1 dummy variables in which each dummy is set equal to 1 when the qualitative level is present and set equal to 0 if it is not. We estimated main-effects conditional logit models with payment-system attributes as the sole explanatory variables using STATA’s *clogit* command. The model allowed us to estimate how the choice among alternatives is affected by characteristics of the alternatives that vary across choice sets. The conditional logit model is an appropriate model when data includes both chosen alternatives and alternative-specific regressors [34], as is the case with DCE data. In the conditional logit model, the predicted probability of observing outcome  $m$  is:

$$\Pr(y_i = m | z_i) = \frac{\exp(z_{im}\gamma)}{\sum_{j=1}^J \exp(z_{ij}\gamma)} \quad \text{for } m=1 \text{ to } J$$

where  $z_m$  contains values of the independent variables for alternative  $m$  for case  $i$ .

For the alternative-specific regressors, the odds ratio is the multiplicative effect of being offered the selected attribute level relative to the baseline level on the odds of choosing any given alternative payment scenario [34].

To understand how respondents’ demographic and professional characteristics influenced their payment preferences, we also estimated models that included interaction terms for several variables with payment attribute variables. To test how gender influenced payment preferences, we included sex (male=1, female=0) in Model 2. Given that head nurses had substantially more involvement in the financial aspects of health facility management, in Model 3 we included an interaction term for the respondent’s title at the health facility (head nurse=1, other=0). To examine if preferences significantly differed between health workers working at primary care facilities and those working at the district hospital, in Model 4 we included level of care where the respondent was employed (primary-care facility=1, secondary-care facility=0). Finally, in order to understand how prior experience with CBI influenced respondents’ preferences, we included facility location in Model 5 (CBI intervention zone=1, outside CBI intervention zone=0). Inclusion of interaction terms in Models 2-5 also allowed for sensitivity analysis, allowing us to investigate the robustness of our main findings in comparison to the main-effects model (Model 1).

We repeated the analysis using a conditional logit model without respondents who chose the “inferior” alternative in the fixed task choice set, as we suspected their responses to be invalid due to their inability to select the explicitly superior alternative in the fixed task choice set. Finally, to ensure that the most appropriate model was used, we repeated the statistical analysis for the main effects model using random-effects logit (Model 6), fixed-effects logit (Model 7), and random-effects probit (Model 8). Results from these models are presented in Table 6.

## RESULTS

Out of 185 healthcare workers in Nouna district, 176 (95%) participated in the survey. Three respondents refused to participate, and 6 were absent during the data collection period. Demographic and professional characteristics of the sample are presented in Table 3.

Table 3: Socio-professional characteristics of respondents

Characteristic	Value	
	No.	%
Respondents	176	100
<b>Sex</b>		
Male	103	58
Female	73	41
<b>Age</b>		
< 30	44	25
30-34	77	44
35-40	36	20
40-44	9	5
45-50	6	3
> 50	4	2
<b>Ethnicity</b>		
Mossi	69	39
Bwaba	27	15
Samo	16	9
Dafing	14	8
Gurunsi	11	6
Other	39	22
<b>Current work location</b>		
Based at first-line facility (CSPS)	107	62
Based at second-line facility (CMA)	69	39
Facility in current CBI zone	101	57
Facility outside current CBI zone	75	43

Current professional title		
Doctor	4	2
Professional nurse w/ specialization (AS)	10	6
Facility head nurse (ICP)	32	18
Professional nurse w/ diploma (IDE)	19	11
Professional nurse (IB)	15	9
Professional midwife (SFE/ME)	9	5
Auxiliary midwife (AA)	34	19
General health worker (AIS)	29	16
Lab technician	15	9
Hospital chief accountant	1	1
Rather not say	8	5
Years employed in Nouna district		
<1	4	2
1-5	120	68
6-10	38	22
> 10	14	8

CSPS: Centre de Santé et Promotion Sociale  
 CMA : Centre Médical avec Antenne Chirurgical  
 AS : Attaché de Santé  
 ICP : Infirmier Chef de Poste  
 IDE : Infirmier Diplômé d'Etat  
 IB : Infirmier Breveté  
 SFE : Sage-Femme d'Etat  
 ME : Magnéticien d'Etat  
 AA : Accoucheuse Auxiliaire  
 AIS : Agent Itinérant de Santé

In the fixed task in which we presented the same choice set to all respondents, 13 (7%) chose among the two scenarios the objectively inferior one, which offered a lower premium level, a capitation schedule of one payment per year instead of two payments, no donation of medical supplies and equipment, and no reimbursement of services fees. Models estimated with and without these respondents did not differ substantively and so, consistent with current practice, these respondents were retained in the main analysis [35].

The preferred payment options of health workers for the CBI provider payment attributes from Section 3 in the questionnaire are presented in Table 4. The majority of health workers preferred a baseline capitation of 1500 FCFA for children (59%), capitation payments made quarterly (42%), an annual CBI provision of medical materials and equipment (77%), 100% reimbursement of service fees (61%), the number of individuals enrolled as an indicator to determine the size of the RBF payment (54%), and a global payment

to the facility health-worker team as the method of payment for the RBF mechanism (59%).

**Table 4: Health-worker unrestricted payment preferences**

Payment attribute	Level	Percent (%)
Capitation level	A	41
	B	59
Capitation Schedule	A	34
	B	24
	C	42
Provision of materials	A	11
	B	12
	C	77
Reimbursement of service fees	A	5
	B	34
	C	61
Results-based financing (RBF) - indicator to determine size of payment	A	54
	B	30
	C	16
Results-based financing (RBF) - Recipient	A	23
	B	59
	C	18

The odds ratios for selection of payment attributes estimated from the conditional logit models are shown in Table 5. In the main-effects model (Model 1), all attribute level alternatives were significantly different from zero except for household coverage as an evaluation indicator for the RBF mechanism (relative to

individual coverage as evaluation indicator). The main effects model had considerable overlap with the payment preferences respondents' noted in Table 4, both in preferences for attribute levels and signs of the odds ratios.

Table 5: Conditional logit model estimates

Payment attribute alternatives	aOR <sup>a</sup>	s.e.	% change	aOR	s.e.	% change	aOR	s.e.	% change
	Model 1			Model 2			Model 3		
Capitation plus subsidy	1.16***	(0.039)	16.0	1.05	(0.052)	5.0	1.15***	(0.044)	15.5
Capitation disbursed twice per year	1.18***	(0.046)	17.6	1.19**	(0.069)	18.7	1.12**	(0.046)	11.9
Capitation disbursed quarterly	1.08*	(0.041)	7.9	1.05	(0.061)	4.8	1.09*	(0.045)	9.5
Allocation of medical supplies	1.12**	(0.041)	11.7	1.11	(0.068)	11.2	1.09*	(0.045)	8.7
Allocation of medical supplies + equipment	1.47***	(0.054)	46.7	1.40***	(0.076)	40.2	1.44***	(0.058)	44.3
50% reimbursement of service fees	1.19***	(0.051)	19.0	1.27***	(0.081)	27.4	1.21***	(0.055)	21.4
100% reimbursement of service fees	1.49***	(0.075)	49.3	1.34***	(0.103)	34.5	1.41***	(0.077)	41.5
RBF <sup>c</sup> indicator: households enrolled	0.97	(0.033)	-3.4	0.93	(0.049)	-7.3	0.97	(0.036)	-3.3
RBF indicator: greatest change in coverage	0.86***	(0.029)	-14.1	0.89*	(0.043)	-11.4	0.90**	(0.032)	-9.7
RBF recipient: global payment to health team	1.09*	(0.043)	9.0	1.19***	(0.063)	19.1	1.12**	(0.048)	12.4
RBF recipient: health facility management team	0.86***	(0.039)	-13.8	0.84**	(0.056)	-16.5	0.85**	(0.042)	-14.8
<b>Interaction terms</b>				<b>Male</b>			<b>Head nurse</b>		
Capitation plus subsidy	-	-	-	1.18*	(0.079)	18.4	1.02	(0.084)	2.2
Capitation disbursed twice per year	-	-	-	0.98	(0.076)	-1.9	1.37**	(0.151)	37.5

Capitation disbursed quarterly	-	-	-	1.06	(0.081)	5.5	0.92	(0.095)	-7.6
Allocation of medical supplies	-	-	-	1.01	(0.077)	1.2	1.18*	(0.101)	18.4
Allocation of medical supplies + equipment	-	-	-	1.09	(0.080)	8.6	1.10	(0.111)	10.2
50% reimbursement of service fees	-	-	-	0.89	(0.076)	-11.2	0.89	(0.120)	-10.7
100% reimbursement of service fees	-	-	-	1.20	(0.121)	20.1	1.41*	(0.188)	40.9
RBF indicator: households enrolled	-	-	-	1.07	(0.073)	7.0	1.02	(0.086)	1.7
RBF indicator: greatest change in coverage	-	-	-	0.95	(0.064)	-4.9	0.72***	(0.070)	-27.7
RBF recipient: global payment to health team	-	-	-	0.86	(0.067)	-13.8	0.84	(0.091)	-16.5
RBF recipient: health facility management team	-	-	-	1.05	(0.095)	5.3	1.10	(0.130)	9.6
<b>No. of respondents</b>	<b>176</b>			<b>176</b>			<b>176</b>		
<b>No. of observations</b>	<b>7392</b>			<b>7392</b>			<b>7392</b>		
<b>Log-likelihood</b>	<b>-4373</b>			<b>-4360</b>			<b>-4350</b>		
<b>Wald <math>\chi^2</math></b>	<b>3045</b>			<b>321.9</b>			<b>426.7</b>		
<b>Pseudo R-squared</b>	<b>0.080</b>			<b>0.083</b>			<b>0.085</b>		

aOR: adjusted odds ratio

s.e.: standard error

RBF: results-based financing

In the main-effects model, 100% reimbursement of service fees (adjusted odds ratio (aOR) 1.49,  $p < 0.001$ ) and donation of medical supplies and equipment (aOR 1.47,  $p < 0.001$ ) had the highest impact on the probability of a payment scenario being chosen. For capitation payment schedule, capitation payments being made twice per year had a greater impact on alternative selection than payments made four times per year (aOR 1.18,  $p < 0.001$  vs. aOR 1.08,  $p = 0.046$ ). For both the attributes "CBI donations of medical supplies and equipment" (level 2 aOR 1.12,  $p = 0.003$ ; level 3 aOR 1.47,  $p < 0.001$ ) and "reimbursement of medical fees" (level 2 aOR 1.19,  $p < 0.001$ ; level 3 aOR 1.49,  $p < 0.001$ ), an increase in attribute levels increased the odds of choosing a given scenario. For the results-based financing mechanism, both household coverage (aOR 0.97,  $p = 0.311$ ) and an annual prize to the three facilities with the greatest increase in coverage (aOR 0.86,  $p < 0.001$ ) decreased the odds of a given scenario being chosen (relative to the number of individuals enrolled as RBF indicator to determine payment size). For the RBF mechanism recipient, the local health facility management team as recipient substantially decreased the odds of a payment scenario being selected (aOR 0.86,  $p = 0.001$ ), while a global payment to the facility health worker team increased the odds of scenario selection (aOR 1.09,  $p = 0.03$ ) (both relative to the CBI scheme pre-determining fund allocation among health facility staff). The only attribute level without a statistically significant effect on alternative selection was household coverage as an indicator of evaluation for the RBF mechanism.

The estimates using random- and fixed-effects logit and random-effects probit were not substantially different from the results of the conditional logit model, and provided poorer fits than using the conditional logit model (Table 6).

For the model that estimated interaction terms between sex and payment attributes (Model 2), the only interaction term that had a significant effect on alternative selection was that between being male and increased capitation payment through child subsidies (aOR 1.18,  $p = 0.003$ ). Being male had a positive effect on choosing an increased premium level. The model that tested interaction terms between professional qualifications and preferences for

payment attributes (Model 3) included several odds ratios that were statistically significant. Being a facility head nurse had a positive impact on choosing a payment schedule of twice per year (aOR 1.37,  $p = 0.004$ ), donation of medical supplies by the CBI (aOR 1.18,  $p = 0.047$ ), and the full reimbursement of service fees (aOR 1.40,  $p = 0.01$ ), but had a strong negative effect on the odds of selecting a scenario that included an annual prize for the greatest change in CBI coverage as an RBF evaluation indicator (aOR 0.72,  $p = 0.01$ ). In the final two models (Models 4 and 5), none of the interaction terms significantly affected the odds of a scenario being selected. Estimates for these models are thus not presented in our results.

## Discussion

Ensuring that health workers are sufficiently motivated to attain health system goals is a key component to successful health-sector interventions [36, 37]. Previous studies have shown that health workers' dissatisfaction with payment mechanisms in CBI can lead to low coverage, because health workers can influence the uptake of insurance in the population from which they draw their patients [13, 23, 38, 39]. Our results provide new information about how health workers in Burkina Faso value different provider payment mechanisms in the context of a CBI scheme, where coverage has been low since the inception of the scheme, and there is strong evidence that health-worker dissatisfaction with the scheme has contributed to the low coverage.

We find that reimbursement of service fees and CBI contributions for medical supplies and equipment were the attributes of the insurance payment system valued most by health workers. For a proposed RBF mechanism linking health worker financial incentives to insurance coverage, health workers significantly preferred to be paid a flat payment for each individual who enrolled in their catchment area as opposed to a competitive prize for the health centers that achieved the largest coverage gains. Health workers were also strongly opposed to payment of the RBF to the health-facility account managed by the local health management committee.

Table 6: Random and Fixed Effects Models

	Random effects logit		Fixed effects logit		Random effects probit	
	Model 6		Model 7		Model 8	
	aOR <sup>a</sup>	s.e.	aOR <sup>a</sup>	s.e.	aOR <sup>a</sup>	s.e.
Capitation plus subsidy	1.16***	(0.029)	1.16***	(0.029)	1.09***	(0.017)
Capitation disbursed semesterly	1.18***	(0.044)	1.18***	(0.044)	1.10***	(0.025)
Capitation disbursed quarterly	1.08*	(0.038)	1.08*	(0.038)	1.05*	(0.023)
Allocation of medical supplies	1.11**	(0.040)	1.12**	(0.040)	1.07**	(0.024)
Allocation of medical supplies + equipment	1.48***	(0.050)	1.47***	(0.050)	1.27***	(0.027)
50% reimbursement of service fees	1.20***	(0.042)	1.19***	(0.042)	1.12***	(0.024)
100% reimbursement of service fees	1.49***	(0.052)	1.49***	(0.052)	1.28***	(0.027)
RBF indicator: households enrolled	0.96	(0.034)	0.97	(0.035)	0.97	(0.022)
RBF indicator: greatest change in enrollment rate	0.86***	(0.031)	0.86***	(0.030)	0.91***	(0.020)
RBF recipient: global payment to health team	1.10**	(0.037)	1.09*	(0.037)	1.06**	(0.022)
RBF recipient: health facility management team	0.85***	(0.032)	0.86***	(0.032)	0.91***	(0.021)
Questionnaire version	0.98*	(0.008)			0.99*	(0.005)
<b>No. of observations</b>	<b>7,392</b>		<b>7,392</b>		<b>7,392</b>	
<b>No. of respondents</b>	<b>176</b>		<b>176</b>		<b>176</b>	
<b>Likelihood ratio X2</b>	<b>681.9</b>		<b>761.7</b>		<b>727.6</b>	
<b>Log-likelihood</b>	<b>-4738</b>		<b>-4373</b>		<b>-4738</b>	

aOR: adjusted odds ratio

s.e.: standard error

RBF: results-based financing



### Capitation payments

Capitation payment may help to control costs by transferring health-expenditure risk to the health workers or facilities [40]. In the case of the *AMBC* scheme in Nouna, health expenditure deficits incurred by contracted facilities are reimbursed at the end of each year. As a result, health-expenditure risk is not transferred to facilities, but facilities commonly suffer negative consequences of temporary revenue shortfalls, as they may not be able to restock drugs or supplies until the annual reimbursement is paid. In previous years, due to depleted funds several facilities have been obligated to restock drugs on credit from the District Health Office and were only able to pay off their loans after reimbursement by the CBI [21, 22]. It is likely that replacing the annual capitation payment with a bi-annual one - as strongly preferred by the health workers in our study - will reduce fear of facility bankruptcy and drug stock-outs. Somewhat surprisingly, once controlling for other payment attributes, respondents preferred payments in two installments over four. One reason for this may be the fact that enrollment continues to be limited and premiums low; leading to small capitation payments. If capitation payments were divided into four installments, they may be considered too insignificant for planning purchases or investments.

### Service fees

In a previous qualitative study on health worker perceptions on the CBI scheme, providers expressed concern that increased CBI coverage would lead to higher healthcare utilization rates [20]. In the past, high healthcare utilization rates led to challenges in ensuring uninterrupted basic medical supplies for consultations and services. As consultation and service fees are neither directly paid by CBI enrollees nor reimbursed by the insurance scheme, health workers feared that any increase in CBI coverage of the population from which their facilities draw their patients could decrease facility revenue, leading to less disposable income to purchase basic medical supplies. Our DCE provides further evidence for this fear: Reimbursement of service fees and an annual provision of medical supplies and materials by the CBI scheme had the greatest effect on whether a payment scenario was chosen within a choice set, leading to the recommendation to diversify provider payment in the CBI to include these mechanisms.

### Health-worker characteristics and preferences

Our DCE analysis shows that sex does not play a particular role in health worker preferences for CBI payment attributes, except in the preference for an increase in the capitation payment for children. Men significantly preferred an increase in the capitation per child, while women did not, which might imply that

women were more likely to fear that such an increase could in the long-term reduce children's access to health insurance and healthcare.

The CBI payment preferences for head nurses were significantly different from other health workers for several payment attributes. Head nurses significantly preferred capitation payments made twice instead of once per year, while other health workers did not share this preference. Head nurses also preferred RBF payments to be paid directly to the health worker team in a lump-sum payment, as opposed to a method of distribution predetermined by the CBI management committee or being paid to the local management committee. Lastly, head nurses were particularly opposed to a competition-based RBF evaluation mechanism. These differences in payment preferences between head nurses and other health workers may stem from head nurses' particular awareness of factors affecting the financial status of their facilities. Facility head nurses are also likely to understand the functioning of the CBI payment scheme better than other health workers.

It is plausible that this increased knowledge, in particular the abovementioned concerns regarding the current capitation payment schedule, may contribute to their preference for payments being made in both April and July. Regarding their preference for RBF payments being made directly to the health worker team, head nurses may view the opposing alternatives as leading to a reduction in their autonomy of how to utilize these new payments.

Neither the level of care, in which the respondent worked, nor whether the respondent was employed in the current CBI implementation zone, significantly affected the type of payment mechanism preferred by health workers in our study. Previous studies have noted that health-worker preferences and motivation are strongly affected by past experiences with insurance and the level of care, at which a worker is employed [41]. It is likely that we did not find such effects, because our variables on level of care and CBI experience only capture the time of the survey and not past work experiences, which for many health workers in this community have included levels of care other than their current levels and facilities both with and without CBI contracts.

### Policy changes based on the DCE results

Upon completing analysis of the DCE data in September 2010, the authors conducted a series of meetings with local decision-makers involved with the *AMBC* scheme in Nouna, in order to disseminate results and discuss policy implications. Meetings were held with the CBI Management Team, the CBI Community Representation Committee, the Scientific Committee of Nouna Health Research Centre, the

District Health Office, and the head nurses from the primary-care facilities contracted with the scheme. Presentations were made to each stakeholder highlighting the key results of the DCE. These presentations were followed by brainstorming and discussion sessions on how to revise the payment system for the upcoming enrollment campaign in 2011. Based on the discussions of the DCE findings in these meetings, a new payment scheme, which closely reflects the health-worker preferences for payment mechanisms elicited in the DCE, was adopted in October 2010 (see Table 6). Health workers will now be paid in two installments (April and July each year); capitation levels for children will increase to 1,500 FCFA (\$3 USD); and consultation fees will be fully reimbursed at the end of each year. No provision of medical supplies will be provided by the scheme, as

increased revenue generated from the reimbursement of consultation fees will be used to cover the cost of supplies. Finally, payments for the results-based financing mechanism will be calculated based on each individual who enrolls in the primary-care facility catchment area during the annual enrollment period. Facilities will be paid 200 FCFA (\$0.40 USD) per new enrollee and 100 FCFA (\$0.20 USD) per re-enrollee. During the stakeholder discussions, several participants stressed the importance of including the local health management committee in the payment process, and that the health worker team should not be entitled to 100% of the RBF payments. Thus the decision was made to earmark 25% of the RBF payments for facility improvement funds, which would be managed by the local health management committee.

**Table 7: Changes in CBI payment mechanisms**

Payment attribute	Previous payment mechanism (2004-2010)	New payment mechanism (2011)
Capitation payment level	The enrollment premium is 500 FCFA (\$1 USD) for children under 15 and 1500 FCFA (\$3 USD) for adults 15 and older.	The enrollment premium is 500 FCFA (\$1 USD) for children under 15 and 1500 FCFA (\$3 USD) for adults 15 and older. A 1000 FCFA subsidy for children will be added for each child enrolled, resulting a capitation level of 1500 FCFA for children and 1500 FCFA for adults.
Capitation payment schedule	The capitation is paid once a year, normally in July or August.	The capitation is paid twice per year, once in April (after the first three months of the enrollment period) and once in July (after the closing of the enrollment period).
Allocation of medical supplies and equipment	No medical supplies or medical equipment are provided to the facilities that are contracted with the CBI scheme.	No change from previous mechanism.
Reimbursement of consultation and service fees	None.	100% of consultation fees of CBI enrollees will be calculated at the end of the calendar year and reimbursed to health facilities during the first quarter of the following calendar year.
Capitation deficit reimbursement	If enrollees are prescribed more drugs than the capitation covers, the deficit is calculated at the end of each calendar year and reimbursed during the first quarter of the following calendar year.	No change from previous mechanism.
Results-based financing (RBF) provider payment mechanism	None.	For each individual enrolled in a primary-care facility (CSPS) catchment area, the primary-care facilities will be paid 200 FCFA (\$0.40 USD) per new enrollee and 100 FCFA (\$0.20 USD) per re-enrollee. Payments will be divided between a direct global payment to the facility health worker team (75%) and the health facility account (25%), and will be paid in April and July. The secondary-care facility (CMA) will not receive any RBF payments.

FCFA: Franc Communauté Financière Africaine, the local currency used in Burkina Faso. 500 FCFA = \$1 USD

CBI: Community-based health insurance

CSPS: Centre de Santé et Promotion Sociale

CMA: Centre Médical avec Antenne Chirurgical

While the new payment mechanisms will be introduced in January 2011, the CBI management team has decided to introduce it in a staggered fashion, first in half (7) of the primary-care facilities and only later in all of the 14 facilities. The initial assignment to the change in provider payment mechanisms will be randomized at the facility level. Prior to introducing the new payment system, alongside the discrete choice experiment, in-depth interviews and a quantitative "satisfaction survey" were conducted to assess workers' satisfaction in relation to the applied payment system. Facility-based patient exit interviews were also conducted to measure client satisfaction and health worker behavior during consultations, with particular focus on whether health workers promoted CBI during patient visits. The randomized assignment will provide the opportunity to confirm the expectations raised by this study and to measure the effect of the changes on CBI coverage, provider satisfaction, and patient satisfaction in a randomized controlled experiment through conducting follow-up rounds of data collection.

## CONCLUSIONS

DCE studies are a cost-effective way of obtaining data for program planning and policy making [42-44]. While DCE have been used to elicit stated preferences for patients in a variety of settings [43-45], they have not previously been used to elicit health-worker preferences for provider payment mechanisms. We demonstrate that DCE, in combination with focus groups and in-depth interviews, can be of great use in the process of choosing provider payment mechanisms in developing countries, potentially leading to better alignment between health-worker incentives and health-system goals. The changes in the provider payment mechanisms that resulted from our DCE are expected to increase health-worker support for the CBI scheme and to lead to increased CBI coverage, improving the long-term performance of the scheme.

## Abbreviations

CBI: Community-based health insurance; AMBC: Assurance Maladie à Base Communautaire; DCE: Discrete Choice Experiment; RBF: Results-based Financing; FCFA: Franc Communauté Financière Africaine CFA, USD: United States Dollars; aOR: adjusted odds ratio; s.e.: standard error.

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