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Cambodia: Using Contracting to Reduce Inequity in Primary Health Care Delivery

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In the mid-1990s, war and political upheaval had left Cambodia with limited health care infrastructure, especially in rural areas. The numbers of paramedical and management staff were adequate, but training and quality of care were inconsistent, and morale was low (Bhushan, Keller, and Schwartz 2002). The primary health care system was unable to deliver an adequate level of services. For example, only 39 percent of children between 12 and 23 months of age were fully immunized (NIS and ORC Macro 2000).

To address these issues, the Cambodian government obtained a loan from the Asian Development Bank (ADB) for the restructuring and broadening of the primary health care system through the development and implementation by the Ministry of Health of a coverage plan modeled on World Health Organization (WHO) guidelines. The plan included the construction or rehabilitation of health centers, each designed to serve about 10,000 people, and the merger of small administrative districts into operational districts with an average population of about 150,000. It also defined a minimum package of activities for health centers. This consisted of basic preventive and curative services, including immunization, birth spacing, antenatal care, provision of micronutrients, and simple curative care for diarrhea, acute respiratory tract infections, and tuberculosis.

Design of the Contracting Test

As part of the overall implementation plan funded by the ADB loan, the Ministry of Health conducted a large-scale test of contracting with non-

governmental organizations (NGOs) for the delivery of primary health care services. In 1997, prior to the construction of health facilities and the procurement of equipment, a precontract baseline household survey was carried out in candidate rural districts. The ministry awarded NGO contracts in five districts; for comparison, four districts where health services were provided by the government were included in the trial. The contracting test started at the beginning of 1999. A follow-up household survey was conducted two and a half years later, in the summer of 2001. The information from the baseline and follow-up surveys comprises a unique data set for comparing the distributional equity of primary health care services provided by contractors and by government.¹

To make the test districts as comparable as possible, the following were excluded as candidate districts: districts included in the Ministry of Health Accelerated District Development program, which were to receive additional support; districts already receiving significant donor assistance; and districts that contained provincial capitals, which receive more government funding than other districts because of their provincial hospitals.

The districts were randomly assigned to one of three health care delivery models:

- *Contracting-out.* The contractors had complete line responsibility for service delivery, including hiring, firing, and setting wages; procuring and distributing essential drugs and supplies; and organizing and staffing health facilities.
- *Contracting-in.* The contractors worked within the Ministry of Health system to strengthen the existing district administrative structure. The contractors could not hire or fire health workers, although they could request their transfer. Drugs and supplies were provided through normal Ministry of Health channels. In addition, the contractor received a nominal budget supplement for staff incentives and operating expenses.
- *Government provision.* The government district health management team (DHMT) continued to manage the services. Drugs and supplies were provided through normal Ministry of Health channels. As in contracted-in districts, the DHMT received the nominal budget supplement for staff incentives and operating expenses.

An international competitive bidding process was used to select contractors for the contracted-out and contracted-in districts. Precisely defined and objectively verifiable health care service indicators were measured for all contracted and government districts, using the data collected from the base-

line survey, and well-defined goals for improvement in service coverage and coverage of the poor were set. Precontract performance goals were established for child immunization and vitamin A provision, antenatal care, delivery by a trained birth attendant, delivery in a health facility, and knowledge and use of birth spacing in each district. More important for this study, an equity goal of targeting services to the poorest half of the population was mandated for all districts.

At the time of the precontract survey, in all candidate districts less than 20 percent of planned health facilities were functional, and health service coverage was poor. Prior to bidding, all potential contractors and the managers of the government districts were given the precontract indicators for each district and the coverage and equity targets to be achieved by the end of the four-year test.

Contract awards were based on the quality of the technical proposal and on price. The nine operational districts included in the contracting test consisted of two contracted-out, three contracted-in, and four government districts. The test districts were spatially separated, in three different provinces. Each had a population of between 100,000 and nearly 200,000, for a total of over 1.25 million people (table 8.1).

NGOs were awarded four-year contracts at a fixed annual price per capita for administering and providing specific primary health care ser-

Table 8.1. *Districts Selected for Cambodia's Health Care Contracting Test*

<i>Health care model and district</i>	<i>Province</i>	<i>Population (2001)</i>
<i>Contracted-out</i>		
Ang Rokar	Takeo	109,459
Memut	Kampong Cham	109,321
<i>Contracted-in</i>		
Cheung Prey	Kampong Cham	167,725
Kirivong	Takeo	197,623
Pearaing	Prey Veng	188,854
<i>Government</i>		
Bati	Takeo	164,006
Kamchay Mear	Prey Veng	112,403
Kruoch Chmar	Kampong Cham	102,639
Preah Sdach	Prey Veng	110,013

Source: Ministry of Health, Cambodia.

vices. All winning bidders were international NGOs with previous experience working in Cambodia. Contracted-out districts were responsible for purchasing their own supplies and materials and for paying labor costs. These expenses were included in the Ministry of Health budget for contracted-in and government districts. Construction and renovation of health centers, referral (district) hospitals, and district health offices, as well as furniture and equipment, were provided for all nine test districts and were not included as expenditures under the contracts. The Ministry of Health retains ownership of these assets.

Average annual recurrent expenditure per capita during the two-and-a-half year period was \$3.88 for the contracted-out districts; \$2.40 for the contracted-in districts; and \$1.65 for the government districts (table 8.2). The difference in expenditure levels between the contracted and government districts is largely accounted for by NGO technical assistance provided by district managers. Net of district management technical assistance, expenditure per capita for contracted-in districts (\$1.63) was nearly the same as for government districts (\$1.65); the higher expenditure level for contracted-out districts (\$2.60) is largely attributable to higher staff salaries.

Research Questions

This study addresses the following questions:

1. Were primary health care services equally distributed before and after the contracting test? Which type of district made the largest

Table 8.2. Average Annual Recurrent Expenditure Per Capita for Health Care Models in Contracting Test, Cambodia (U.S. dollars)

<i>Expenditure category</i>	<i>Contracted-out</i>	<i>Contracted-in</i>	<i>Government provision</i>
NGO technical assistance	1.28	0.77	0.0
Staff salaries ^a	1.32	0.55	0.53
Drugs, supplies, and operating expenses ^b	1.28	1.08	1.12
<i>Total</i>	<i>3.88</i>	<i>2.40</i>	<i>1.65</i>

Source: Schwartz 2001.

a. Salaries, bonuses, and other allowances.

b. Drugs, medical supplies, travel, fuel, per diem, office supplies, communications, building and vehicle maintenance and repair, and utilities.

gains in reaching the poor between the pre- and postcontracting surveys?

As is often the case in developing countries, we would expect an unequal distribution of health care services prior to the contracting test. Using bivariate analysis we examine the equity of the distribution of health care services before and after the trial in each test district, as well as the direction and magnitude of change during the trial, and compare contracted districts with government districts.

2. What factors other than wealth are related to an equitable distribution of primary health care services? When these factors are controlled, did the poor receive more health care services than the nonpoor in contracted or in government districts? What are the policy implications of these findings?

District managers faced different budget constraints, different baseline values for coverage and distribution of services, and possible differences in population demographics, all of which may have influenced resource allocation decisions. Recognizing these differences, we use multivariate methods to isolate the effect of contracting on distribution of services to the poor while controlling for these other related factors.

Methodology

To identify the poor, principal component analysis (PCA) is used to construct a wealth index of households. Concentration indexes and multivariate regressions are employed to test whether the distribution of health services to the poor improved under contracting.

Wealth Index

In the absence of income or consumption data from the household surveys, household ownership of assets, which serves as a proxy for household wealth, is used as the basis for constructing a wealth index for the study. To enable comparisons between the baseline and follow-up surveys, the types of household asset used to construct the index were restricted to those covered by questions asked in both household surveys: whether there was a permanent type of roof on the house (brick, cement, metal, or a combination of these materials) and whether anyone in the household owned a bicycle, radio, motorcycle, television, oxcart, motorboat, or at least one cow.

The wealth index was constructed by coding each asset as equal to one if the household had the asset and equal to zero if it did not. Principal component analysis, which searches for the linear combination of the assets that yields the maximum possible variance in the data, was conducted, and the first principal component was retained (Filmer and Pritchett 1999; Wagstaff 2002). The PCA wealth index was used to rank households (and thereby the individuals in each household) in the sample as a whole for each of the two surveys and was constructed separately for each of the nine districts for each survey.²

We follow the approach used by Wagstaff and Watanabe (2002), using artificial convenient regressions to test for any statistically significant differences between the equity results from ranking individuals within each district and those obtained by ranking individuals in the nine districts taken as a whole. The results of the tests indicate no statistically significant differences. That is, differences in the concentration indexes for the nine districts based on comparison of a wealth ranking of households from all districts with a wealth ranking of the households within each district are not statistically significant. In absolute terms, an individual ranked as poor in one district would be ranked as poor in all other districts. This suggests that observed differences in the equity of health care services between districts are not attributable to differences in wealth across districts and implies that at the time of the two surveys the populations in the districts made up a fairly homogeneous group of rural households as measured by asset ownership.³

Concentration Indexes

Bivariate concentration indexes were calculated to quantify the degree of economic inequality for health care service indicators across districts and across surveys. The Newey-West regression estimator, which corrects the standard error of the estimated concentration index for serial correlation of the fractional rank variable, as well as any heteroscedasticity, was used (Wagstaff, Paci, and van Doorslaer 1991; Newey and West 1994; Kakwani, Wagstaff, and van Doorslaer 1997).

Need-Standardized Use of Public Health Facilities

Assessment of the use of public health facilities for treatment of illness requires standardization to correct for differences in the need to seek health care at a public health facility. We assume that need for other health care services (child immunization, antenatal care, birth delivery by a trained professional, and so on) is the same for all individuals targeted for each of these

types of care. For the use of public health facilities for treatment of illness, we follow the procedure developed by Wagstaff and van Doorslaer (2000) to take into account individuals' need for medical care. This procedure uses a two-step indirect standardization, with the estimation of a nonlinear prediction equation in the first step, to generate values of need-expected curative health care at a public facility.

To proxy the need for medical care, we include demographic dummy variables for gender and age categories in the estimation of a first-stage probit model for all individuals in each survey in order to obtain predictions of the probability that an individual will choose a public health facility for treatment of an illness.⁴ The Newey-West regression estimator is used in the second step to obtain (a) the estimated concentration index and its standard error of the need-expected probability of seeking health care at a public health facility and (b) the indirectly standardized concentration index.⁵

Multivariate Method

We examine the relative weight of factors that may be related to the receipt of health services, using descriptive probit regressions. In this analysis, no attempt is made to model all the factors that predict the receipt of services in each survey. Rather, we use the multivariate analysis as an extension to confirm the bivariate analysis and to test whether the simple correlations between wealth and receipt of services and between contracted and non-contracted districts hold when controlling for other related factors such as district expenditures, initial coverage levels, and population demographics. A probit regression is estimated for the pooled precontract (1997) and evaluation (2001) surveys for each health service indicator.

Nature and Source of Data

The baseline household survey was carried out in May–June 1997; the follow-up survey was conducted in June–August 2001, two and a half years after the contractors were in place in the first quarter of 1998.⁶ The follow-up household survey used the same baseline survey instrument, with a few exceptions.

The Sample

A standard cluster survey methodology was used for the household surveys. The sample size was calculated so as to allow each district to be compared with its own performance statistics at the time of the follow-up

survey. In each district, 30 villages (clusters) were selected randomly, stratified by health center catchment area with a probability proportionate to population size. The total population of each district was divided by 30 (clusters), giving a sampling interval of k , where each k th village was selected as a survey cluster. The probability of a village's being selected was thus proportional to the size of the population of that village.⁷ The same villages sampled in the baseline survey were resurveyed in the 2001 follow-up survey.

Sample sizes were calculated to yield reliable estimates of the immunization status of children age 12–23 months, antenatal care provision, and type of birth attendant. For immunization, 7 children age 12–23 months were required from each cluster to provide 210 children per district for estimates ± 10 percent, with a 95 percent confidence interval. For antenatal and birth provider information, 7 women who had given birth within the prior 12 months (including stillbirths but excluding miscarriages) were required from each cluster, yielding 210 women in each district for estimates ± 10 percent, with a 95 percent confidence interval.⁸ Thus, in each district about 420 households were sampled, consisting of about 210 households with a child between 12 and 23 months old and about 210 households with a woman who had given birth in the previous year. There was some overlapping of households where both conditions were met.

In addition to information on child immunization, antenatal care, and birth provider, data were collected from all sampled households on socioeconomic and demographic characteristics, as well as on use of curative health care services by all individuals in each household. Because the average household size in both surveys is between five and six individuals, sample sizes, depending on the health care indicator, range from about 210 children, 210 women, and 420 households to more than 2,000 individuals in each district. In all, more than 20,000 individuals are included in each household survey (table 8.3).

Health Care Indicators

The contractual indicators used for service coverage are consistent with the priority topics that have a prominent place in the United Nations Millennium Development Goals (MDGs) and that appear frequently in World Bank poverty reduction strategy papers (PRSPs). These focus on preventive child and maternal health care—for example, child immunization and vitamin A provision, antenatal care, delivery by a trained birth attendant, delivery in a health facility, and use and knowledge of modern birth-spacing

Table 8.3. *Sample Sizes, Cambodia Study*

	<i>Child age 12–23 months</i>		<i>Child age 6–59 months</i>		<i>Women with birth in prior 12 months</i>		<i>Women with child age 6–23 months</i>		<i>Individuals reported sick in past 4 weeks</i>		<i>Total individuals</i>		<i>Total households</i>	
	<i>1997</i>	<i>2001</i>	<i>1997</i>	<i>2001</i>	<i>1997</i>	<i>2001</i>	<i>1997</i>	<i>2001</i>	<i>1997</i>	<i>2001</i>	<i>1997</i>	<i>2001</i>	<i>1997</i>	<i>2001</i>
<i>Health care model and district</i>														
<i>Contracted-out</i>														
Ang Rokar	203	208	329	346	211	210	418	408	496	616	2,245	2,275	418	408
Memut	197	208	361	351	199	209	399	414	523	529	2,235	2,403	399	414
<i>Contracted-in</i>														
Cheung Prey	196	209	371	353	212	210	409	410	510	558	2,352	2,267	409	410
Kirivong	196	207	333	342	205	210	407	409	404	543	2,291	2,388	407	409
Pearaing	209	203	343	333	205	210	415	413	569	471	2,408	2,248	415	413
<i>Government provision</i>														
Bati	206	209	367	348	211	210	417	412	549	591	2,369	2,331	417	412
Kamchay Mear	206	207	341	328	202	210	411	416	533	428	2,223	2,019	411	416
Kruoch Chmar	218	205	380	345	201	209	419	415	267	605	2,325	2,323	419	415
Preah Sdach	194	204	306	342	220	210	418	414	606	512	2,589	2,130	418	414
<i>Total</i>	<i>1,825</i>	<i>1,860</i>	<i>3,131</i>	<i>3,088</i>	<i>1,866</i>	<i>1,888</i>	<i>3,713</i>	<i>3,711</i>	<i>4,457</i>	<i>4,853</i>	<i>21,037</i>	<i>20,384</i>	<i>3,713</i>	<i>3,711</i>

Source: Keller and Schwartz 2001.

methods. No specific coverage goal was given for the use of public health care facilities for curative care—only that the poor be targeted for services. Table 8.4 provides definitions of the health care indicators included in the contracts and goals.

Baseline and follow-up values for the health care service indicators are given in table 8.5. At the time of the follow-up survey in mid-2001, well before completion of the contracting test at the end of 2002, most districts had already achieved several of the predefined contractual goals, which many people had thought overambitious at the time the contracts were awarded. Initial large investments of capital and labor were likely responsible for much of this early success, but returns to these investments were increasingly marginal. Still, the increases in indicators achieved by mid-2001 were impressive (figure 8.1; tables 8.5 and 8.6). The overall average in

Table 8.4. *Health Service Indicators: Definitions and Coverage Goals, Contracting-Out Test, Cambodia*

<i>Indicator</i>	<i>Definition</i>	<i>Goal (percent)</i>
Fully immunized child (FIC)	Children age 12–23 months fully immunized.	70
Vitamin A (VITA)	High-dose vitamin A received twice in the past 12 months by children age 6–59 months.	70
Antenatal care (ANC)	At least two antenatal care visits, with blood pressure measurement at least once, for women who gave birth in the prior year.	50
Delivery by trained professional (TDEL)	Birth attendant was a qualified nurse, midwife, doctor, or medical assistant for women with a delivery in the past year.	50
Delivery in a health facility (FDEL)	Birth was in a private or public health facility for women with a delivery in the past year.	10
Use of modern birth-spacing method (MBS)	Women with a live child age 6–23 months currently using a modern method of birth spacing.	30
Knowledge of modern birth spacing (KBS)	Women who gave birth in the prior 24 months know four or more modern birth-spacing methods and where to obtain them.	70
Use of public health care facilities (USE)	Use of district public health care facilities (district hospital or primary health care center) for illness in the prior four weeks.	Increase ^a

Source: Ministry of Health, Cambodia.

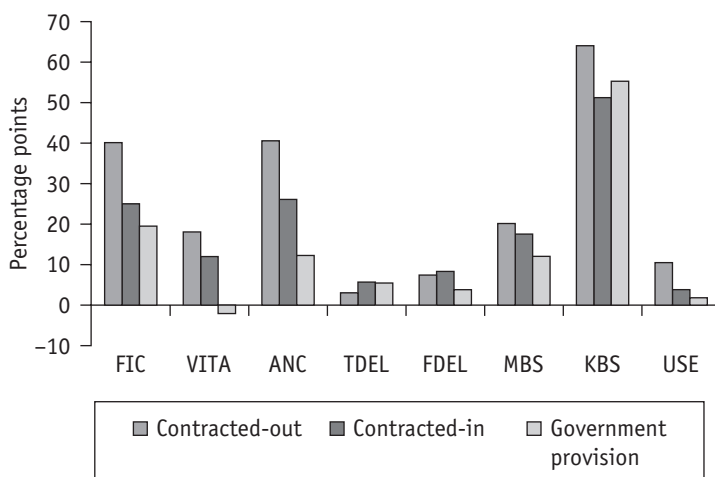
a. Percentage goal not specified.

Table 8.5. Health Care Service Coverage by District and Indicator, Cambodia, 1997 and 2001 Surveys (percent)

Health care model and district	Fully immunized child (FIC)		Vitamin A (VITA)		Antenatal care (ANC)		Delivery by trained professional (TDEL)		Delivery in health facility (FDEL)		Use of modern birth-spacing method (MBS)		Knowledge of modern birth spacing (KBS)		Use of public health care facilities (USE)	
	1997	2001	1997	2001	1997	2001	1997	2001	1997	2001	1997	2001	1997	2001	1997	2001
<i>Contracted-out</i>																
Ang Rokar	27.1	57.2	28.5	53.8	20.4	65.2	43.6	42.4	9.9	16.2	8.9	29.3	11.7	90.7	0.4	15.3
Memut	23.3	73.6	47.1	57.8	6.1	42.1	18.9	25.7	2.0	11.0	17.3	37.1	19.5	58.9	0.9	7.1
<i>Contracted-in</i>																
Cheung Prey	26.5	49.8	50.1	38.5	22.2	53.9	28.8	21.4	2.4	7.6	17.8	29.9	22.0	57.8	1.7	3.5
Kirivong	40.8	61.8	46.5	62.9	10.7	36.7	13.2	24.8	4.8	8.6	15.3	35.2	17.9	80.9	0.7	5.2
Pearaing	23.4	53.7	33.2	64.0	4.3	25.2	39.7	52.6	2.9	19.5	12.9	33.0	21.2	66.3	0.4	5.3
<i>Government provision</i>																
Bati	64.5	76.6	46.5	56.9	17.1	42.4	43.6	49.5	5.2	12.4	15.6	27.2	16.4	85.4	0.8	5.1
Kamchay Mear	24.3	40.6	36.4	34.1	3.5	16.2	14.9	24.8	0.5	4.8	10.7	23.7	20.0	77.6	1.1	1.4
Kruoch Chmar	31.7	68.8	50.5	24.4	16.4	21.5	28.9	31.9	4.9	9.0	13.8	24.6	27.7	64.3	0.9	3.2
Preah Sdach	15.5	27.9	32.7	38.9	5.0	10.5	10.5	13.8	2.3	1.9	16.5	29.2	12.9	68.6	1.1	1.9

Source: Cambodia contracting test, baseline and follow-up household surveys.

Note: See table 8.4 for full definitions of terms.

Figure 8.1. Changes in Health Care Coverage Rates, Cambodia Study, 1997–2001

Source: Cambodia contracting test, baseline and follow-up household surveys.

Note: FIC, fully immunized child; VITA, vitamin A; ANC, antenatal care; TDEL, delivery by trained professional; FDEL, delivery in a health facility; MBS, use of modern birth-spacing method; KBS, knowledge of modern birth spacing; USE, use of public health care facilities. For full definitions of terms, see table 8.4.

the nine districts for fully immunized children, for example, increased from 30.9 to 56.7 percent, almost doubling in two and a half years.

Findings about Distribution

Contracted districts outperformed the government districts with respect to changes in the distribution of health care services from an initial distribution favoring the nonpoor toward a more equitable or pro-poor distribution.

Baseline Distribution

As expected, the 1997 baseline distribution of health care services in the nine test districts is found to be inequitable in all districts, largely to the disadvantage of the poor. Concentration indexes for health care services before and after the contracting test began are given in table 8.7.⁹ Negative values indicate a pro-poor distribution, and positive values indicate a distribution favoring the nonpoor.

Table 8.6. Changes in Health Care Service Coverage by District and Indicator, Cambodia, 1997–2001
(percentage points)

<i>Health care model and district</i>	<i>Fully immunized child (FIC)</i>	<i>Vitamin A (VITA)</i>	<i>Antenatal care (ANC)</i>	<i>Delivery by trained professional (TDEL)</i>	<i>Delivery in health facility (FDEL)</i>	<i>Use of modern birth-spacing method (MBS)</i>	<i>Knowledge of modern birth spacing (KBS)</i>	<i>Use of public health care facility (USE)</i>
<i>Contracted-out</i>								
Ang Rokar	30.1	25.2	44.7	-1.2	6.2	20.4	79.0	14.9
Memut	50.2	10.7	36.0	6.8	9.0	19.8	49.4	6.2
<i>Contracted-in</i>								
Cheung Prey	23.3	-11.5	31.7	-7.8	5.2	12.0	35.8	1.8
Kirivong	21.0	16.4	26.0	11.6	3.7	19.9	73.0	4.5
Pearaing	30.3	30.8	20.8	12.9	16.6	20.1	45.1	4.9
<i>Government provision</i>								
Bati	12.0	10.3	25.3	5.9	7.2	11.6	70.5	4.3
Kamchay Mear	16.3	-2.3	12.7	9.9	4.3	13.0	57.6	0.3
Kruoch Chmar	37.1	-26.2	5.1	3.0	4.1	10.8	36.6	2.3
Preah Sdach	12.4	6.2	5.5	3.3	-0.4	12.7	55.7	0.8

Source: Cambodia contracting test, baseline and follow-up household surveys.

Note: See table 8.4 for full definitions of terms.

Table 8.7. Concentration Indexes, Cambodia, 1997 and 2001 Surveys

<i>Health care model and district</i>	<i>Fully immunized child (FIC)</i>		<i>Vitamin A (VITA)</i>		<i>Antenatal care (ANC)</i>		<i>Delivery by trained professional (TDEL)</i>		<i>Delivery in health facility (FDEL)</i>		<i>Use of modern birth-spacing method (MBS)</i>		<i>Knowledge of modern birth spacing (KBS)</i>		<i>Use of public health care facilities (USE)</i>	
	1997	2001	1997	2001	1997	2001	1997	2001	1997	2001	1997	2001	1997	2001	1997	2001
<i>Contracted-out</i>																
Ang Rokar	0.131*	-0.028	-0.030	-0.028	0.011	-0.020	0.100*	-0.099*	0.371*	0.187	-0.003	0.004	-0.017	-0.007	0.051	-0.091*
Memut	0.178*	0.022	0.007	0.013	0.439*	0.136*	0.293*	0.189*	0.332	0.399*	0.197*	0.023	0.444*	0.026	0.236	-0.096*
<i>Contracted-in</i>																
Cheung Prey	0.159*	0.006	0.052	0.029	0.057	0.032	0.020	0.132	0.228	0.175	-0.112	-0.009	0.074	-0.010	0.065	0.127*
Kirivong	0.066	0.026	-0.055	0.001	-0.136	-0.348	-0.105	-0.310	-0.234	-0.439	0.118	0.011	0.024	0.009	0.004	-0.058
Pearaing	0.172	-0.015	0.094*	0.003	0.230	0.189*	0.118*	0.131*	0.049	0.185*	-0.077	-0.070	0.110*	-0.006	0.072	0.075
<i>Government provision</i>																
Bati	0.040	-0.004	0.059	0.003	0.017	0.042	0.031	0.429	-0.140	0.129	0.174	0.162	0.091	0.010	-0.103	-0.051
Kamchay Mear	-0.021	0.058	0.038	-0.029	-0.112	0.316*	0.022	0.273*	-0.333	0.205	0.251*	0.164*	0.229*	0.210*	-0.287*	0.134
Kruoch Chmar	0.182*	0.081*	0.017	0.113*	0.152	0.291*	0.066	0.269*	0.172	0.359*	0.180*	0.298	0.077	0.040	-0.154	0.094
Preah Sdach	0.021	-0.031	0.042	0.059	0.225	0.508*	0.186	0.297*	0.229	0.024	0.175*	0.021	0.001	0.009	0.247	0.296*

Source: Cambodia contracting test, baseline and follow-up household surveys.

Note: See table 8.4 for full definitions of the terms.

* Statistically significant at the 0.05 level.

Only one indicator, the use of public facilities for illness in Kamchay Mear, shows a statistically significant distribution in favor of the poor before the contracting test began. Immunization, use of a trained birth practitioner, and use and knowledge of modern birth spacing account for most of the remaining statistically significant indexes that have relatively large inequality levels in favor of the nonpoor. Eight of these concentration indexes are in the two districts selected for contracting-out, Ang Rokar and Memut, and these show the highest level of inequality for five of the eight health care indicators.

Of the three districts chosen for contracting-in, Pearaing has three statistically significant and positive health service indexes (vitamin A, trained birth delivery, and knowledge of modern birth spacing), and Cheung Prey has one (fully immunized child). Four of the eight health care services in the districts to be contracted-in do not have statistically significant indexes, suggesting that the concentration index is not different from zero, or a wealth-neutral distribution of these services at the baseline. The remaining six statistically significant indexes are spread over the four government districts selected for comparisons in the contracting test. These indexes show that three of the government districts have distributions favoring the nonpoor for the use of modern birth spacing. Four of the health care services in these districts—vitamin A, antenatal care, trained birth practitioner, and facility delivery—do not have statistically significant indexes, suggesting an equitable distribution of these services.

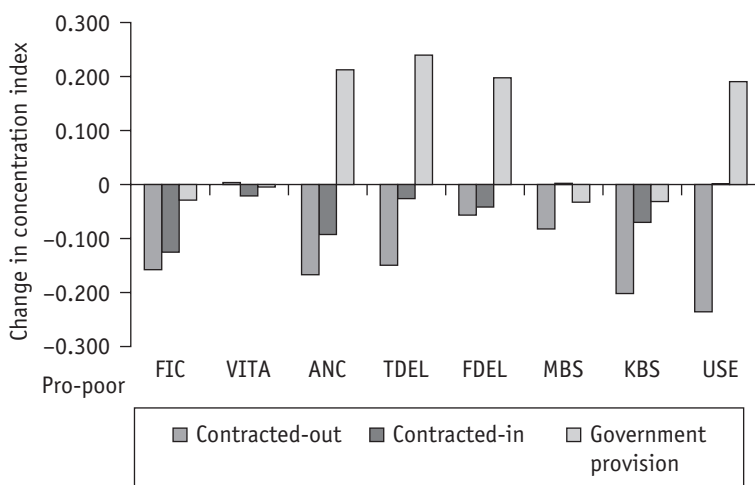
Follow-Up Distribution

Two and a half years into the contracting test, the distribution of health care services overall appears to have shifted toward a more equitable distribution that is less favorable to the nonpoor across the nine districts, but with few exceptions the distribution is not pro-poor. In 2001 contracted-out districts show pro-poor use of public facilities. Half of the concentration indexes found for three of the four government districts favor the nonpoor, and these are spread across all health care services. The remaining government district (Bati) appears to be an exception, with no statistically significant concentration indexes in 2001, indicating an equal distribution of services across poor and nonpoor groups.

Changes between the Baseline and Follow-Up Surveys

Perhaps more important than the static results found for the baseline and midterm surveys are the direction and magnitude of changes in concentra-

Figure 8.2. Changes in Concentration Index by Health Care Indicator and Model, Cambodia Study



Source: Cambodia contracting test, baseline and follow-up household surveys.

Note: FIC, fully immunized child; VITA, vitamin A; ANC, antenatal care; TDEL, delivery by trained professional; FDEL, delivery in a health facility; MBS, use of modern birth-spacing method; KBS, knowledge of modern birth spacing; USE, use of public health care facilities. For full definitions of terms, see table 8.4.

tion indexes. These suggest that the provision of health care services in contracted districts has become more equitable or more pro-poor during the time that the contracting test has been in place (figure 8.2). The direction, magnitude, and statistical significance of changes in the concentration indexes between the baseline and midterm surveys are given in table 8.8.

Of the statistically significant changes in concentration indexes, all those for the contracted-out districts show movement toward improving equity in the provision of health care services. Negative values, indicating an increase in a pro-poor distribution (or a decrease in a distribution favoring the non-poor) are found for immunization, trained birth delivery, knowledge of birth-spacing methods, and use of public facilities in contracted-out districts. Similarly, for contracted-in districts, all the statistically significant changes in concentration indexes show movement toward a more pro-poor distribution of health care services, including immunization and knowledge of modern birth spacing. By contrast, all but one statistically significant change in concentration indexes for the government districts show movement toward a nonpoor distribution of services. All are in the same three government districts found to have distributions favoring the nonpoor in the 2001 survey.

Table 8.8. Change in Concentration Indexes by District and Health Care Indicator, Cambodia, 1997–2001

<i>Health care model and district</i>	<i>Fully immunized child (FIC)</i>	<i>Vitamin A (VITA)</i>	<i>Antenatal care (ANC)</i>	<i>Delivery by trained professional (TDEL)</i>	<i>Delivery in health facility (FDEL)</i>	<i>Use of modern birth-spacing method (MBS)</i>	<i>Knowledge of modern birth spacing (KBS)</i>	<i>Use of public health care facility (USE)</i>
<i>Contracted-out</i>								
Ang Rokar	-0.159*	0.003	-0.031	-0.199*	-0.184	0.006	0.010	-0.142*
Memut	-0.156*	0.006	-0.303	-0.104	0.067	-0.173	-0.419*	-0.333 *
<i>Contracted-in</i>								
Cheung Prey	-0.154*	-0.024	-0.026	0.112	-0.054	0.104	-0.084	0.062
Kirivong	-0.039	0.056	-0.212	-0.205	-0.206	-0.107	-0.015	-0.061
Pearaing	-0.187*	-0.092	-0.041	0.013	0.136	0.007	-0.116*	0.004
<i>Government provision</i>								
Bati	-0.044	-0.056	0.25	0.398	0.269	-0.012	-0.082	0.052
Kamchay Mear	0.079	-0.067	0.427*	0.251*	0.538	-0.088	-0.019*	0.421*
Kruoch Chmar	-0.101	0.096	0.139	0.203*	0.187	0.118	-0.038	0.247
Preah Sdach	-0.052	0.018	0.282	0.111	-0.205	-0.155	0.008	0.049

Source: Cambodia contracting baseline and midterm household surveys.

* Statistically significant at the 0.05 level.

Multivariate Results

The multivariate results are consistent with the findings of the bivariate concentration indexes. When differences in district expenditures and demographic characteristics are controlled for, the contracted districts perform better in targeting the poorer half of the population than do the government districts. District managers in contracted districts appear to be more responsive and more effective in organizing, managing, and monitoring service delivery to reach the poor than district managers in government districts, all else being equal.

For each of the health care services, we include time (2001 survey), membership in the poorest half of households, district location (collinear with district expenditures), and mother and child characteristics as categorical (dummy) variables in probit regressions to examine the relative weight of each factor on the likelihood of an individual's receiving the health care service. In addition, we include interaction terms for membership in the poorest half of the households, location in a contracted district, and time (2001 survey) to examine more systematically the effect of contracting on the distribution of services.

The probit results for the pooled baseline and follow-up survey data are given in table 8.9. They include estimated (transformed) coefficients, which show the effect on the probability of receiving each service of a discrete change in each dummy variable (omitted category noted) from zero to one (dF/dx) while holding all else constant.¹⁰ Underlying coefficients found to be statistically significant at the 0.01 level are noted. The regression coefficients were obtained using Stata statistical software, with a *probit* estimation, and the transformed coefficients (dF/dx), or marginal effects, were obtained using the *dprobit* Stata command. The transformed coefficients indicate the independent effect on the predicted probability of changing each categorical variable relative to the omitted variable. The standard errors of coefficient estimates are corrected for multiple observations in villages using the cluster option.

The most striking results are found for the independent effect of the interaction term for household wealth, location in a contracted district, and time (2001 survey). The statistically significant and positive results suggest that individuals from the poorest half of households in contracted districts in 2001 were more likely to receive health care services.¹¹

Because the district location variable is perfectly collinear with per capita expenditure in each district, the independent effect of district location captures differences in expenditure levels, as well as other district-specific differences in health delivery system management, implementation methods,

and supervision. The district location variables are found to be positive and statistically significant independent factors of the likelihood of receiving services relative to the omitted low-performing government district, when controlling for other factors included in the estimation. A child living in Memut, for example, is estimated to have a 0.285 higher probability of being fully immunized than one living in Preah Sdach, the omitted government district. Residence in any of the three government districts included is also found to be a statistically significant and positive factor in the probability of full immunization relative to the omitted government district, and these effects are seen to be large. A child living in Bati, for example, had a 0.445 higher probability of being fully immunized than one living in Preah Sdach. While the coverage statistics indicated increased full immunization coverage in all districts, the multivariate results for the pooled sample, controlling for other factors, appear to give added weight for large increases in full immunization (Memut and Krouch Chmar), and for sustained, relatively high full immunization coverage (Bati and Kirivong).

The independent effect of time (that is, of an observation's being from the 2001 follow-up survey) on the likelihood of receiving each of the health care services is positive and statistically significant and suggests that all individuals, regardless of location and other factors, were more likely to receive these health care services in 2001 than at the time of the baseline survey. These results are consistent with the increases in health care service coverage rates shown in table 8.6.

The results for the independent effect of wealth in the pooled baseline and follow-up sample suggest that individuals from the poorest half of the population are less likely to receive child immunization, to be delivered by a trained birth attendant, and to know and use modern birth-spacing methods but are more likely to use public facilities for illness. In addition, the results found for the interaction term for being an individual from the poorest half of households at the time of the follow-up survey in 2001 suggest that these individuals were less likely to receive vitamin A and antenatal care and to use public facilities. Together, these results suggest that in all districts, being poor was and still is associated with a lower likelihood of receiving health care services. The results are consistent with the bivariate concentration indexes in table 8.7, which indicate that few health care services are well targeted to the poor in any of the districts, contracted or not.

The results found for the control variables for mother and child characteristics suggest that mothers' education is positively associated with a higher likelihood of a child's receiving health care services. This is a common finding in the literature.

Table 8.9. Probit Results, Marginal Effects (dF/dx) on the Probability of Health Services Received in the Pooled Baseline and Follow-Up Surveys, Cambodia

Variable	Fully immunized child (FIC)	Vitamin A (VITA)	Antenatal care (ANC)	Delivery by trained professional (TDEL)	Delivery in health facility (FDEL)	Use of modern birth-spacing method (MBS)	Knowledge of modern birth spacing (KBS)	Use of public health care facility (USE)
2001 follow-up survey	0.249*	0.073*	0.263*	0.066*	0.057*	0.140*	0.558*	0.198*
Household wealth								
Poorest one-half	-0.072*	-0.011	-0.009	-0.049*	-0.019	-0.050*	-0.063*	0.038*
Interaction terms								
Poorest one-half, contracted district, 2001 survey	0.085*	0.107*	0.145*	0.066*	0.013	0.066*	0.059*	0.124*
Poorest one-half, 2001 survey	0.009	-0.068*	-0.132*	-0.054	-0.015	-0.005	0.007	-0.106*
<i>District (Preah Sdach omitted)</i>								
Contracted-out (highest expenditures)								
Ang Rokar	0.165*	0.008	0.367*	0.305*	0.114*	0.005*	0.077*	0.223*
Memut	0.285*	0.135*	0.207*	0.156*	0.071*	0.016*	0.104*	0.089*
Contracted-in (medium expenditures)								
Cheung Prey	0.149*	0.055	0.353*	0.158*	0.039*	-0.016	-0.039	0.020
Kirivong	0.274*	0.150*	0.153*	0.055	0.054*	-0.014	-0.005	0.041*
Pearaing	0.129*	0.083*	0.023	0.349*	0.101	-0.040	-0.011	0.038*
Government provision (lowest expenditures)								
Bati	0.445*	0.136*	0.258*	0.352*	0.078*	-0.037	0.077*	0.050*
Kroch Mear	0.108*	-0.014	0.009	0.088*	-0.001	-0.070*	0.090*	0.015
Krouch Chmar	0.279*	0.007	0.156*	0.212*	0.065*	-0.053*	0.043	0.029

Mother's education (omitted variable, no education)

1–3 years	0.069*	-0.020	0.073*	0.060*	-0.010	-0.006	0.075*
4–6 years	0.118*	0.040*	0.108*	0.122*	0.025*	0.030*	0.104*
7+ years	0.185*	0.063*	0.187*	0.258*	0.089*	0.070*	0.186*

Mother's age (years) (omitted variable, <20)

20–24	0.019	0.086	0.053	-0.033	-0.006	0.116*	0.077*
25–29	0.031	0.115*	0.059*	-0.057	-0.024	0.115*	0.083*
30–34	0.056	0.156*	0.041	-0.078*	-0.013	0.126*	0.096*
35–39	0.037	0.113*	0.030	-0.095*	-0.022*	0.079	0.057
40+	0.001	0.099*	-0.022	-0.050	-0.010	0.061	0.025

Child's sex = male

0.032* 0.008 — — — — —

Sex = male

-0.009

Age (months) (omitted variable, <5)

5–19								-0.001
20–29								0.005
30–39								0.004
40+								0.002

Predicted probability	0.439	0.447	0.210	0.274	0.061	0.202	0.422	0.110
Number of observations	3,619	6,219	3,754	3,754	3,754	5,290	7,424	9,310
LR χ^2	578.3	205.8	710.7	441.9	211.9	169.4	2,727.1	1,069.7
Prob > χ^2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pseudo R^2	0.116	0.124	0.174	0.097	0.111	0.108	.267	0.141
Log likelihood	-2,196.4	-2,174.1	-1,685.7	-2,052.8	-849.4	-1,695.6	-3,738.6	-3,271.7

Note: See table 8.4 for fuller definitions of terms.

* Statistically significant at the 0.01 level.

Limitations

The study is limited by inability to identify differences in underlying motivations, resource allocation decisions, incentives, and district managers' service delivery and monitoring methods. These shortcomings may have led to the observed differences in the distribution of health care services in contracted districts compared with government districts.

Until further research is conducted, we can only speculate about the reasons for the varied outcomes. Perhaps the international NGO managers were better trained than their local counterparts in management, implementation, supervision, and monitoring methods for targeting the poor. Perhaps the NGO district managers expected future personal rewards if they achieved all the goals set for them. This was the first large-scale contracting experience for the NGOs, and it may be that proven managers were assigned to Cambodia to increase the chances of success and enable the NGOs to maintain a good reputation for providing health care services in developing countries and possibly to win follow-on contracts or contracts in other countries. Perhaps higher guaranteed wages and bonuses paid to health care workers in contracted districts provided more effective motivation to attain contractual goals—and more than compensated for unofficial fees and bonuses collected by government health care workers. These types of questions need further investigation, in general and in other large-scale contracting projects such as those in Afghanistan, Bangladesh, and Pakistan.

Implications

The Cambodia contracting test is the first known large-scale test with baseline and follow-up survey data suitable for systematic examination of whether NGO contracts are an effective means of providing health care services that reach the poor. This chapter compares contracted districts with noncontracted government districts, using data from the 1997 baseline and 2001 follow-up household surveys, to determine which districts were successful in targeting health care services to the poorest half of households—an equity goal for all districts included in the test. Bivariate concentration indexes and multivariate analysis results are consistent. They suggest that although all districts increased health care service coverage, the contracted districts outperformed the government districts in targeting services to the poor, even when controlling for other factors, including differences in expenditure levels, starting values, and demographics.

It is difficult to generalize to other countries Cambodia's experience with reaching the poor through contracting services. The dearth of physical infra-

structure and the large numbers of entrenched government health care workers in rural areas of Cambodia at the start of the contracting test were conditions conducive to innovative approaches such as rational redelineation of operational districts and testing of new service delivery methods to rapidly rebuild the primary health care system. Circumstances are similar in densely populated urban areas in the four largest cities of Bangladesh and the rural areas of Afghanistan and Pakistan. The results of large-scale contracting projects in those areas could help shed light on the question of whether the experience in Cambodia offers an effective model for other developing countries.

Notes

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1. A similar contracting experiment in Guatemala to improve service delivery to indigenous people did not collect precontract baseline data that would have enabled pre- and postcontract comparisons (Loevinsohn 2000).

2. An alternative index that weighted household assets by the scarcity of the assets was also tested and produced similar results.

3. The index constructed for each district is arbitrarily chosen to present the remaining results of the study.

4. Use of public health facilities only for those who reported an illness, standardized for choosing a public health facility, was also tested and produced nearly identical results.

5. Details of the method may be found in World Bank (2002).

6. No significant change in service coverage was experienced between the baseline survey in mid-1997 and the beginning of the contracting test in 1999. The intervening period was taken up by preparatory steps: the international bidding process, construction and rehabilitation of health facilities, and procurement of equipment.

7. Further details of village mapping, randomized selection of eligible households, sample sizes, within-district statistical confidence intervals, and survey instruments for household and health facility surveys are given in Keller and Schwartz (2001).

8. The sample sizes include an adjustment of 2x for the clustering effect. It was assumed initially that 30 percent of women received antenatal care.

9. A complete listing of concentration indexes, standard errors, *t*-values, and sample sizes for each indicator is available from the authors on request.

10. The results shown for child immunization are reported in Schwartz and Bhushan (forthcoming).

11. An exception is birth delivery in a health facility, which was found to be positive but not statistically significant.

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