CDRI - Cambodia's leading independent development policy research institute

Public Spending on Education, Health and Infrastructure and Its Inclusiveness in Cambodia: Benefit Incidence Analysis

PHAY Sokcheng and TONG Kimsun

Working Paper Series No. 99

December 2014

A CDRI Publication

Public Spending on Education, Health and Infrastructure and Its Inclusiveness in Cambodia: Benefit Incidence Analysis

PHAY Sokcheng and TONG Kimsun

CDRI Working Paper Series No. 99

CDRI
Cambodia's leading independent development policy research institute

Phnom Penh, December 2014

ISBN-13: 97899950–52–98-0

Public Spending on Education, Health and Infrastructure and Its Inclusiveness in Cambodia: Benefit Incidence Analysis

Suggested full citation:

PHAY Sokcheng and TONG Kimsun. 2014. *Public Spending on Education, Health and Infrastructure and Its Inclusiveness in Cambodia: Benefit Incidence Analysis.* CDRI Working Paper Series No. 99. Phnom Penh: CDRI.

CDRI
☞ 56, Street 315, Tuol Kork, Phnom Penh, Cambodia
✉ PO Box 622, Phnom Penh, Cambodia
☎ (855-23) 881384/881701/881916/883603
🖷 (855-23) 880734
E-mail: cdri@cdri.org.kh
Website: www.cdri.org.kh

Edited by: Susan Watkins
Layout and Cover Design: Oum Chantha
Printed and Bound in Cambodia by Invent Cambodia, Phnom Penh

Contents

Acknowledgements v
Abstract vi
1. Introduction 1
2. Literature review 2
3. Data and methodology 4
3.1. Data 4
3.2. Benefit incidence analysis 4
3.3. Marginal benefit incidence analysis 6
3.4. Limitations of benefit incidence analysis 8
3.5. Limitations of the study 8
4. Empirical results 9
4.1. Empirical results on education 9
4.2. Empirical Results on Health 13
4.3. Empirical results on infrastructure (pipe-borne water and electricity) 17
5. Conclusion and policy implications 21
References 24
Appendices
Appendix 1: Educational structure in cambodia 22
Appendix 2: Progressivity of public expenditure on education in 2004 and 2009 22
Appendix 3: Progressivity of public expenditure on health in 2004 and 2009 22
Appendix 4: Progressivity of public expenditure on infrastructure in 2004 and 2009 23
CDRI working paper series 24

List of acronyms

BIA	Benefit Incidence Analysis
CSES	Cambodia Socio-Economic Survey
MBIA	Marginal Benefit Incidence Analysis

List of Table and Figures

Table 1: Sample size 4
Table 2: Participation rates and share of public spending on education (%) 10
Table 3: Participation rates and share of public spending on education, by geographical zones (%) 11
Table 4: Marginal benefit incidence in education 13
Table 5: Benefit incidence analysis in health (%) 14
Table 6: Benefit incidence analysis in health—public sector (%) 15
Table 7: Participation rates and share of public spending on health by geographical zones (%) 16
Table 8: Marginal benefit incidence on health care 17
Table 9: Benefit incidence of public spending on pipe–borne water and electricity (%) ... 18
Table 10: Participation rates and share of public spending on pipe-borne water and electricity, by geographical zones (%) 18
Table 11: Marginal benefit incidence in infrastructure (pipe-borne water and electricity) .. 20

Figure 1: Concentration curves for government spending and two benchmarks 6
Figure 2: Concentration curve for public spending on education in 2011 12
Figure 3: Concentration curve for public spending on health in 2011 16
Figure 4: Concentration curve for public spending on infrastructure in 2011 19

Acknowledgements

The authors would like to thank Swedish International Development Agency (Sida) for providing five-year financial support (June 2011-June 2016) for the Inclusive Growth Study. This working paper is an extension of our first article on "The Inclusiveness of Public Spending on Education in Cambodia: Benefit Incidence Analysis" published in CDRI's *Annual Development Review 2013-2014*. It has extended our analysis into two other major development issues: health and infrastructure. The authors are grateful to CDRI executive director Dr Chhem Rethy, former executive director Mr Larry Strange, research director Dr Srinivasa Madhur and operations director Mr Ung Sirn Lee for their support and encouragement. The views expressed here are those of the authors and do not necessarily reflect those of CDRI or Sida.

Phnom Penh
December 2014

Abstract

This paper examines public spending on education, health and infrastructure in Cambodia. Using benefit incidence analysis (BIA), marginal benefit incidence analysis (MBIA) and the nationally representative household survey data from the Cambodia Socio-Economic Survey (CSES) in 2004, 2009 and 2011, the paper examines whether government spending in each sector is equally distributed across household income groups or geographical zones, and to what extent changes in public spending affect different population groups. Broadly speaking, public spending in Cambodia is not pro-poor except for the spending on primary schools, and it is also disproportionately allocated between rural and urban areas and among geographical zones. Increased public spending, except for primary and lower secondary schools, is highly unlikely to benefit the poor. This suggests that there is an urgent need to implement sectoral pro-poor policies within the prioritisation of target regions.

Key Words: Benefit Incidence Analysis, Marginal Benefit Incidence Analysis, Concentration Curve, Education, Health, Infrastructure

1. Introduction

Emerging development has turned its emphasis from sustaining strong and inclusive growth to ensuring that the poor receive a proportionate share of increased public spending (CDRI 2013). Thus there is a need for a more inclusive fiscal policy due to increasing inequality, which suggests a budget reallocation, a redistribution of productive assets as public investments in health and education to improve human development and capacities. Therefore, the study of the effectiveness and distribution of public expenditure has been receiving a lot of attention from development specialists and governments. Benefit Incidence Analysis (BIA), initiated by Gillespie (1965), and Marginal Benefit Incidence Analysis (MBIA), proposed by Lanjouw and Ravallion (1999) and Ajwad and Wodon (2001), have been widely used to assess the distributional benefits of public spending and marginal changes in government spending. In this study, these two approaches will be explored further to assess the inclusiveness of public spending on education, health and infrastructure (piped water supply and electricity) in Cambodia.

Cambodia's economic development in recent decades has reduced overall poverty significantly, and disparities between rich and poor are also growing visibly across regions. The national poverty rate dropped to 18.89 percent, and the poverty gap, based on the Foster-Greer-Thorbecke Index, was 2.8 percent in Phnom Penh and 3.58 percent in rural areas in 2012 (RGC 2014a). It is also important to note that major achievements have been made in overall development. First, the school enrolment rate increased to 97 percent in primary, 56.5 percent in lower secondary and 29.8 percent in upper secondary school in 2013, although the enrolment gap between urban and rural areas and between males and females, especially in upper secondary school, is increasing (RGC 2014b). Second, besides district, provincial and central hospitals, more than 1000 health centres have been established throughout the country (RGC 2014a). Third, 68.5 percent of urban households had piped water in 2012, and 85 percent of Phnom Penh residents (RGC 2014a). Also, there has been a remarkable increase in electrical connections, covering about 51 percent of all villages in 2013, according to RGC (2013).

Although BIA and MBIA have received high recognition as powerful tools to evaluate the opportunities provided by government resources, this kind of study is very new in Cambodia. This study is thus expected to provide empirical answers to whether existing budget allocations reach the poor, and to what extent increased public expenditure on education, health and infrastructure benefits the poor.

The results will have significant policy implications for access to and utilisation of public services. In the remaining sections of this paper, Section 2 retrieves information from existing studies on fiscal policy; Section 3 explains the data and the methodology of Benefit Incidence Analysis and Marginal Benefit Incidence Analysis; Section 4 illustrates the empirical results; and Section 5 draws conclusions and policy implications.

2. Literature review

It is widely believed that fiscal policy is one of the most powerful instruments to stabilise the economy over the course of the business cycle. It has great impacts on poverty reduction through growth and income redistribution. The literature has suggested two broad approaches to assess distributional impacts of public social (education and health) and infrastructure expenditure: behavioural responses and benefit incidence analysis. Behavioural responses, initially proposed in Aaron and McGuire (1970), later in Demery (2000), Castro-Lead et al. (1999) and Chakraborty, Singh and Jacob (2013), highlighted measurement of individual preferences for publicly provided goods or services. The drawback of the approach is that the evaluation is based on microeconomic theory and unit record data, which requires knowledge of the underlying demand functions of individuals or households—not a practical approach to assessing the distributional impacts of government spending.

Benefit Incidence Analysis, initially proposed by Gillespie in 1965 (cited in Davoodi, Tiongson and Asawanuchit2003) has been improved several times and widely used to assess the distributional benefits of public spending. BIA will assess if current public spending is pro-poor at a given time, and MBIA will figure out who are the ultimate beneficiaries if there is an adjustment of the government budget in a particular sector. Various studies apply BIA and MBIA in many countries to assess the pro-poorness of public expenditure on sectors such as education (Hammer, Nabi and Cercone 1995; Selden and Wasylenko 1995; van de Walle 1998; Demery 1997; Castro-Lead et al. 1999; Lanjouw and Ravallion 1999; Ajwad and Wodon 2002, 2007; Davoodi, Tiongson and Asawanuchit 2003; Guloba, Magidu and Wokadala. 2010; Alabiet al. 2011; Cuesta, Kabaso and Suarez-Becerra 2012), health (Hammer et al. 1995; Demery 1997; Castro-Lead et al. 1999; Davoodi, Tiongson and Asawanuchit 2003; Kruse et al. 2012; Alabiet al. 2011; Cuesta, Kabaso and Suarez-Becerra 2012; Chakraborty, Singh and Jacob 2013), antipoverty programmes (Lanjouw and Ravallion 1999; Cuesta, Kabaso and Suarez-Becerra 2012 on fertiliser subsidies; Meessenet al. 2008 on health equity funds) and infrastructure—mainly water supply and electricity (Ajwad and Wodon 2001, 2002, 2007; Alabiet al. 2011). Broadly speaking, public spending on education and health is poorly targeted while infrastructure service is in favour of the rich. More precisely, public spending on education, to a great extent, is pro-poor in primary schools but is neither progressive nor regressive in lower and upper secondary schools. Public spending is pro-poor for health centres or primary health care. Public spending on infrastructure such as pipe-borne water, sewerage, telephones and electricity is pro-rich. For marginal benefit, poor households are highly likely to benefit from the expansion of public spending in some sectors but not in others.

In Cambodia, many studies have attempted to assess the impact of fiscal policy on poverty and income distribution (Lord 2001), provide a comprehensive review of fiscal policy during the period 1991-2002 (Beresford et al. 2004) and identify the key constraints on fiscal policy that hinder economic growth (Jenkins and Klevchuk 2006).[1] However, there are very few studies that examine to what extent government spending has reached the poor. Using BIA and Socio-Economic Survey data in 1996-97, the World Bank (1999) found that education spending in Cambodia is pro-rich: the richest group received up to 29 percent of the total spending. By disaggregating the educational system into three levels, it noted that public spending on

[1] See Tong and Phay (2014) for a summary of these studies' key findings.

education was pro-poor at primary level, but pro-rich at lower and upper secondary levels. Using the same approach, Meessen et al. (2008) assessed the pro-poorness of health equity funds based on inpatient censuses in six rural hospitals in Cambodia. They concluded that the implementation was a successful approach to extending public health care to very poor and poor households.

Most recently, Lun and Roth (2014) measured inequality in accessing basic healthcare (vaccination, antenatal care and delivery in public hospitals), education (primary, lower secondary and upper secondary) and infrastructure services(electricity, safe water and sanitation) by using the Human Opportunity Index proposed by Paes de Barroset al. (2009) and Cambodia Socio-Economic Survey 2009 and 2011. They noted that access to primary school and healthcare is high and inequality of access low. In contrast, access to secondary school and infrastructure was low while the inequality of access was high. They highlighted that policies targeting both coverage and distribution should be designed, but the priority should be the former given the extent of the problem.

In line with the World Bank (1999), we use Benefit Incidence Analysis to assess the pro-poorness of education, health and infrastructure, specifically pipe-borne water and electricity. This study is expected to provide up-to-date evidence on the effectiveness of public spending by using the Cambodia Socio-Economic Survey in 2004, 2009 and 2011 and to have some implications for both policy makers and development partners to ensure that budget allocations in the selected sectors reach the poor.

3. Data and methodology

3.1. Data

The study is mainly based on the nationally representative household data from the CSES conducted by the National Institute of Statistics in 2004, 2009 and 2011; it has conducted nationally representative household surveys since 1993-94. All survey data are available for public use; however, only the surveys done since 2004 used a proper sampling frame and are considered of acceptable quality. The sampling frame for the 2004, 2007 and 2008 surveys was the 1998 general population census, and that for the remaining data was the 2008 general population census. The 2004 survey started in November 2003 and lasted until February 2005, with a total sample of 867 villages and 15,000 households, while the remaining surveys were conducted within the calendar year. To be consistent with other surveys, observations collected in 2003 and 2005 were dropped from the study. The samples for 2007 and 2008 were sub-samples of 2004—half the villages and one-third of the households—and those of 2010 and 2011 were sub-samples of 2009. For this reason, we mainly use only the 2004 and 2009 survey data, but we also report the results from 2011 to capture the most recent developments.

The survey datasets contain detailed information on geographical location, household characteristics, household expenditure including educational and health spending, household income, education of household members aged 3 years and older, health care seeking of all household members and household access to safe water and electricity. This allows us to examine the pro-poorness of public spending on education, health and infrastructure and to decompose our analysis by region (urban and rural; Phnom Penh, plain, Tonle Sap, coastal and plateau and mountain), sector (primary, lower secondary and upper secondary school for education; health centre and hospital for medical) and income group. However, it is widely noted that household income is likely to be underestimated and subject to seasonality, especially in developing countries, while consumption remains relatively stable (Haughton and Khandker 2009). This suggests that consumption reflects household welfare better than income. Therefore, our study uses consumption as a welfare indicator.

Table 1: Sample size

	2004	2007	2008	2009	2010	2011
Phnom Penh	1110	737	729	1113	744	747
Other urban	1710	628	626	1332	640	638
Other rural	9180	2228	2193	9526	2208	2207
Total	12000	3593	3548	11,971	3592	3592

Source: CSES 2004, 2007-2011

3.2. Benefit incidence analysis

BIA is primarily designed to connect government spending on public services with household members who have used it. Data of national spending on public services are normally available, but only sometimes disaggregated for regions and localities, while data on users of public services can be found in household surveys. Having combined these two sources, the benefit incidence of public spending can be estimated via the following three steps (Demery 2000):

1. **Estimating unit cost:** estimate the unit cost of the service by dividing government spending on that service by the total number of users. Define the unit cost as the benefit to the users.
2. **Identifying the users:** identify the users of public services from household survey, and then aggregate the users into sub-groups e.g. poor and non-poor, population quintile, rural and urban or male and female.
3. **Calculating the benefit incidence:** multiply the benefit by the total number of users in each group, which is derived from the previous step.

If the above procedures are applied to government spending on education, benefit incidence is estimated by the following formula:

$$X_j = \sum_{i=1}^{n} E_{ij} \frac{S_i}{E_i} = \sum_{i=1}^{n} \frac{E_{ij}}{E_i} S_i \qquad (1)$$

where X_j is the benefit incidence of group j, E_{ij} represents the number of students enrolled at educational level i (primary, secondary or tertiary) from group j, E_i the total enrolment at educational level i and S_i is the government spending on educational level i.

The benefit share from total government spending for group j is given by:

$$x_j = \sum_{i=1}^{n} \left(\frac{E_{ij}}{E_i}\right) \times \left(\frac{S_i}{S}\right) = \sum_{i=1}^{n} e_{ij}\, s_i \qquad (2)$$

where x_j is $\frac{X_j}{S}$, e_{ij} the share of student enrolled at educational level i from group j, s_i the share of government spending for educational level i.

However, the data on government expenditures on public services in some countries, e.g. Nigeria (Alabiet al. 2011), are not available. To fill the gap, Araar and Duclos (2009, 2013) introduced an alternative approach to estimating the benefit incidence that does not require this information. They estimate the individual participation rate for each type of service by dividing the actual number of users by the number of eligible members in the households. The larger the value of the participation rate, the greater the public service benefits received.

The participation rate of group j in educational level i is defined as:

$$P_j^i = \frac{\sum_{h=1}^{n} f_h^i I(h \in j)}{\sum_{h=1}^{n} e_h^i I(h \in j)} \qquad (3)$$

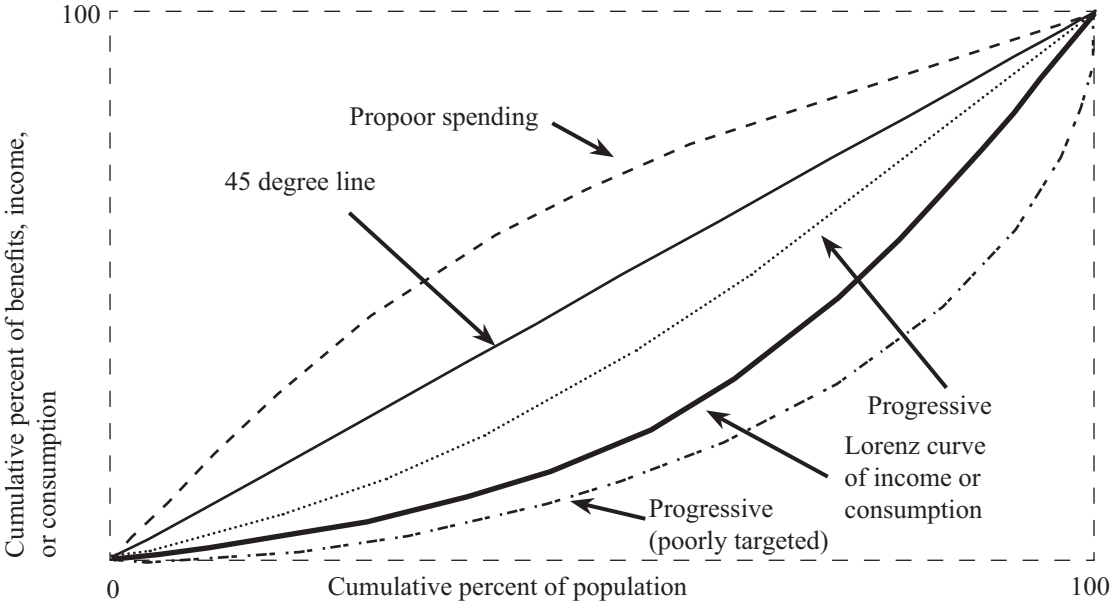
where f_h^i the number of students of observation h enrolled at educational level i, e_h^i the number of "eligible" members of observation h, and $I[\cdot]$ is an indicator function which equals 1 if $i \in j$ and zero otherwise.[2] These statistics can be calculated by using the Distributive Analysis Stata Package, either version 2.1 or 2.3. The analysis of health, antipoverty and infrastructure spending follow the same approach.

Despite the simplicity of BIA, it does not provide complete information[3] on how well government spending is targeted or how it compares with other types of government spending—in the case of education, how the spending on primary schools differs from

[2] For complex sampling frame survey data, sampling weight for each observation will be taken into account.
[3] BIA has typically focused on either five or 10 discrete points (Davoodi, Tiongson and Asawanuchit 2003).

secondary and tertiary schools, how current spending compares with past spending or with the spending in other countries. To fill this gap, the concentration curve which displays the cumulative percent of benefits from government spending against the cumulative percent of population ranked by per capita expenditure has commonly been utilised (Kakwani 1977; Kakwani et al. 1997; Wagstaff et al. 1991).

Figure 1: Concentration curves for government spending and two benchmarks



Source: Davoodi, Tiongson and Asawanuchit (2003), p. 14

As illustrated in Figure 1, government spending on services is pro-poor if the concentration curve for those benefits is above the 45-degree line. If the concentration curve is below the 45-degree line and above the Lorenz curve for income or consumption, government spending on the service is progressive. The spending is said to be regressive if the concentration curve for the benefits is below the Lorenz curve for income or consumption.

3.3. Marginal benefit incidence analysis

Despite the improvement in BIA over the years, it has been criticised as an inadequate instrument for evaluating a change of policy (van de Walle 1998; Younger 2003). From a practical policy-making standpoint, in addition to the distribution of current public spending, it is extremely important to understand the extent to which changes in public spending affect different population groups. For instance, the average benefit from the existing policy that accrues to the poor may be relatively low compared with that to richer groups, but the poor may benefit more from expansion of the policy than their counterparts do, and vice versa.

To address this issue, Lanjouw and Ravallion (1999) and Ajwad and Wodon (2001) proposed an innovative empirical method: Marginal Benefit Incidence Analysis, i.e., a regression technique to measure marginal benefit incidence using single cross-sectional data. Technically, they regress the participation rate in a given quintile against the mean participation rate of all quintiles to capture the expected changes of participation over time. The assumption is that the distribution of the new participation rates in the regions where participation is lower will follow the patterns observed in the regions where participation rates are higher. But the two approaches

differ in terms of ranking methods (Ajwad and Wodon 2002). Lanjouw and Ravallion (1999) rank individuals as poor or non-poor according to national income distribution, whereas Ajwad and Wodon (2001) use local income distribution, where the country is divided into several distinct geographical regions.

Given these comprehensive measures of well-being, we estimate marginal benefit incidence using the method proposed by Ajwad and Wodon (2001). If the incidence is 1, it means that the households in a given quintile derive benefits from an increase in public spending equal to those of the average household. If the incidence is above (or below) 1, it means the households in a given quintile benefit more (or less) than the average household from an increase in public spending.

Following Ajwad and Wodon (2001), we assume that a country has N regions $i = 1,2,..,N$ with a number of households in each region. Households in each region are ranked by per capita income or consumption and then assigned to an income or consumption quintile $q = 1,2,..,Q$. We define X_{ij}^{q} as the benefit incidence of government spending for household j, quintile q of region i. The mean benefit incidence in quintile q in region $i\left(X_i^q\right)$ and the overall region mean (X_i) are written as:

$$X_i^q = \frac{\sum_{j=1}^{J_i^q} x_{ij}^q}{J_i^q} \tag{4}$$

$$X_i = \frac{\sum_{q=1}^{Q}\sum_{j=1}^{J_i^q} x_{ij}^q}{\sum_{q=1}^{Q} J_i^q} \tag{5}$$

where J_i^q is the number of households in quintile q of region i. To estimate the marginal benefit incidence, Ajwad and Wodon (2001) propose to estimate the benefit incidence in each quintile in the region against the region means by using Q regression technique.

$$X_i^q = \alpha^q + \beta^q \left(\frac{\sum_{q=1,j=1}^{Q,J_i^q} x_{ij}^q - \sum_{j=1}^{J_i^q} x_{ij}^q}{\sum_{q=1}^{Q} J_i^q - J_i^q} \right) + \varepsilon_i^q \tag{6}$$

for $q = 1,2,..,Q$. The explanatory variables are calculated at the regional level as the mean for all households excluding quintile q in order to avoid the endogeneity problem.

Having defined further that each quintile in a given region has the same number of households $J_i^q = J_i$, equation (6) can be simplified as follows:

$$X_i^q = \alpha^q + \beta^q \left(\frac{Q\overline{X_i} - X_i^q}{Q-1} \right) + \varepsilon_i^q \tag{7}$$

for $q = 1,2,..,Q$, and $\sum_{q=1}^{Q} X_i^q = Q\overline{X_i}$.

Equation (7) can be rewritten by dropping the error term:

$$X_i^q = \frac{\alpha^q + \beta^q (Q/Q-1)\overline{X_i}}{1 + \beta^q/(Q-1)} \tag{8}$$

Partially differentiating equation (8), we get:

$$\frac{\partial X_i^q}{\partial \overline{X_i}} = \frac{Q\beta^q}{Q-1+\beta^q} \qquad (9)$$

The right hand side of equation (9), $\frac{Q\beta^q}{Q-1+\beta^q}$, is the estimates of the marginal benefit incidence.

3.4. Limitations of benefit incidence analysis

Despite several refinements to the original methodology and its appealing simplicity over the decades, BIA has a number of limitations (van de Walle 1998; Mckay 2002), for instance:

1. It is a static method that examines the distributional benefit at a specific time.
2. It is based on monetary measures of welfare, which capture only one dimension; in some cases, e.g. the evaluation of food subsidy projects, non-monetary measures such as nutritional outcomes will be of greater interest than monetary indicators.
3. It simply assumes that the cost of the service is its benefit, and it does not take the quality of the service into account.
4. It does not explain why some households do not use the service.

Regardless of those limitations, empirical evidence from BIA can at least inform policy makers about the current incidence of public spending, that is, the extent to which different segments of the population benefit, or the changes in incidence due to the expansion or contraction of public spending over time. This kind of information would definitely help the formulation of policy that is more pro-poor.

3.5. Limitations of the study

Given the unavailability of details on public spending at sub-section level, the study is not able to present the amount of educational spending per student or health spending and infrastructure spending per household.

4. Empirical results

4.1. Empirical results on education

Benefit Incidence Analysis: Table 2 shows the participation rates and shares of government spending on education by household expenditure quintiles (quintile 1=the poorest, quintile 5=the richest) against education levels. The participation rate is defined as the number of eligible children registered at each education level divided by the total number of eligible children at that level (Appendix 1).

Generally, school enrolment increased with household welfare (consumption), the rich having the highest participation rate. Furthermore, the gap in enrolment between the highest and lowest quintiles increased with the education level. The primary school enrolment rate ranged from 85 to 89 percent during 2004-11, and public spending at this level was dispersed proportionately across quintiles, the poor receiving at least 18-19 percent of the spending during the study period. Meanwhile, participation in lower secondary schooling increased to 85 percent in 2011 from 77 percent in 2004; however, public spending at this level was relatively unchanged, going disproportionately to households in quintiles 2-4 during 2004-11. At the same time, participation in upper secondary schooling doubled from 20 percent in 2004 to 42 percent in 2011; yet government spending at this level was skewed towards quintiles 4 and 5 even though the share to the richest group declined from 56 percent to 39 percent.

Table 3 presents participation rates and distribution of educational spending across five geographical regions. The participation rate in Phnom Penh was the highest, while that in the mountain and plateau region was the lowest. However, primary school enrolment in Phnom Penh declined to 85 percent in 2011, the lowest among the regions in that year. The implication could be a tendency for citizens to send their children to private primary schools. Urban areas always had a higher participation rate at all levels than rural areas, and the gap was highest in upper secondary school, above 30 percentage points during 2004-11.

Government expenditure on education is unevenly distributed across zones. Education spending went disproportionately to the plain and Tonle Sap regions, ranging between 36 and 43 percent and 29 and 31 percent, respectively, during 2004-11. Primary and lower secondary spending was also allocated more to the plain and Tonle Sap regions, while upper secondary spending went more to Phnom Penh. For instance, the plain region received 37 to 43 percent of primary and 38-41 percent of lower secondary spending, while the Tonle Sap region obtained 31-32 percent of primary spending and 25-27 percent of lower secondary spending. Phnom Penh received about 33 percent of upper secondary spending in 2004 and 40 percent in 2011. A larger share of public spending on primary and lower secondary education went to rural areas; conversely, a greater share of public upper secondary spending was distributed to urban areas.

Table 2: Participation rates and share of public spending on education (%)

	2004		2009		2011	
	Participation rate	Share	Participation rate	Share	Participation rate	Share
All Education levels						
Quintile 1	66	17	66	17	68	17
Quintile 2	74	20	73	19	76	19
Quintile 3	77	20	77	20	80	20
Quintile 4	79	21	79	21	87	22
Quintile 5	85	22	83	22	86	22
All	76	100	76	100	79	100
Primary						
Quintile 1	77	18	78	18	83	19
Quintile 2	84	20	88	20	89	20
Quintile 3	86	20	88	21	90	20
Quintile 4	88	21	88	21	94	21
Quintile 5	90	21	90	21	88	20
All	85	100	86	100	89	100
Lower Secondary						
Quintile 1	51	13	61	15	64	15
Quintile 2	71	19	76	19	81	19
Quintile 3	82	21	84	21	92	22
Quintile 4	87	23	86	22	93	21
Quintile 5	93	24	89	23	95	23
All	77	100	79	100	85	100
Upper Secondary						
Quintile 1	2	2	7	5	10	5
Quintile 2	7	7	15	10	19	9
Quintile 3	13	13	26	17	39	19
Quintile 4	22	22	41	27	59	28
Quintile 5	56	56	62	41	82	39
All	20	100	30	100	42	100

Source: Authors' calculation

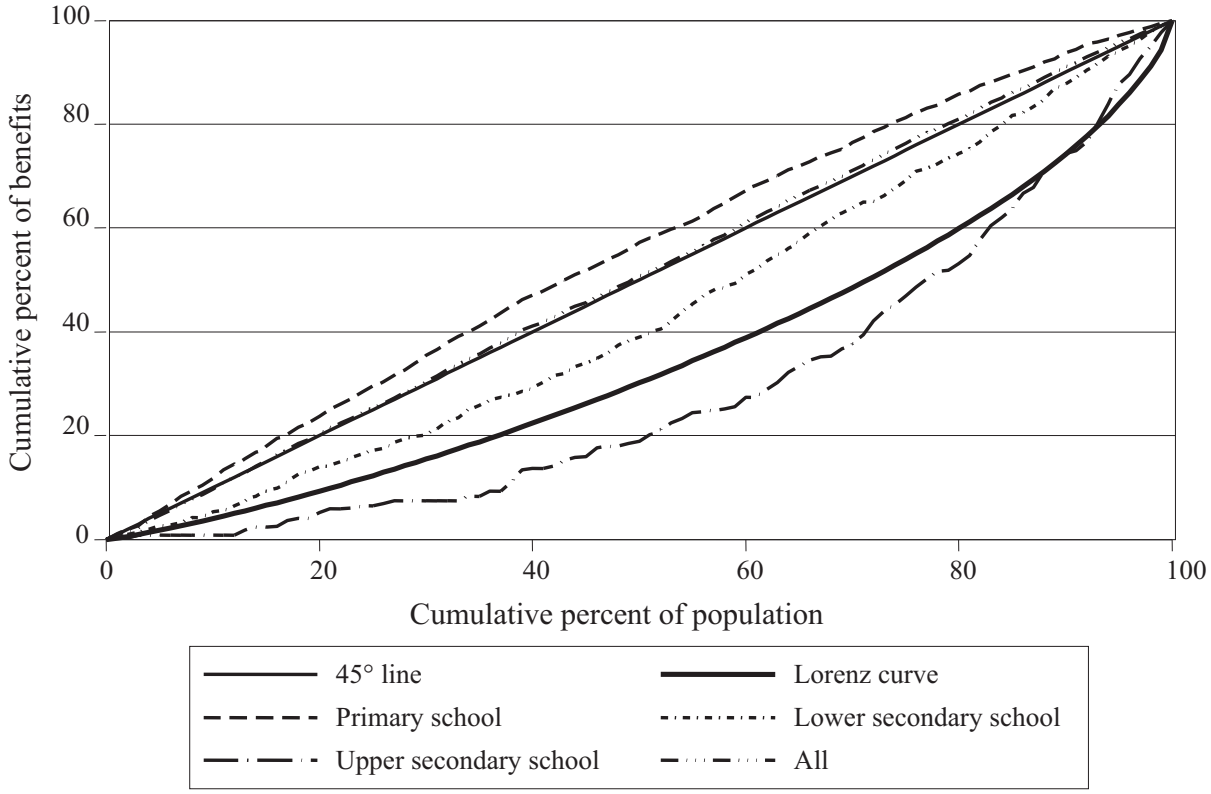
Table 3: Participation rates and share of public spending on education, by geographical zones (%)

	2004		2009		2011	
	Participation rate	Share	Participation rate	Share	Participation rate	Share
All Education Levels						
Phnom Penh	85	9	83	8	83	17
Plain	77	43	76	41	80	36
Tonle Sap	74	31	74	32	77	29
Coastal	78	8	78	8	79	6
Plateau and Mountain	72	9	71	11	78	12
Urban	81	24	81	19	83	36
Rural	75	76	74	81	78	64
All	76	100	76	100	79	100
Primary						
Phnom Penh	90	6	88	6	85	13
Plain	86	43	88	42	90	37
Tonle Sap	84	32	86	33	90	31
Coastal	87	8	87	8	92	7
Plateau and Mountain	80	10	81	12	86	13
Urban	87	20	88	15	90	31
Rural	85	80	86	85	88	69
All	85	100	86	100	89	100
Lower Secondary						
Phnom Penh	93	16	90	11	91	22
Plain	77	41	79	41	87	38
Tonle Sap	72	27	77	32	79	25
Coastal	79	9	83	8	88	7
Plateau and Mountain	67	7	74	9	80	10
Urban	88	37	87	24	89	41
Rural	71	63	77	76	83	59
All	77	100	79	100	85	100
Upper Secondary						
Phnom Penh	58	33	63	22	73	40
Plain	15	29	29	38	34	26
Tonle Sap	14	23	24	27	30	20
Coastal	26	12	33	8	29	5
Plateau and Mountain	11	5	20	6	37	9
Urban	45	63	55	40	60	61
Rural	11	37	23	60	28	39
All	20	100	30	100	42	100

Source: Authors' calculations

Figure 2 presents the benefit concentration curves of government spending on all education and the three educational levels with benchmark distributions, the 45-degree line and the Lorenz curve. Generally, the educational spending curve lies just above and alongside the 45-degree line, indicating that total education spending is pro-poor. The primary school concentration curve lies above the 45-degree line, and spending on primary education is thus pro-poor. That the concentration curve for lower secondary school lies between the 45-degree line and the Lorenz curve indicates that education spending for lower secondary schools is progressive. Finally, the concentration curve for upper secondary school runs across the Lorenz curve, implying that government expenditure on upper secondary education is neither progressive nor regressive.

Figure 2: Concentration curve for public spending on education in 2011



Source: CSES 2011

Marginal benefit incidence: The MBI analysis presented in Table 4 shows the marginal gain if public spending on education is increased. Overall, if there is an increase of public spending on primary and lower secondary school, the benefit will be allocated more to households in quintiles 1 to 4. According to the table, a 1 percent increase in government spending on primary and lower secondary schools would have led to increases of 1-1.22 percent and 1.40-1.64 percent, respectively, during 2004-11 for school enrolment among the poorest group. From an increase of public spending on upper secondary schools, middle income households (quintiles 2-4) would have received more benefit than the poorest and richest households. Specifically, 1 percent increases in public spending on upper secondary school would have led to 1.19-1.26 percent increases in upper secondary school enrolment among middle income households during the study periods.

A simple explanation is that school-aged children from the poorest households are more likely to attend public primary and lower secondary school, while those from the richest households prefer to enrol in private schools. So it is possible that increased spending on public primary and lower secondary schools will benefit the poorest children more. However, children from the poorest group might not be able to afford the unofficial expenses in upper secondary school, and those from the richest households already had full access. That is why middle income households could gain the most benefit from the expansion of upper secondary schooling.

Table 4: Marginal benefit incidence in education

	2004	2009	2011
Primary			
Quintile 1	1.00	1.26	1.22
Quintile 2	1.24	1.24	1.12
Quintile 3	1.08	1.11	0.87
Quintile 4	1.02	0.93	1.25
Quintile 5	0.67	0.46	0.54
Lower Secondary			
Quintile 1	1.40	1.40	1.64
Quintile 2	1.16	1.40	0.89
Quintile 3	1.05	0.91	1.38
Quintile 4	0.94	1.07	0.66
Quintile 5	0.46	0.22	0.43
Upper Secondary			
Quintile 1	0.56	1.06	0.79
Quintile 2	0.65	1.07	1.07
Quintile 3	1.26	0.99	1.19
Quintile 4	1.37	1.12	1.10
Quintile 5	1.17	0.76	0.85

Note: Household weight is applied.
Source: Authors' calculations

4.2. Empirical results on health

Benefit incidence analysis: We define eligible members as household members reported being sick or injured during the past 30 days and actual users as household members reported having sought treatment from private or public health facilities or non-medical health service providers, and then we decompose public facilities into health centres (health centre and health post) and hospitals (national, provincial and referral). Although there is increased accessibility over the last decade, the utilisation of public health services remains very low. As shown in Table 5, utilisation rates in public health facilities were in the range of 10-18 percent during 2004-11, while in private facilities they were 53-58 percent. Despite the extremely low utilisation of public health services, public health spending seemed to be equally distributed across different income quintiles in 2004 and 2009, and a pro-poor pattern emerged more prominently in 2011, around 24 percent of public health spending going to the poorest households and only 12 percent to the richest.

Table 5: Benefit incidence analysis in health (%)

	2004		2009		2011	
Groups	Participation rate	Share	Participation rate	Share	Participation rate	Share
All Health Care						
Quintile 1	60	18	90	19	95	20
Quintile 2	62	19	92	20	97	20
Quintile 3	65	20	95	20	96	20
Quintile 4	70	21	95	20	96	20
Quintile 5	78	23	96	21	97	20
All	67	100	93	100	96	100
Public Sector						
Quintile 1	11	22	19	20	15	24
Quintile 2	9	18	17	18	17	26
Quintile 3	11	21	18	20	14	22
Quintile 4	10	20	18	19	11	17
Quintile 5	11	20	20	22	8	12
All	10	100	18	100	13	100
Private Sector						
Quintile 1	45	17	44	17	38	13
Quintile 2	49	19	47	18	46	16
Quintile 3	51	19	50	19	54	19
Quintile 4	56	21	56	22	69	24
Quintile 5	64	24	62	24	81	28
All	53	100	52	100	58	100

Source: Authors' calculations

The utilisation rates of health centres (Table 6) are 5-7 percent—almost the same as referral hospitals. However, public spending on health centres benefits the poorest households more than the richest. Between 2004 and 2011, the share of public spending on health centres going to the poorest households increased from 27 percent to 37 percent, and that to the richest households declined from 13 percent to 4 percent. Conversely, public spending on referral hospitals benefited the richest households more than the poorest. The share of public health spending on referral hospitals benefiting the poorest households declined from 17 percent in 2004 to 10 percent in 2011. Although the share for the richest households also declined over the same period, the disparity between the two groups was unchanged. This strongly suggests that the poorest households are likely to gain the most benefit from public spending on health centres and the least from referral hospitals.

Table 6: Benefit incidence analysis in health—public sector (%)

	2004		2009		2011	
Groups	Participation rate	Share	Participation rate	Share	Participation rate	Share
Health Centres						
Quintile 1	7	27	14	28	13	37
Quintile 2	5	20	11	22	11	33
Quintile 3	6	23	10	19	6	17
Quintile 4	4	16	10	19	3	9
Quintile 5	3	13	6	11	1	4
All	5	100	10	100	7	100
Hospitals						
Quintile 1	5	17	3	10	3	10
Quintile 2	4	15	4	12	6	20
Quintile 3	5	19	7	21	7	23
Quintile 4	6	23	7	20	7	25
Quintile 5	7	26	13	38	7	22
All	6	100	7	100	6	100

Source: Authors' calculations

Table 7 presents the utilisation rates and the shares of public spending on health across geographical zones. We note that the utilisation rate of health centres in Phnom Penh is lower than in other geographical zones. The health centre utilisation rates in rural areas are always higher than in urban areas. Households in urban areas are more likely to use referral hospitals than those in rural areas. This may be attributed to the fact that referral hospitals are concentrated in urban areas. Our finding is in line with NIS and ICF Macro (2011), which confirmed that households in rural areas commonly seek care from public health centres, those in urban areas from public referral hospitals.

Public spending on health centres went disproportionately to the plain and Tonle Sap regions. As shown in Table 7, about 44 percent and 40 percent of public spending on health centres went to those regions in 2004, and their share was unchanged in 2011. Public spending on referral hospitals was also unevenly allocated to those regions. The great majority of public spending on health centres and referral hospitals was allocated to rural areas, although the disparity decreased significantly in 2011.

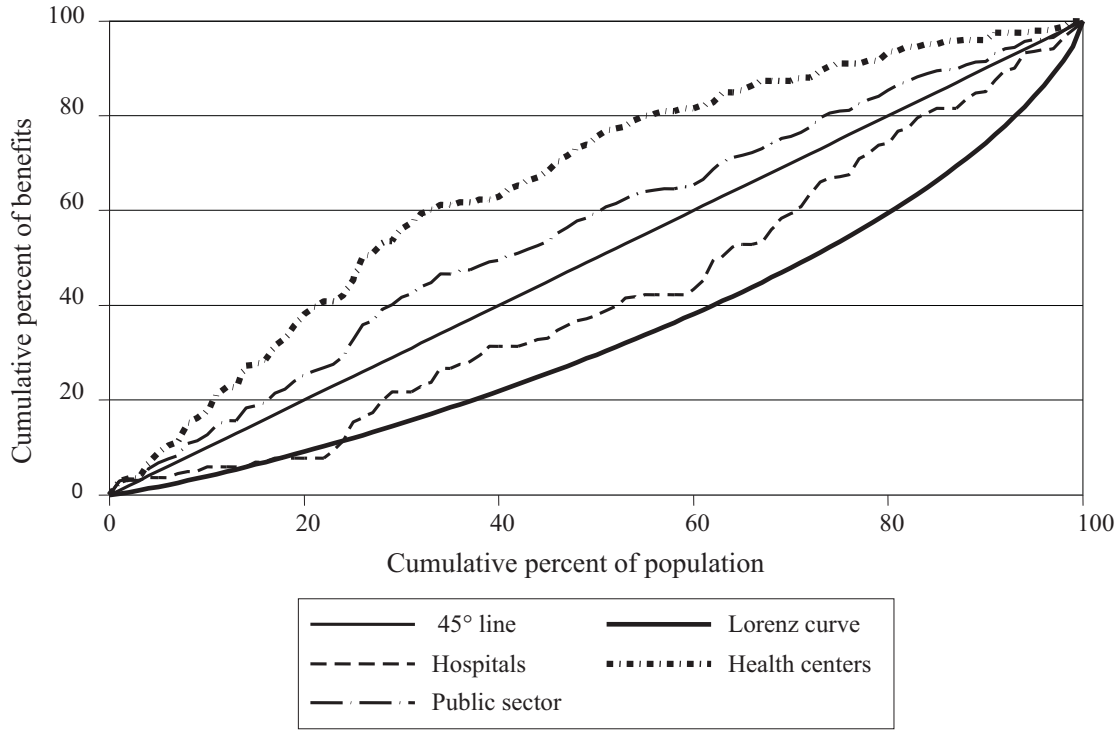
Figure 3 provides a comprehensive picture of the inclusiveness of public spending on health care. The concentration curve for spending on health centres lies above the 45 degree line, suggesting that spending on them is pro-poor. The concentration curve of public spending on hospitals lies below the 45 degree line but cross the Lorenz curve, implying that government expenditure on hospitals is neither progressive nor regressive. In other words, public spending on referral hospitals is as unequally distributed as household income.

Table 7: Participation rates and share of public spending on health by geographical zones (%)

	2004		2009		2011	
Groups	Participation rate	Share	Participation rate	Share	Participation rate	Share
Health Centres						
Phnom Penh	1	3	3	2	0	1
Plain	5	44	10	51	9	45
Tonle Sap	6	40	13	30	10	39
Coastal	3	4	9	5	7	6
Plateau and Mountain	4	9	12	12	6	9
Urban	2	9	3	5	4	20
Rural	6	91	12	95	9	80
All	5	100	10	100	7	100
Hospitals						
Phnom Penh	7	14	9	8	6	22
Plain	5	40	6	48	6	36
Tonle Sap	5	30	8	27	6	30
Coastal	7	7	11	9	6	6
Plateau and Mountain	5	10	6	9	4	7
Urban	7	30	9	22	7	42
Rural	5	70	7	78	5	58
All	6	100	7	100	6	100

Source: Authors' calculations

Figure 3: Concentration curve for public spending on health in 2011



Source: Authors' calculations

Marginal benefit incidence: Table 8 shows the marginal benefit incidence of public spending on health centres and referral hospitals for different household groups. Households in quintile 1 would have benefited more from increased public spending on health centres than those in quintile 5 in 2004 and 2009. In 2011, the expansion of public spending on health centres would have benefited only households in quintile 2. An increase in public spending on referral hospitals would have benefited households in quintiles 1, 3 and 4 more than those in quintile 5 in 2004; but in 2009 and 2011 only quintiles 2, 3 and 4 would have benefited. The evidence implies that the poorest households would have benefited more than the richest households from increased spending on both health centres and referral hospitals in 2004, but only from spending on health centres in 2009. In 2011, the poorest households would have received less benefit from any kind of expansion of public health care spending.

Table 8: Marginal benefit incidence on health care

	2004	2009	2011
Health Centres			
Quintile 1	1.60	1.47	0.68
Quintile 2	0.92	0.84	1.62
Quintile 3	0.69	1.01	0.94
Quintile 4	1.13	1.00	0.93
Quintile 5	0.66	0.68	0.83
Hospitals			
Quintile 1	1.52	0.84	0.56
Quintile 2	0.68	1.16	1.58
Quintile 3	1.24	1.09	0.88
Quintile 4	1.26	0.98	1.09
Quintile 5	0.30	0.93	0.89

Note: Household weight is applied.

Source: Authors' calculations

4.3. Empirical results on infrastructure (pipe-borne water and electricity)

Benefit Incidence Analysis: Access to pipe-borne water and electricity indicates sanitation and welfare improvement. Table 9 presents access rates and shares of public spending on water and electricity by income quintiles. Overall, figures for households having access to pipe-borne water and electricity were extremely low: only 29 percent in 2011 from 12 percent in 2004 and 49 percent in 2011 from 15 percent in 2004, respectively.

Households in quintile 5 have the highest access rates for both water and electricity. Conversely, households in quintile 1 had the least access to both. The access gap for both pipe-borne water and electricity between the poorest and the richest households widened during the study periods.

Not surprisingly, public spending on both pipe-borne water and electricity tends to benefit households in quintile 5 more than those in quintile 1. The share of spending on pipe-borne water for households in quintile 1 was only 2-3 percent during 2004-11, whereas that for households in quintile 5 was between 51 and 64 percent during the same years. However, the gap between the two groups in the incidence of public spending on pipe-borne water and electricity was reduced from 61 percent to 48 percent and 56 percent to 31 percent, respectively, during 2004-11.

Table 9: Benefit incidence of public spending on pipe–borne water and electricity (%)

	2004		2009		2011	
Groups	Participation rate	Share	Participation rate	Share	Participation rate	Share
Pipe–borne Water						
Quintile 1	2	3	3	4	4	3
Quintile 2	3	4	5	7	8	6
Quintile 3	5	8	10	12	20	14
Quintile 4	13	22	20	24	38	27
Quintile 5	39	64	44	53	74	51
All	12	100	17	100	29	100
Electricity						
Quintile 1	2	3	6	5	14	6
Quintile 2	3	5	12	9	27	11
Quintile 3	8	10	20	15	45	18
Quintile 4	17	23	35	26	70	28
Quintile 5	45	59	61	45	92	37
All	15	100	27	100	49	100

Source: Authors' calculations

Table 10: Participation rates and share of public spending on pipe-borne water and electricity, by geographical zones (%)

	2004		2009		2011	
Groups	Participation rate	Share	Participation rate	Share	Participation rate	Share
Pipe-borne Water						
Phnom Penh	83	62	91	51	95	68
Plain	4	15	10	24	12	14
Tonle Sap	5	12	8	15	13	13
Coastal	10	6	13	6	9	2
Plateau and Mountain	6	5	7	4	9	3
Urban	46	89	62	75	69	89
Rural	2	11	5	25	5	11
All	12	100	17	100	29	100
Electricity						
Phnom Penh	86	53	99	34	99	42
Plain	5	15	17	27	33	23
Tonle Sap	10	20	23	27	45	26
Coastal	15	8	22	6	37	5
Plateau and Mountain	8	5	15	6	25	5
Urban	57	88	86	64	91	69
Rural	2	12	12	36	24	31
All	15	100	27	100	49	100

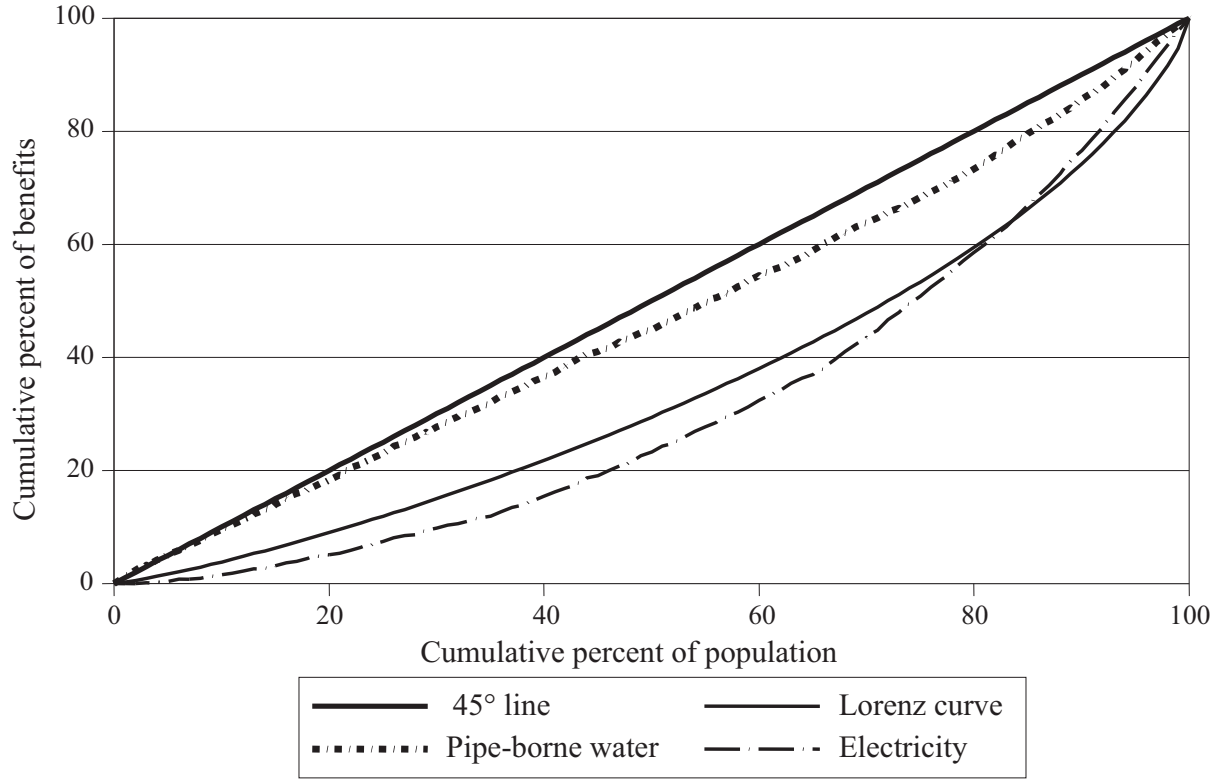
Source: Authors' calculations

The disparity in access to pipe-borne water and electricity by geographical zones is illustrated in Table 10. Phnom Penh has had almost full access to both pipe-borne water and electricity since 2004. In other regions, the access to pipe-borne water was extremely low, only 4-10 percent in 2004 and 9-13 percent in 2011. Although the access rates to electricity in other regions were almost the same as that to pipe-borne water in 2004, they had improved significantly in 2011. In rural areas between 2004 and 2011, access to pipe-borne water increased 3 percentage points and to electricity 22 percentage points. In urban areas the respective increases were 23 and 34 percentage points.

Phnom Penh's share of public spending on pipe-borne water was in the range of 51-68 percent, compared to 2-6 percent for plateau and mountain or coastal regions. For public spending on electricity, these figures were 34-53 percent for Phnom Penh and 5-8 percent for plateau and mountain or coastal. Urban areas received 75-89 percent and 64-88 percent of public spending on pipe-borne water and electricity respectively. The urban-rural disparity remained high at 78 percentage points for pipe-borne water, but only 38 percentage points for electricity, in 2011.

In Figure 4, the concentration curve of public spending on pipe-borne water lies below both the 45 degree line and the Lorenz curve, confirming that public spending on pipe-borne water is regressive, i.e. the public spending on it is more unequally distributed than household income. Since the concentration curve of electricity is across the Lorenz curve but below the 45 degree line, it suggests that the public spending on electricity is neither progressive nor regressive, i.e. the public spending on electricity is as unequally distributed as household income.

Figure 4: Concentration curve for public spending on infrastructure in 2011



Source: Authors' calculations

Marginal benefit incidence: Analysis indicates that households in quintiles 3 and 4 are likely to benefit more than those in other quintiles if there is an increase in public spending on pipe-borne water and electricity. Increased public spending on these services is likely to benefit middle income households more than the poorest ones, which are unable to afford the utilities, and the richest households, which already have access.

Table 11: Marginal benefit incidence in infrastructure (pipe-borne water and electricity)

Group	2004	2009	2011
Pipe–borne water			
Quintile 1	0.75	0.91	0.92
Quintile 2	0.94	1.01	0.99
Quintile 3	1.10	1.07	1.06
Quintile 4	1.12	1.06	1.06
Quintile 5	1.09	0.95	0.97
Electricity			
Quintile 1	0.87	1.03	0.94
Quintile 2	1.00	1.07	1.07
Quintile 3	1.05	1.05	1.07
Quintile 4	1.10	1.01	1.02
Quintile 5	0.98	0.84	0.90

Note: Household weight is applied.

Source: Authors' calculations

5. Conclusion and policy implications

The main objective of this study is to assess the pro-poorness of public expenditure on education, health and infrastructure in Cambodia by using nationally representative household surveys in 2004, 2009 and 2011.

We found that public spending on education is pro-poor at primary school and progressive at lower secondary school, but neither progressive nor regressive at upper secondary school. There is a huge disparity of public spending on education among geological zones. The plain region has received the largest share of public spending on primary and lower secondary schools, while Phnom Penh received the most for upper secondary schools. Children in the poorest households benefit more than those in the richest households from an expansion of public spending on primary and lower secondary schools. Increased spending on upper secondary schools will be more beneficial to children in middle income households than to those in the poorest and richest households. This could reflect the fact that the opportunity cost of sending children to school for the poorest households is too high, and the richest households favour private rather than public schools.

Public spending on health is pro-poor at health centres but neither progressive nor regressive at referral hospitals. This could be due to the rich not using public health care unless there is a strong requirement for intensive care. There is a large disparity of public spending on urban and rural health centres, as well as among the five geological zones during the study periods. Marginal benefit incidence analysis reconfirms that the poorest households would have benefited more than the richest from the expansion of public spending on both health centres and referral hospitals in 2004, but only from increased spending on health centres in 2009. In 2011, the poorest households would have been unlikely to get more benefits from increased spending on health than in 2004 and 2009.

Public spending on pipe-borne water is regressive, while that on electricity is neither progressive nor regressive. The richest households have greater access to these services than the poorest households. The urban-rural gap of public spending on pipe-borne water and electricity was extremely high. The expansion of public spending on pipe-borne water and electricity is highly likely to benefit the middle income households more than the poorest households, largely because the poorest may not be able to afford these utilities, while the richest households already have access to these services.

A number of policy options can be drawn from this study. Broadly speaking, there is a need for pro-poor policies so that the poor can benefit from public services. Specifically, the Ministry of Education, Youth and Sports should reallocate the available funds for lower and upper secondary school to target children in the poorest households, located mainly in rural areas. In addition, it should continue to expand the budget for primary and lower secondary schools because the poorest households are likely to benefit more than the richest. Increased public spending on upper secondary education should be done with great care since this will benefit only middle income households. The Ministry of Health should reallocate the available funds for referral hospitals to target the poorest households and provide more funds to both health centres and referral hospitals located in the plateau and mountain and coastal regions to reduce the inequalities among zones. The Ministry of Industry, Mines and Energy should reallocate the available funds for pipe-borne water and electricity to target the poorest households, particularly those in rural areas and the plateau and mountain and coastal regions. Since increased public

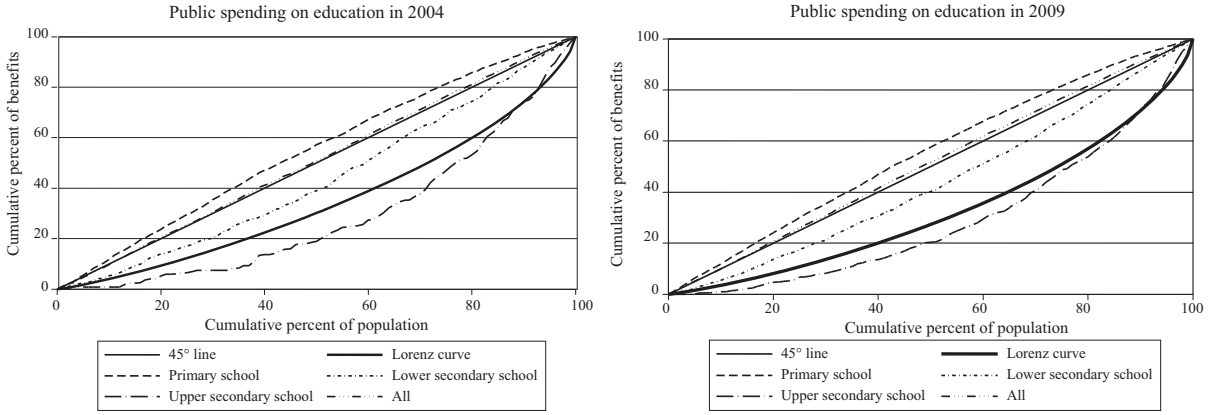
spending on upper secondary school, health centres, referral hospitals, pipe-borne water and electricity is highly likely to benefit the middle income households more than the poorest, each ministry should use different approaches to ensure that improved public services benefit the poorest households and do not just increase the budget.

Appendices

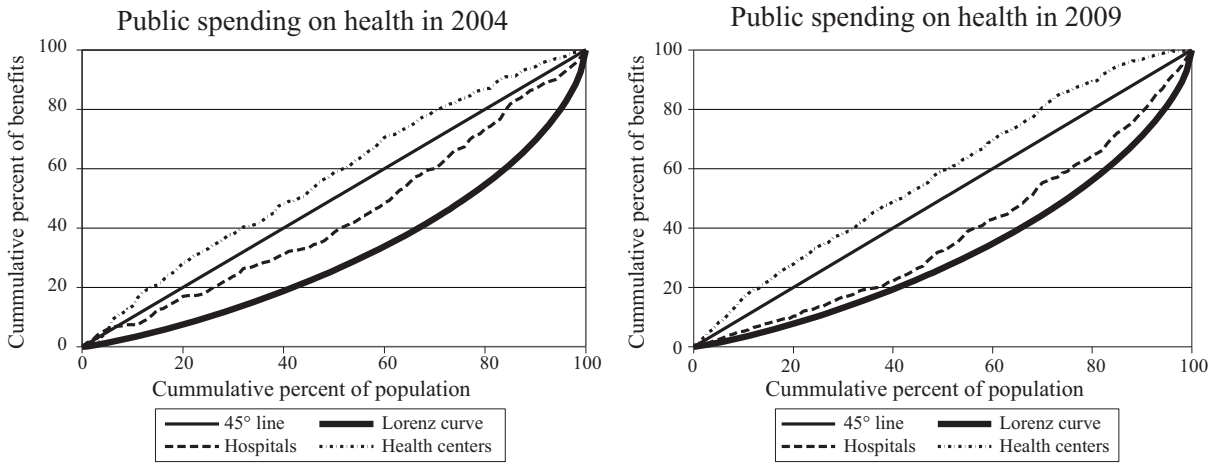
Appendix 1: Educational structure in cambodia

Age	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Grade				1	2	3	4	5	6	7	8	9	10	11	12
Level	Pre-school			Primary						Lower Secondary			Upper Secondary		
Access	Voluntary			Compulsory									Voluntary		
Cost	Free or small fee			Free											

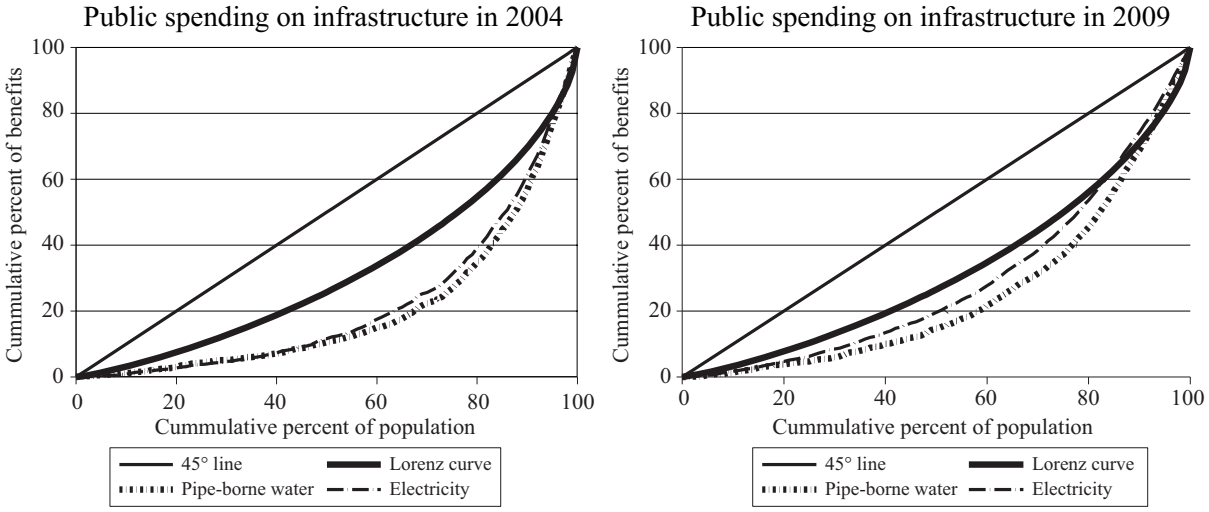
Appendix 2: Progressivity of public expenditure on education in 2004 and 2009



Appendix 3: Progressivity of public expenditure on health in 2004 and 2009



Appendix 4: Progressivity of public expenditure on infrastructure in 2004 and 2009



References

Aaron, Henry and Martin McGuire. 1970. "Public Goods and Income Distribution." *Econometrica* 38 (6): 907-720.

Ajwad, Mohamed Ihsan and Quentin Wodon. 2007. "Do Local Government Maximize Access Rates to Public Services Across Areas? A Test Based on Marginal Benefit Incidence Analysis." *Quarterly Review of Economic and Finance* 47: 242-260.

Ajwad, Mohamed Ihsanand Quentin Wodon. 2002. "Who Benefits from Increased Access to Public Services at the Local Level? A Marginal Benefit Incidence Analysis for Education and Basic Infrastructure." *World Bank Economists' Forum* 2: 155-175.

Ajwad, Mohamed Ihsan and Quentin Wodon. 2001. *Marginal Benefit Incidence Analysis Using a Single Cross-section of Data*. Washington DC: World Bank.

Alabi, Reuben Adeolu, Adams Oschobugie Ojor, Chime Chinonso Chinyere, Aiguomudu Ebehimerem Edith and Abu Sifawu Omkhefue. 2011. *Marginal Benefit Incidence Analysis of Public Spending in Nigeria*. PEP-PMMA Working Paper 2011/03. Poverty & Economic Policy Research Network. Available at SSRN: http;//ssrn.com/abstract=1809018 or http://dx.doi.org/10.2139/ssrn.1809018

Araar, Abdelkrim and Jean-Yves Duclos. 2013. *DASP 2.3: Distributive Analysis Stata Package.* PEP, CIRPEE and World Bank. Available at dasp.ecn.ulaval.ca

Araar, Abdelkrim and Jean-Yves Duclos. 2009. *DASP 2.1: Distributive Analysis Stata Package*. PEP, CIRPEE and World Bank. Available at dasp.ecn.ulaval.ca

Cambodia Development Resource Institute. 2013. *Cambodia's Development Dynamics: Past Performance and Emerging Priorities*. Phnom Penh: CDRI.

Castro-Lead, Florencia, Julia Dayton, Lionel Demery and Kalpana Mehra. 1999. "Public Social Spending in Africa: Do the Poor Benefit?" *World Bank Research Observer* 14 (1): 49-72.

Chakraborty, S. Lekha, Yadawendra Singh and Jannet Farida Jacob. 2013. *Analyzing public expenditure benefit incidence in health care: evidence from India*. Working Paper No. 748. Levy Economics Institute.

Cuesta, Jose, Pamela Kabaso and Pablo Suarez-Becerra. 2012. *How Pro-poor and Progressive is Social Spending in Zambia?* Policy Research Working Paper 6052. Washington DC: World Bank.

Davoodi, Hamid R., Erwin R. Tiongson and Sawitree S. Asawanuchit.2003. *How Useful Are Benefit Incidence Analyses of Public Education and Health Spending?* IMF Working Paper WP/03/227. Washington DC: International Monetary Fund.

Demery, Lionel. 1997. "Benefit Incidence Analysis." *Institutional and Social Policy, Africa Technical Family*. Washington DC: World Bank.

Demery, Lionel. 2000. "Benefit Incidence: A Practitioner's Guide." Washington DC: World Bank, Poverty and Social Development Group. Unpublished.

Gillespie, W. Irwin. 1965. "Public Expenditure and Income Distribution." In *Essays in Fiscal Federalism,* edited by Richard A. Musgrave, 122-186. Washington: Brookings Institute.

Guloba Madina, Nyende Magidu and James Wokadala. 2010. *Public Spending in the Education Sector in Uganda: Evidence from Benefit Incidence Analysis*. Global Development Network.

Hammer, Jeffrey S., IjazNabi and James A. Cercone. 1995. "Distributional Effects of Social Sector Expenditures in Malaysia 1974-89." In *Public Spending and the Poor: Theory and Evidence,* edited by Dominique van de Walle and Kimberly Nead p. 521-554, Baltimore Md: Johns Hopkins University Press.

Haughton, Jonathan and Shahidur R. Khandker. 2009. *Handbook of Poverty Analysis*. Washington, DC: World Bank.

Jenkins, P. Glenn and Andrey Klevchuk. 2006. *Expenditure Policy to Promote Growth: Cambodia*. Development Discussion Paper No. 2. Phnom Penh: World Bank

Kakwani, Nanak C. 1977. "Measurement of Tax Progressivity: An international Comparison." *Economic Journal* 87 (345): 71-80

Kakwani, Nanak C, Adam Wagstaff, and Eddy van Doorslaer. 1997. "Socioeconomic Inequalities in Health: Measurement, Computation and Statistical Inference." *Journal of Econometrics* 77(1): 87-104

Kruse Ioana, Pradhan Mennon and Sparrow Robert. 2012. "Marginal benefit incidence of public health spending: Evidence from Indonesian sub-national data." *Journal of Health Economcs* 31 (1): 147-157

Lanjouw, Peter and Martin Ravallion. 1999. "Benefit Incidence, Public Spending Reforms, and the Timing of Program Capture." *World Bank Economic Review* 13 (2): 257-273.

Lord, Montague J. 2001. *Macroeconomic Policies for Poverty Reduction in Cambodia*. MPRA Paper 41174, University Library of Munich, Germany

Lun Pide and Roth Vathana. 2014. "How Unequal is Access to Opportunity in Cambodia?" *Cambodia Development Review* 18(2):6-11

Mckay, Andrew. 2002. *Assessing the Impact of Fiscal Policy on Poverty*. Discussion Paper No. 42. Helsinki: World Institute for Development Economics Research, United Nations University.

Meessen, Bruno, Chheng Kannarath, Decoster Kristof, Heng Ly Thay and Chap Seak Chhay. 2008. "Can public hospitals be pro-poor? The health equity fund experience in Cambodia." In *Health and social protection: experiences from Cambodia, China and Lao PDR,* edited by Bruno Meessen, Xiaomei Pei, Bart Criel and Gerald Bloom, 469-490. Studies in Health Services Organisation & Policy.

National Institute of Statistics. 2005. *Cambodia Socio-Economic Survey 2004: Technical Report on Survey Design and Implementation*. Phnom Penh: National Institute of Statistics, Ministry of Planning.

National Institute of Statistics, Directorate General for Health and ICF Macro. 2011. *Cambodia Demographic and Health Survey 2010*. Phnom Penh, Cambodia and Calverton, Md, USA: National Institute of Statistics, Directorate General for Health and ICF Macro.

Paes de Barros, Ricardo, Francisco H.G. Ferreira, Jose R. Molinas Vega and Jaime Saavedra Chanduvi. 2009. "Measuring Inequality of Opportunities in Latin America and the Caribbean." Washington, DC: World Bank.

Royal Government of Cambodia. 2014a. *Poverty Alleviation: An Approach to an Action Plan for CMDG 1*. Phnom Penh: Ministry of Planning.

Royal Government of Cambodia. 2014b. *National Strategic Development Plan 2014-2018*. Phnom Penh: Ministry of Planning.

Royal Government of Cambodia. 2013. *Annual Progress Report 2013: Achieving Cambodia's Millennium Development Goals*. Phnom Penh: Ministry of Planning.

Seldem, Thomas M. and Micheal J. Wasylenko. 1995. "Measuring the Distributional Effects of Public Education in Peru." In *Public Spending and the Poor: Theory and Evidence*, edited by Dominique van de Walle and Kimberly Nead. Baltimore, Md: Johns Hopkins University Press.

Tong Kimsun and Phay Sokcheng. 2014. The Inclusiveness of Public Spending on Education in Cambodia: Benefit Incidence Analysis. Annual Development Review 2013-2014: 52-67. Phnom Penh: CDRI

Van de Walle, Dominique.1998. "Assessing the Welfare Impacts of Public Spending." *World Development* 26 (3): 365-379.

Wagstaff Adam, Pierella Paci and Eddy van Doorslaer. 1991. "On the Measurement of Inequalities in Health." *Social Science & Medicine* 33 (5): 545-557

World Bank. 1999. "Cambodia Poverty Assessment." Poverty Reduction and Economic Management Sector Unit and Human Development Sector Unit, East Asia and Pacific Region. Phnom Penh: Ministry of Planning.

Younger, Stephen D. 2003. Benefits on the Margin: Observations on Marginal Benefit Incidence." *World Bank Economic Review* 12(1): 89-106

CDRI working paper series

WP 98) Srinivasa Madhur (August 2014), *Cambodia's Skill Gap: An Anatomy of Issues and Policy Options*

WP 97) Kim Sour, Dr Chem Phalla, So Sovannarith, Dr Kim Sean Somatra and Dr Pech Sokhem (August 2014), *Methods and Tools Applied for Climate Change Vulnerability and Adaptation Assessment in Cambodia's Tonle Sap Basin*

WP 96) Kim Sean Somatra and Hort Navy (August 2014), *Cambodian State: Developmental, Neoliberal? A Case Study of the Rubber Sector*

WP 95) Theng Vuthy, Keo Socheat, Nou Keosothea, Sum Sreymom and Khiev Pirom (August 2014), *Impact of Farmer Organisations on Food Security: The Case of Rural Cambodia*

WP 94) Heng Seiha, Vong Mun and Chheat Sreang with the assistance of Chhuon Nareth (July 2014), *The Enduring Gap: Decentralisation Reform and Youth Participation in Local Rural Governance*

WP 93) Nang Phirun, Sam Sreymom, Lonn Pichdara and Ouch Chhuong (June 2014), *Adaptation Capacity of Rural People in the Main Agro-Ecological Zones in Cambodia*

WP 92) Phann Dalis (June 2014) *Links between Employment and Poverty in Cambodia*

WP 91) Theng Vuthy, Khiev Pirom and Phon Dary (April 2014), *Development of the Fertiliser Industry in Cambodia: Structure of the Market, Challenges in the Demand and Supply Sidesand the Way Forward*

WP 90) CDRI Publication (January 2014), *ASEAN 2030: Growing Together for Economic Prosperity–the Challenges (Cambodia Background Paper)*

WP 89) Nang Phirun and Ouch Chhuong (January 2014), *Gender and Water Governance: Women's Role in Irrigation Management and Development in the Context of Climate Change*

WP 88) Chheat Sreang (December 2013), *Impact of Decentralisation on Cambodia's Urban Governance*

WP 87) Kim Sedara and Joakim Öjendal with the assistance of Chhoun Nareth (November 2013), *Gatekeepers in Local Politics: Political Parties in Cambodia and their Gender Policy*

WP 86) Sen Vicheth and Ros Soveacha with the assistance of Hieng Thiraphumry (October 2013), *Anatomy of Higher Education Governance in Cambodia*

WP 85) Ou Sivhuoch and Kim Sedara (August 2013), *20 Years' Strengthening of Cambodian Civil Society: Time for Reflection*

WP 84) Ou Sivhuoch (August 2013), *Sub-National Civil Society in Cambodia: A Gramscian Perspective*

WP 83) Tong Kimsun, Lun Pide and Sry Bopharath with the assistance of Pon Dorina (August 2013) *Levels and Sources of Household Income in Rural Cambodia 2012*

WP 82) Nang Phirun (July 2013), *Climate Change Adaptation and Livelihoods in Inclusive Growth: A Review of Climate Change Impacts and Adaptive Capacity in Cambodia*

WP 81) Hing Vutha (June 2013), *Leveraging Trade for Economic Growth in Cambodia*

WP 80) Saing Chan Hang (March 2013), *Binding Constraints on Economic Growth in Cambodia: A Growth Diagnostic Approach*

WP 79) Lun Pidé (March 2013), *The Role of Rural Credit during the Global Financial Crisis: Evidence From Nine Villages in Cambodia*

WP 78) Tong Kimsun and Phay Sokcheng (March 2013), *The Role of Income Diversification during the Global Financial Crisis: Evidence from Nine Villages in Cambodia*

WP 77) Saing Chan Hang (March 2013), *Household Vulnerability to Global Financial Crisis and Their Risk Coping Strategies: Evidence from Nine Rural Villages in Cambodia*

WP 76) Hing Vutha (March 2013), *Impact of the Global Financial Crisis on the Rural Labour Market: Evidence from Nine Villages in Cambodia*

WP 75) Tong Kimsun (March 2013), *Impact of the Global Financial Crisis on Poverty: Evidence from Nine Villages in Cambodia*

WP 74) Ngin Chanrith (March 2013), *Impact of the Global Financial Crisis on Employment in SMEs in Cambodia*

WP 73) Hay Sovuthea (March 2013), *Government Response to Inflation Crisis and Global Financial Crisis*

WP 72) Hem Socheth (March 2013), *Impact of the Global Financial Crisis on Cambodian Economy at Macro and Sectoral Levels*

WP 71) Kim Sedara and Joakim Öjendal with Chhoun Nareth and Ly Tem (December 2012), *A Gendered Analysis of Decentralisation Reform in Cambodia*

WP 70) Hing Vutha, Saing Chan Hang and Khieng Sothy (August 2012), *Baseline Survey for Socioeconomic Impact Assessment: Greater Mekong Sub-region Transmission Project*

WP 69) CDRI Publication (March 2012), *Understanding Poverty Dynamics: Evidence from Nine Villages in Cambodia*

WP 68) Roth Vathana (March 2012), *Sectoral Composition of China's Economic Growth, Poverty Reduction and Inequality: Development and Policy Implications for Cambodia*

WP 67) Keith Carpenter with assistance from PON Dorina (February 2012), *A Basic Consumer Price Index for Cambodia 1993–2009*

WP 66) TONG Kimsun (February 2012), *Analysing Chronic Poverty in Rural Cambodia Evidence from Panel Data*

WP 65) Ros Bansok, Nang Phirun and Chhim Chhun (December 2011), *Agricultural Development and Climate Change: The Case of Cambodia*

WP 64) Tong Kimsun, Sry Bopharath (November 2011), *Poverty and Evironment Links: The Case of Rural Cambodia*

WP 63) Heng Seiha, Kim Sedara and So Sokbunthoeun (October 2011), *Decentralised Governance in Hybrid Polity: Localisation of Decentralisation Reform in Cambodia*

WP 62) Chea Chou, Nang Phirun, Isabelle Whitehead, Phillip Hirsch and Anna Thompson (October 2011), *Decentralised Governance of Irrigation Water in Cambodia: Matching Principles to Local Realities*

WP 61) Ros Bandeth, Ly Tem and Anna Thompson (September 2011), *Catchment Governance and Cooperation Dilemmas: A Case Study from Cambodia*

WP 60) Saing Chan Hang, Hem Socheth and Ouch Chandarany with Phann Dalish and Pon Dorina (November 2011), *Foreign Investment in Agriculture in Cambodia*

WP 59) Chem Phalla, Philip Hirsch and Someth Paradis (September 2011), *Hydrological Analysis in Support of Irrigation Management: A Case Study of Stung Chrey Bak Catchment, Cambodia*

WP 58) Hing Vutha, Lun Pide and Phann Dalis (August 2011), *Irregular Migration from Cambodia: Characteristics, Challenges and Regulatory Approach*

WP 57) Tong Kimsun, Hem Socheth and Paulos Santos (August 2011), *The Impact of Irrigation on Household Assets*

WP 56) Tong Kimsun, Hem Socheth and Paulos Santos (July 2011), *What Limits Agricultural Intensification in Cambodia? The role of emigration, agricultural extension services and credit constraints*

WP 55) Kem Sothorn, Chhim Chhun, Theng Vuthy and So Sovannarith (July 2011), *Policy Coherence in Agricultural and Rural Development: Cambodia*

WP 54) Nang Phirun, Khiev Daravy, Philip Hirsch and Isabelle Whitehead (June), *Improving the Governance of Water Resources in Cambodia: A Stakeholder Analysis*

WP 53) Chann Sopheak, Nathan Wales and Tim Frewer (August 2011), *An Investigation of Land Cover and Land Use Change in Stung Chrey Bak Catchment, Cambodia*

WP 52) Ouch Chandarany, Saing Chanhang and Phann Dalis (June 2011), *Assessing China's Impact on Poverty Reduction In the Greater Mekong Sub-region: The Case of Cambodia*

WP 51) Christopher Wokker, Paulo Santos, Ros Bansok and Kate Griffiths (June 2011), *Irrigation Water Productivity in Cambodian Rice System*

WP 50) Pak Kimchoeun (May 2011), *Fiscal Decentralisation in Cambodia: A Review of Progress and Challenges*

WP 49) Chem Phalla and Someth Paradis (March 2011), *Use of Hydrological Knowledge and Community Participation for Improving Decision-making on Irrigation Water Allcation*

WP 48) CDRI Publication (August 2010), *Empirical Evidence of Irrigation Management in the Tonle Sap Basin: Issues and Challenges*

WP 47) Chea Chou (August 2010), *The Local Governance of Common Pool Resources: The Case of Irrigation Water in Cambodia*

WP 46) CDRI Publication (December 2009), *Agricultural Trade in the Greater Mekong Sub-region: Synthesis of the Case Studies on Cassava and Rubber Production and Trade in GMS Countries*

WP 45) CDRI Publication (December 2009), *Costs and Benefits of Cross-country Labour Migration in the GMS: Synthesis of the Case Studies in Thailand, Cambodia, Laos and Vietnam*

WP 44) Chan Sophal (December 2009), *Costs and Benefits of Cross-border Labour Migration in the GMS: Cambodia Country Study*

WP 43) Hing Vutha and Thun Vathana (December 2009), *Agricultural Trade in the Greater Mekong Sub-region: The Case of Cassava and Rubber in Cambodia*

WP 42) Thon Vimealea, Ou Sivhuoch, Eng Netra and Ly Tem (October 2009), *Leadership in Local Politics of Cambodia: A Study of Leaders in Three Communes of Three Provinces*

WP 41) Hing Vutha and Hossein Jalilian (April 2009), *The Environmental Impacts of the ASEAN-China Free Trade Agreement for Countries in the Greater Mekong Sub-region*

WP 40) Eng Netra and David Craig (March 2009), *Accountability and Human Resource Management in Decentralised Cambodia*

WP 39) Horng Vuthy and David Craig (July 2008), *Accountability and Planning in Decentralised Cambodia*

WP 38) Pak Kimchoeun and David Craig (July 2008), *Accountability and Public Expenditure Management in Decentralised Cambodia*

WP 37) Chem Phalla *et al.* (May 2008), *Framing Research on Water Resources Management and Governance in Cambodia: A Literature Review*

WP 36) Lim Sovannara (November 2007), *Youth Migration and Urbanisation in Cambodia*

WP 35) Kim Sedara & Joakim Öjendal with the assistance of Ann Sovatha (May 2007), *Where Decentralisation Meets Democracy: Civil Society, Local Government, and Accountability in Cambodia*

WP 34) Pak Kimchoeun, Horng Vuthy, Eng Netra, Ann Sovatha, Kim Sedara, Jenny Knowles & David Craig (March 2007), *Accountability and Neo-patrimonialism in Cambodia: A Critical Literature Review*

WP 33) Hansen, Kasper K. & Neth Top (December 2006), *Natural Forest Benefits and Economic Analysis of Natural Forest Conversion in Cambodia*

WP 32) Murshid, K.A.S. & Tuot Sokphally (April 2005), *The Cross Border Economy of Cambodia: An Exploratory Study*

WP 31) Oberndorf, Robert B. (May 2004), *Law Harmonisation in Relation to the Decentralisation Process in Cambodia*

WP 30) Hughes, Caroline & Kim Sedara with the assistance of Ann Sovatha (February 2004), *The Evolution of Democratic Process and Conflict Management in Cambodia: A Comparative Study of Three Cambodian Elections*

WP 29) Yim Chea & Bruce McKenney (November 2003), *Domestic Fish Trade: A Case Study of Fish Marketing from the Great Lake to Phnom Penh*

WP 28) Prom Tola & Bruce McKenney (November 2003), *Trading Forest Products in Cambodia: Challenges, Threats, and Opportunities for Resin*

WP 27) Yim Chea & Bruce McKenney (October 2003), *Fish Exports from the Great Lake to Thailand: An Analysis of Trade Constraints, Governance, and the Climate for Growth*

WP 26) Sarthi Acharya, Kim Sedara, Chap Sotharith & Meach Yady (February 2003), *Off-farm and Non-farm Employment: A Perspective on Job Creation in Cambodia*

WP 25) Chan Sophal & Sarthi Acharya (December 2002), *Facing the Challenge of Rural Livelihoods: A Perspective from Nine Villages in Cambodia*

WP 24) Kim Sedara, Chan Sophal & Sarthi Acharya (July 2002), *Land, Rural Livelihoods and Food Security in Cambodia*

WP 23) McKenney, Bruce & Prom Tola. (July 2002), *Natural Resources and Rural Livelihoods in Cambodia*

WP 22) Chan Sophal & Sarthi Acharya (July 2002), *Land Transactions in Cambodia: An Analysis of Transfers and Transaction Records*

WP 21) Bhargavi Ramamurthy, Sik Boreak, Per Ronnås and Sok Hach (December 2001), *Cambodia 1999-2000: Land, Labour and Rural Livelihood in Focus*

WP 20) So Sovannarith, Real Sopheap, Uch Utey, Sy Rathmony, Brett Ballard & Sarthi Acharya (November 2001), *Social Assessment of Land in Cambodia: A Field Study*

WP 19) Chan Sophal, Tep Saravy & Sarthi Acharya (October 2001), *Land Tenure in Cambodia: a Data Update*

WP 18) Godfrey, Martin, So Sovannarith, Tep Saravy, Pon Dorina, Claude Katz, Sarthi Acharya, Sisowath D. Chanto & Hing Thoraxy (August 2001), *A Study of the Cambodian Labour Market: Reference to Poverty Reduction, Growth and Adjustment to Crisis*

WP 17) Chan Sophal, & So Sovannarith, with Pon Dorina (December 2000), *Technical Assistance and Capacity Development at the School of Agriculture Prek Leap*

WP 16) Sik Boreak, (September 2000), *Land Ownership, Sales and Concentration in Cambodia*

WP 15) Godfrey, Martin, Chan Sophal, Toshiyasu Kato, Long Vou Piseth, Pon Dorina, Tep Saravy, Tia Savara & So Sovannarith (August 2000), *Technical Assistance and Capacity Development in an Aid-dependent Economy: the Experience of Cambodia*

WP 14) Toshiyasu Kato, Jeffrey A. Kaplan, Chan Sophal & Real Sopheap (May 2000), *Enhancing Governance for Sustainable Development*

WP 13) Ung Bunleng, (January 2000), *Seasonality in the Cambodian Consumer Price Index*

WP 12) Chan Sophal, Toshiyasu Kato, Long Vou Piseth, So Sovannarith, Tia Savora, Hang Chuon Naron, Kao Kim Hourn & Chea Vuthna (September 1999), *Impact of the Asian Financial Crisis on the SEATEs: The Cambodian Perspective*

WP 11) Chan Sophal & So Sovannarith (June 1999), *Cambodian Labour Migration to Thailand: A Preliminary Assessment*

WP 10) Gorman, Siobhan, with Pon Dorina & Sok Kheng (June 1999), *Gender and Development in Cambodia: An Overview*

WP 9) Teng You Ky, Pon Dorina, So Sovannarith & John McAndrew (April 1999), *The UNICEF/Community Action for Social Development Experience—Learning from Rural Development Programmes in Cambodia*

WP 8) Chan Sophal, Martin Godfrey, Toshiyasu Kato, Long Vou Piseth, Nina Orlova, Per Ronnås & Tia Savora (January 1999), *Cambodia: The Challenge of Productive Employment Creation*

WP 7) McAndrew, John P. (December 1998), *Interdependence in Household Livelihood Strategies in Two Cambodian Villages*

WP 6) Murshid, K.A.S. (December 1998), *Food Security in an Asian Transitional Economy: The Cambodian Experience*

WP 5) Kato, Toshiyasu, Chan Sophal & Long Vou Piseth (September 1998), *Regional Economic Integration for Sustainable Development in Cambodia*

WP 4) Chim Charya, Srun Pithou, So Sovannarith, John McAndrew, Nguon Sokunthea, Pon Dorina & Robin Biddulph (June 1998), *Learning from Rural Development Programmes in Cambodia*

WP 3) Kannan, K.P. (January 1997), *Economic Reform, Structural Adjustment and Development in Cambodia*

WP 2) McAndrew, John P. (January 1996), *Aid Infusions, Aid Illusions: Bilateral and Multilateral Emergency and Development Assistance in Cambodia.* 1992-1995

WP 1) Kannan, K.P. (November 1995), *Construction of a Consumer Price Index for Cambodia: A Review of Current Practices and Suggestions for Improvement*

CDRI - Cambodia's leading independent development policy research institute

☞ 56 Street 315, Tuol Kork

✉ PO Box 622, Phnom Penh, Cambodia

☎ (855 23) 881 384/881 701/881 916/883 603

🖷 (855 23) 880 734

E-mail: cdri@cdri.org.kh

Website: www.cdri.org.kh

Price: USD2.50

9 789995 052980