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

J. Brad Schwartz and Indu Bhushan

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Health, Nutrition and Population (HNP) Discussion Paper

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Paper prepared for the Program on Reaching the Poor with Effective Health, Nutrition, and Population Services, organized by the World Bank in cooperation with the William and Melinda Gates Foundation and the Governments of the Netherlands and Sweden.

Abstract: This study examines the equity impact of using private sector contracts for the delivery of primary health care as an alternative to traditional government provision in Cambodia. It does so by using pre- and post intervention data from a large scale contracting experiment to provide primary health care in rural districts of Cambodia between 1998 and 2001. Equity as well as coverage targets for primary health care services were explicitly included in contracts awarded in five of nine rural districts with a population totaling over 1.25 million people. The remaining four districts included in the test were given identical equity and coverage targets and used the traditional government provision of services. After two-and-a-half years of the trial, the results suggest that although coverage of primary health care services in all districts had substantial increases, people in the poorest one-half of households living in contracted districts were more likely to receive these services than similarly circumstanced poor people in government districts, other factors equal.

Keywords: Cambodia, health service inequality, primary health care, contracting, non-governmental organization.

Disclaimer: The findings, interpretations and conclusions expressed in the paper are entirely those of the authors, and do not represent the views of the World Bank, its Executive Directors, or the countries they represent.

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FOREWORD

This discussion paper is one in a series presenting the initial results of work undertaken through the Reaching the Poor Program, organized by the World Bank in cooperation with the Gates Foundation and the Governments of Sweden and the Netherlands. The Program is an effort to begin finding ways to overcome social and economic disparities in the use of health, nutrition, and population (HNP) services. These disparities have become increasingly well documented in recent years. Thus far, however, there has been only limited effort to move beyond documentation to the action needed to alleviate the problem.

The Program seeks to start rectifying this, by taking stock of recent efforts to reach the poor with HNP services. The objective is to determine what has and has not worked in order to guide the design of future efforts. The approach taken has been quantitative, drawing upon and adapting techniques developed over the past thirty years to measure which economic groups benefit most from developing country government expenditures.

This discussion paper is one of eighteen case studies commissioned by the Program. The studies were selected by a professional peer review committee from among the approximately 150 applications received in response to an internationally-distributed request for proposals. An earlier version of the paper was presented in a February 2004 global conference organized by the Program; the present version will appear in a volume of Program papers scheduled for publication in 2005, *Reaching the Poor with Effective Health, Nutrition, and Population Services: What Works, What Doesn't, and Why*.

Further information about the Reaching the Poor Program is available at the following sites:

Program Overview:

<http://www1.worldbank.org/prem/poverty/health/rpp/overview.htm>

List of Papers Commissioned by the Program:

<http://www1.worldbank.org/prem/poverty/health/rpp/projectlist.htm>

Presentations at the Program Conference:

<http://www1.worldbank.org/prem/poverty/health/rpp/conference.htm>

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The authors are also grateful to the World Bank for publishing this study as an HNP Discussion Paper.

Country Context to the Study

In the mid-1990s, war and political upheaval had left Cambodia with limited health care infrastructure, especially in rural areas. There were sufficient paramedical and management staff, 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 2000).

Research Questions

To address these issues, the Royal Government of Cambodia obtained a loan from the Asian Development Bank (ADB) for the Ministry of Health (MOH) to develop and implement a coverage plan modeled on World Health Organization (WHO) guidelines to restructure and broaden the primary health care system. The plan included the construction or rehabilitation of health centers, each designed to serve about 10,000 people, and merged small administrative districts into operational districts with an average of about 150,000 people. The coverage plan also defined a minimum package of activities (MPA) for health centers consisting 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.

Contracting Test

As part of the overall implementation plan, the ADB loan also was used by the MOH to conduct a large-scale test of contracting with nongovernmental organizations (NGOs) for the delivery of primary health care services. In 1997, prior to health facility construction and procurement of equipment, a pre-contract baseline household survey was taken in candidate rural districts. The MOH awarded NGO contracts in five districts and included four government districts in the trial for comparisons. The contracting test started at the beginning of 1998, and a follow-up household survey was taken two-and-a-half years later in the summer of 2001. The information from the baseline and follow-up surveys comprises a unique dataset for comparing the distributional equity of primary health care services obtained with contracted and government provision of services.¹

To make the test districts as comparable as possible, the candidate districts were not allowed to be: districts included in the MOH Accelerated District Development program, which were to receive additional support; districts already receiving significant donor assistance; or districts that encompassed the provincial capital, which receive more government funding than other districts because of their provincial hospitals.

¹ A similar contracting experiment in Guatemala to improve service delivery to indigenous people did not collect pre-contract baseline data to enable pre- and post-contract comparisons (Loevinsohn 2000).

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

- *Contract-out*, in which the contractors had complete line responsibility for service delivery, including hiring, firing and setting wages, procuring and distributing essential drugs and supplies, organizing and staffing health facilities.
- *Contract-in*, where the contractors worked within the MOH 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 the normal MOH channels. In addition, the contractor received a nominal budget supplement for staff incentives and operating expenses.
- *Government provision*, in which the management of services remained with the government District Health Management Team (DHMT) and drugs and supplies were provided through normal MOH channels. Like the contract-in districts, the DHMT received the same nominal budget supplement for staff incentives and operating expenses.

An international competitive bidding process was used to select contractors for the contract-out and contract-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 baseline survey, along with well-defined goals for improvement in service coverage and coverage of the poor. Pre-contract performance goals were established for child immunization and vitamin A, 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 to target services to the poorest half of the population was mandated for all districts.

All candidate districts at the time of the pre-contract survey had less than 20 percent of planned health facilities functional, and health service coverage was poor. Prior to bidding all potential contractors and the managers of the government districts were provided with the pre-contract indicators for each district and the coverage and equity targets to be achieved at the end of the four-year test.

Contract awards were based on the quality of the technical proposal and price. The nine operational districts included in the contracting test were made up of two contracted-out, three contracted-in, and four government districts. The test districts are spatially separated in three different provinces, and each has a population of between 100,000 and nearly 200,000 for a total of over 1.25 million people (Table 1).

Table 1: Test districts

<i>District</i>	<i>Province</i>	<i>2001 Population</i>
<i>Contract-out</i>		
Ang Rkar	Takeo	109,459
Memut	Kampong Cham	109,321
<i>Contract-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, Royal Government of Cambodia.

NGOs were awarded four-year contracts at a fixed annual price per capita to administer and provide specific primary health care services. All winning bidders were international NGOs with previous experience working in Cambodia. Contract-out districts were responsible for purchasing their own supplies and materials and for paying labor costs. These expenses were included in the MOH budget for contract-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 to all nine test districts and not included as expenditures under the contracts. The MOH retains ownership of these assets.

Average annual recurrent expenditure per capita during the two-and-a-half year period was \$3.88 for the contract-out districts; \$2.40 for the contract-in districts; and \$1.65 for the government districts (Table 2). The difference in expenditure levels between the contracted and government districts is accounted for largely by NGO technical assistance provided by district managers. Net of district management technical assistance, expenditure per capita for contract-in districts (\$1.63) was nearly the same as government districts (\$1.65). The higher expenditure level for contract-out districts (\$2.60) is largely due to higher staff salaries.

Table 2: Average annual recurrent expenditure per capita (in U.S. dollars)

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

a. Salaries, bonuses, other allowances. b. Drugs, medical supplies, travel, fuel, per diem, office supplies, communications, building and vehicle maintenance and repair, utilities.

Source: Schwartz (2001).

Research Questions

This study addresses the following sets of questions:

- Were primary health care services distributed equally before and after the contracting test? Which type of districts made the largest gains in reaching the poor between the pre- and post-contracting 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 statistics, 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 that during the trial, and compare contracted districts to government districts.

- 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 government districts? What are the policy implications of these findings?

District managers faced different budget constraints to reach the poor and increase health service coverage, 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 the distribution of services to the poor while controlling for these other related factors.

Methodology

To identify the poor, principal components analysis is used to construct a wealth index of households. Concentration indices and multivariate regressions are used to test the hypothesis of whether the distribution of health services to the poor improved under contracting.

Wealth Index

In the absence of income or consumption data collected by the household surveys, household ownership of assets, which serve as a proxy for household wealth, is used as the basis for constructing a wealth index for the study. For comparisons between the baseline and mid-term surveys, the types of household assets used to construct the index were restricted to those included as questions in both household surveys. These eight assets include: 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, motor boat, or at least one cow.

The wealth index was constructed with coding for each asset set equal to one if the household had the asset, and equal to zero if not. Principal components analysis (PCA), which searches for the linear combination of the assets for 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 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 in the equity results from ranking individuals within each district compared with 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 indices for the nine districts based on a wealth ranking of households from all districts compared with a wealth ranking based on the households within each district, are not statistically significant. In absolute terms, an individual ranked as “poor” in one district would be equally ranked as poor in all other districts. This suggests that observed differences in the equity of health care services between the districts are not due to differences in wealth across districts and implies that the populations in the districts comprise a fairly homogeneous group of rural households in terms of asset ownership at the time of the two surveys.³

Concentration Indices

Bivariate concentration indices are calculated to quantify the degree of income-related inequality for health care service indicators across the districts and across the surveys, using 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 (Wagstaff, Paci, and van Doorslaer 1991; Kakwani, Wagstaff, and Van Doorslaer 1997; Newey and West 1994).

Need-Standardized Use of Public Health Facilities

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 the need for the other health care services (e.g., 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 due to 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.

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.

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 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 the estimated concentration index and its standard error of the need-expected probability of seeking health care at a public health facility, and 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, the attempt is not to model all 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 contract and no-contract 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 pre-contract (1997) and evaluation (2001) surveys for each of the health service indicators.

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 mid-term household survey used the same baseline survey instrument with few exceptions.

A standard cluster survey methodology was used for the household surveys, with the sample size calculated to allow each district to be compared to 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 into 30 (clusters), giving a sampling interval of k , where each k^{th} village was selected as a survey cluster. The probability of a village being selected was thus proportional to the size of the

⁴ Use of public health facilities for only those who reported an illness, standardized for choosing a public health facility, also was 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 until the contracting test commenced in 1999 due to the time required for the international bidding process, construction and rehabilitation of health facilities, and procurement of equipment.

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 between 12 and 23 months old, antenatal care and type of birth attendant. For immunization, seven children between 12 and 23 months old 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, seven women who had given birth within the prior 12 months (including stillbirths but excluding miscarriages) were required from each cluster, or 210 women in each district, for estimates with a ± 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 child immunization and antenatal/birth provider information, data were also 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, depending on the health care indicator, sample sizes range from around 210 children, 210 women, 420 households, to more than 2,000 individuals for each district. In total, more than 20,000 individuals are included in each household survey (Table 3).

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.

Table 3: Sample sizes

<i>District</i>	<i>Child 12–23 months</i>		<i>Child 6–59 months</i>		<i>Women with birth in prior 12 months</i>		<i>Women with child 6–23 months old</i>		<i>Individuals reported sick in last 4 weeks</i>		<i>Total individuals</i>		<i>Total households</i>	
	1997	2001	1997	2001	1997	2001	1997	2001	1997	2001	1997	2001	1997	2001
<i>Contract-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>Contract-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</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
Total	1,825	1,860	3,131	3,088	1,866	1,888	3,713	3,711	4,457	4,853	2,103	20,384	3,713	3,711

Source: Keller and Schwartz (2001).

Health Care Indicators

The contractual indicators used for service coverage are consistent with the priority topics most prominently noted in the United Nations Millennium Development Goals (MDGs), and appearing most frequently in World Bank Poverty Reduction Strategy Papers (PRSPs), with a focus on preventive child and maternal health care (e.g., child immunization and vitamin A, antenatal care, trained birth attendant delivery, delivery in a health facility, and use and knowledge of modern birth-spacing 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 4 gives 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 5. At the time of the mid-term survey in mid-2001, which was well before completion of the test at the end of 2002, most districts had already achieved several of the pre-defined contractual goals, which many people thought overly ambitious at the time the contracts were awarded. Increasingly marginal returns to initial large capital and labor investment likely were responsible for much of this early success. Still, the increases in indicators achieved by mid-2001 are impressive (Figure 1). The overall average in the nine districts for fully immunized children, for example, increased from 30.9 percent to 56.7 percent, almost doubling in two-and-a-half years (Table 6).

Findings about Distribution

Contracted districts outperformed the government districts with changes in the distribution of health care services from an initial pro-nonpoor distribution 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, and largely to the disadvantage of the poor. Concentration indices for health care services, with negative values indicating a pro-poor distribution and positive values indicating a pro-non poor distribution, before and after the contracting test began are given in Table 7.⁹

Only one exception, the use of public facilities for illness in KamChay Mear, indicates a statistically significant distribution in favor of the poor before the contracting test began. Immunization, using a trained birth practitioner, and use and knowledge of modern birth

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

Table 4: Health service indicator definitions and coverage goals

<i>Indicator</i>	<i>Definition</i>	<i>Goal (percent)</i>
Fully immunized child (FIC)	Full immunization for children 12–23 months.	70
Vitamin A (VITA)	High-dose vitamin A received twice in the past 12 months by children aged 6–59 months	70
Antenatal care (ANC)	≥2 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 modern birth spacing method (MBS)	Women with a live child age 6–23 months old 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 4 weeks.	Increase ^a

a. Specific percentage goal not specified.

Source: Ministry of Health, Royal Government of Cambodia.

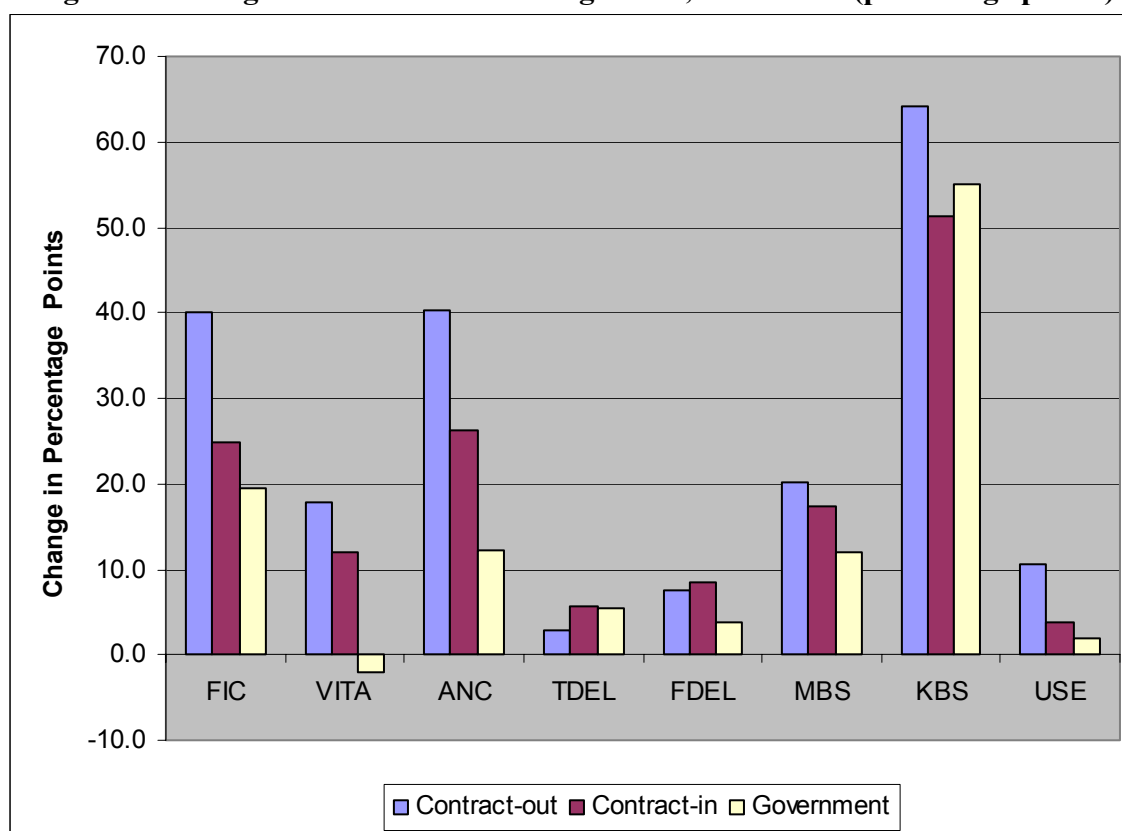
Table 5: Health care service coverage by district, 1997 and 2001 surveys(percent)

District	FIC		VITA		ANC		TDEL		FDEL		MBS		KBS		USE	
	1997	2001	1997	2001	1997	2001	1997	2001	1997	2001	1997	2001	1997	2001	1997	2001
<i>Contract-out</i>																
Ang Rokr	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>Contract-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</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

Note: See table 4 for spell outs of acronyms.

Source: Cambodia Contracting Baseline and Midterm Household Surveys

Figure 1: Changes in health care coverage rates, 1997–2001 (percentage points)



Note: See table 4 for spell outs of acronyms.

Source: Cambodia Contracting Baseline and Midterm Household Surveys

Table 6: Changes in health care service coverage, 1997-2001 (percentage points)

<i>District</i>	<i>FIC</i>	<i>VITA</i>	<i>ANC</i>	<i>TDEL</i>	<i>FDEL</i>	<i>MBS</i>	<i>KBS</i>	<i>USE</i>
<i>Contract-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>Contract-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</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

Note: See table 4 for spell outs of acronyms.

Source: Cambodia Contracting Baseline and Midterm Household Surveys

Table 7: Concentration indices, 1997 and 2001 surveys

District	FIC		VITA		ANC		TDEL		FDEL		MBS		KBS		USE	
	1997	2001	1997	2001	1997	2001	1997	2001	1997	2001	1997	2001	1997	2001	1997	2001
<i>Contract-out</i>																
Ang Rokr	.131 ^a	-.028	-.030	-.028	.011	-.020	.100 ^a	-.099 ^a	.371 ^a	.187	-.003	.004	-.017	-.007	.051	-.091 ^a
Memut	.178 ^a	.022	.007	.013	.439 ^a	.136 ^a	.293 ^a	.189 ^a	.332	.399 ^a	.197 ^a	.023	.444 ^a	.026	.236	-.096 ^a
<i>Contract-in</i>																
Cheung Prey	.159 ^a	.006	.052	.029	.057	.032	.020	.132	.228	.175	-.112	-.009	.074	-.010	.065	.127 ^a
Kirivong	.066	.026	-.055	.001	-.136	-.348	-.105	-.310	-.234	-.439	.118	.011	.024	.009	.004	-.058
Pearaing	.172	-.015	.094 ^a	.003	.230	.189 ^a	.118 ^a	.131 ^a	.049	.185 ^a	-.077	-.070	.110*	-.006	.072	.075
<i>Government</i>																
Bati	.040	-.004	.059	.003	.017	.042	.031	.429	-.140	.129	.174	.162	.091	.010	-.103	-.051
KamChay Mear	-.021	.058	.038	-.029	-.112	.316 ^a	.022	.273 ^a	-.333	.205	.251 ^a	.164 ^a	.229 ^a	.210 ^a	-.287 ^a	.134
Kruoch Chmar	.182 ^a	.081 ^a	.017	.113 ^a	.152	.291 ^a	.066	.269 ^a	.172	.359 ^a	.180 ^a	.298	.077	.040	-.154	.094
Preah Sdach	.021	-.031	.042	.059	.225	.508 ^a	.186	.297 ^a	.229	.024	.175 ^a	.021	.001	.009	.247	.296 ^a

Note: See table 4 for spell outs of acronyms.

a. Statistically significant at the .05 level.

Source: Cambodia Contracting Baseline and Midterm Household Surveys

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spacing account for the most of the remaining statistically significant indices that have relatively large inequality levels in favor of the nonpoor. Eight of these concentration indices are in the two districts that would be contracted-out (Ang Rokar and Memut), and these indicate the highest level of inequality for five of the nine health care indicators.

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

Follow-Up Distribution

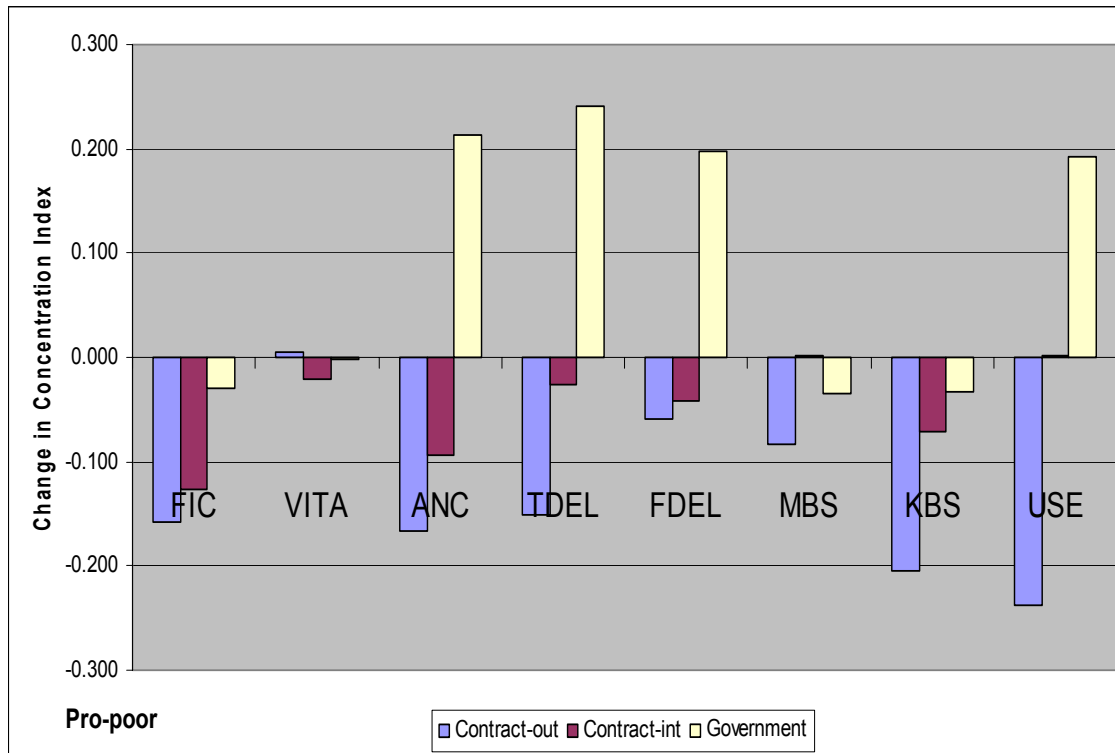
Two-and-a-half years into the contracting test, the distribution of health care services overall appear to have shifted toward a more equitable, or less nonpoor distribution across the nine districts but, with few exceptions, not distributed toward the poor. In 2001, contracted-out districts are found to have pro-poor use of public facilities. More than half of the concentration indices found for three of the four government districts are in favor of the nonpoor, however, and these are spread across all health care services. The remaining government district (Bati) appears to be an exception, with no statistically significant concentration indices 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 mid-term surveys, the direction and magnitude of *changes* in concentration indices suggest that the provision of health care services in contracted districts has become more equitable or more pro-poor during the two-and-a-half years that contracting test has been in place (figure 2). The direction, magnitude, and statistical significance of changes in the concentration indices between the baseline and mid-term surveys are given in table 8.

Of the statistically significant changes in concentration indices, all found 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 pro-nonpoor distribution) are found for immunization, trained birth delivery, knowledge of birth-spacing methods, and use of public facilities in contract-out districts.

Figure 2: Changes in concentration indices, 1997–2001



Note: See Table 4 for explanations of acronyms.

Source: Cambodia Contracting Baseline and Midterm Household Surveys.

Table 8: Changes in concentration indices, 1997–2001

District	FIC	VITA	ANC	TDEL	FDEL	MBS	KBS	USE
<i>Contract-out</i>								
Ang Rokar	−.159 ^a	.003	−.031	−.199 ^a	−.184	.006	.010	−.142 ^a
Memut	−.156 ^a	.006	−.303	−.104	.067	−.173	−.419 ^a	−.333 ^a
<i>Contract-in</i>								
Cheung Prey	−.154 ^a	−.024	−.026	.112	−.054	.104	−.084	.062
Kirivong	−.039	.056	−.212	−.205	−.206	−.107	−.015	−.061
Pearaing	−.187 ^a	−.092	−.041	.013	.136	.007	−.116 ^a	.004
<i>Government</i>								
Bati	−.044	−.056	.006	.398	.269	−.012	−.082	.052
KamChay Mear	.079	−.067	.427 ^a	.251 ^a	.538	−.088	−.019 ^a	.421 ^a
Kruoch Chmar	−.101	.096	.139	.203 ^a	.187	.118	−.038	.247
Preah Sdach	−.052	.018	.282	.111	−.205	−.155	.008	.049

a. Statistically significant at the .05 level.

Source: Cambodia Contracting Baseline and Midterm Household Surveys.

Similarly for contracted-in districts, all of the statistically significant changes in concentration indices show movement toward a more pro-poor distribution of health care services, including immunization and knowledge of modern birth spacing.

In contrast, all but one statistically significant change in concentration indices found for the government districts show movement toward a nonpoor distribution of services. All are found for the same three government districts also found to have pro-nonpoor distributions in the 2001 survey.

Multivariate Results

The multivariate results are consistent with the findings of the bivariate concentration indices. In other words, the contracted districts better targeted the poorest half of the population than the government districts, when controlling for differences in district expenditures and demographic characteristics. District managers in contracted districts appear to be more responsive and effective at organizing, managing, and monitoring service delivery to reach the poor than district managers in government districts, all else equal.

For each of the health care services, we include time (2001 survey), being among the poorest half of households, district location (colinear 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 being from the poorest half of the households, being 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 9, including estimated (transformed) coefficients, which show the effect on the probability of receiving each service for a discrete change of 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 .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 from 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.

¹⁰ The results shown for child immunization were previously reported in Schwartz and Bhushan (2003).

Table 9: Probit results, marginal effects (dF/dx) on the probability of health services received in the pooled baseline and follow-up surveys

<i>Variable</i>	<i>FIC</i>	<i>VITA</i>	<i>ANC</i>	<i>TDEL</i>	<i>FDEL</i>	<i>MBS</i>	<i>KBS</i>	<i>USE</i>
2001 Follow-up survey	.249*	.073*	.263*	.066*	.057*	.140*	.558*	.198*
Household wealth								
Poorest one-half	-.072*	-.011	-.009	-.049*	-.019	-.050*	-.063*	.038*
Interaction terms								
Poorest one-half, contracted district, 2001 survey	.085*	.107*	.145*	.066*	.013	.066*	.059*	.124*
Poorest one-half, 2001 survey	.009	-.068*	-.132*	-.054	-.015	-.005	.007	-.106*
District (Preah Sdach omitted)								
<i>Contract-out (highest expenditures)</i>								
Ang Rokar	.165*	.008	.367*	.305*	.114*	.005*	.077*	.223*
Memut	.285*	.135*	.207*	.156*	.071*	.016*	.104*	.089*
<i>Contract-in (medium expenditures)</i>								
Cheung Prey	.149*	.055	.353*	.158*	.039*	-.016	-.039	.020
Kirivong	.274*	.150*	.153*	.055	.054*	-.014	-.005	.041*
Pearaing	.129*	.083*	.023	.349*	.101	-.040	-.011	.038*
<i>Government (lowest expenditures)</i>								
Bati	.445*	.136*	.258*	.352*	.078*	-.037	.077*	.050*
Kroch Mear	.108*	-.014	.009	.088*	-.001	-.070*	.090*	.015
Krouch Chmar	.279*	.007	.156*	.212*	.065*	-.053*	.043	.029
Mother's education (omitted=none)								
1 – 3 years	.069*	-.020	.073*	.060*	-.010	-.006	.075*	
4 – 6 years	.118*	.040*	.108*	.122*	.025*	.030*	.104*	
7 + years	.185*	.063*	.187*	.258*	.089*	.070*	.186*	
Mother's age (< 20 omitted)								
20 – 24	.019	.086	.053	-.033	-.006	.116*	.077*	
25 – 29	.031	.115*	.059*	-.057	-.024	.115*	.083*	
30 – 34	.056	.156*	.041	-.078*	-.013	.126*	.096*	
35 – 39	.037	.113*	.030	-.095*	-.022*	.079	.057	
40 +	.001	.099*	-.022	-.050	-.010	.061	.025	
Child's sex = male	.032*	.008	—	—	—	—	—	

<i>Variable</i>	<i>FIC</i>	<i>VITA</i>	<i>ANC</i>	<i>TDEL</i>	<i>FDEL</i>	<i>MBS</i>	<i>KBS</i>	<i>USE</i>
Sex = male								-.009
Age (<5 omitted)								
5 – 19								-.001
20 – 29								.005
30 – 39								.004
40 +								.002
Predicted probability	.439	.447	.210	.274	.061	.202	.422	.110
Number of observations	3619	6219	3754	3754	3754	5290	7424	9310
LR chi2	578.3	205.8	710.7	441.9	211.9	169.4	2727.1	1069.7
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pseudo R2	0.116	0.124	0.174	0.097	0.111	0.108	.267	0.141
Log likelihood	-2196.4	-2174.1	-1685.7	-2052.8	-849.4	-1695.6	-3738.6	-3271.7

Note: See table 4 for spell outs of acronyms.

a. Statistically significant at the .01 level.

Source: Cambodia Contracting Baseline and Midterm Household Surveys

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 expenditures in each district, the independent effect of district location captures differences in expenditure levels as well as other district-specific 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. On the other hand, residence in any of the three included government districts is also found to be a statistically significant and positive factor in the probability of FIC 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 all districts increased FIC coverage, the multivariate results for the pooled sample, when controlling for other factors, appear to give added weight for large increases in FIC (Memut, Krouch Chmar), and for sustained relatively high FIC coverage (Bati, Kirivong).

The independent effect of an observation being from the 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, are 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 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, 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 indices in table 7, which indicate that few health care services are well targeted to the poor in any of the districts, contracted or not.

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

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

Limitations

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

Until further research is conducted, we can only speculate about the reasons. Perhaps the international NGO managers were better trained than their local counterparts in management, implementation, supervision, and monitoring methods to target the poor. Perhaps the NGO district managers expected future personal rewards if they achieved all goals—reaching the poor and coverage increases. Because this was the first large-scale contracting experience for the NGOs, perhaps proven managers were assigned to Cambodia to better ensure success, maintain a good reputation for providing health care services in developing countries, and even possibly be awarded a follow-on contract 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 generally and in other more recent large-scale contracting projects such as those in Bangladesh, Afghanistan, and Pakistan.

Implications

The Cambodia contracting test is the first known large-scale test with suitable baseline and follow-up survey data to examine systematically 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 to see which were successful in targeting health care services to the poorest half of households, an equity goal for all districts included in the test, using data from 1997 baseline and 2001 follow-up household surveys. Bivariate concentration indices 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 the results of the contracting experience on reaching the poor in Cambodia. The lack of physical infrastructure and the large numbers

of entrenched government health care workers in rural areas of Cambodia at the start of the contracting test lent themselves to innovative approaches such as rational redelineation of operational districts and testing new service delivery methods to rapidly rebuild the primary health care system. The 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 these large-scale contracting projects could help answer the question of whether experience in Cambodia provides an effective model for other developing countries.

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