Kingdom of Cambodia

Completing the Continuum of Care for Maternal and Newborn Health in Cambodia: Who Drops Out?

Further Analysis of the Cambodia Demographic and Health Surveys

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Completing the Continuum of Care for Maternal and Newborn Health in Cambodia: Who Drops Out?

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This report presents findings from a further analysis study undertaken as part of the follow-up to the 2010 Cambodia Demographic and Health Survey (CDHS). ICF International provided technical assistance for the project. This report is part of the MEASURE DHS program, which is designed to collect, analyze, and disseminate data on fertility, family planning, maternal and child health, nutrition, and HIV/AIDS. Funding was provided by the U.S. Agency for International Development (USAID) through the MEASURE DHS project (#GPO-C-00-03-00002-00). The opinions expressed herein are those of the authors and do not necessarily reflect the views of the USAID and other cooperating agencies.

Additional information about the survey may be obtained from the National Institute of Statistics (NIS) of Cambodia, (#386, Monivong Blvd, Phnom Penh, Cambodia. Telephone/Fax: 855-23-213-650, Email: hdarith@nis.gov.kh, internet: http://www.nis.gov.kh/). Additional information about the DHS project may be obtained from ICF International, 11785 Beltsville Drive, Calverton, MD 20705, USA; Telephone: 301-572-0200, Fax: 301-572-0999, Email: reports@measuredhs.com, Internet: http://www.measuredhs.com.

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EXECUTIVE SUMMARY

Background: Cambodia still suffers high levels of neonatal mortality and maternal mortality, despite recent progress. Continuum of care refers to the continuity of care throughout pregnancy, birth, and after delivery—that is, use of antenatal care, skilled birth attendance, and postnatal care. Assuring continuity of care has become a key program strategy for improving the health of mothers and newborns. Successful service delivery that offers continuum of care relies on understanding where the gaps are in seeking care along the continuum and what factors contribute to these gaps.

Methods: To address these issues we analyzed data from the 2010 Cambodia Demographic and Health Survey (CDHS). Three random-effects logit regressions were fitted to identify factors facilitating continuation of care along the pathway from pregnancy to the postnatal period.

Results: Three of every five Cambodian women received all three types of maternal care—antenatal care, skilled birth attendance at birth and postnatal care—for their most recent birth, which is a remarkable accomplishment for a country where 30 percent of the population lives below the poverty line. Still, 40 percent did not receive all three maternal services. Over 90 percent of women who had a live birth in the five years before the survey had at least one antenatal visit during the pregnancy and 59 percent had the WHO-recommended four or more visits. After receiving antenatal care, however, 11 percent of women had skilled attendance at birth but received no postnatal care, while 8 percent had postnatal care but no skilled birth attendance, and 13 percent received neither. Poorer women, in particular, suffered from lower access to continued care. Regional variation was substantial. The proportion of women who received all three maternal services ranged from 14 percent to 96 percent among Cambodia's 19 provinces. Differences between provinces accounted for more than one-third of the total variation in the percentage of women who went on to receive postnatal care after receiving skilled birth attendance. Also, the quality of antenatal care that women received affected their subsequent use of skilled birth attendance and postnatal care.

Conclusion: Despite success in extending the reach of maternal health care, Cambodia needs continuing effort to reduce maternal and neonatal mortality. Increasing continuum of care through an integrated service-delivery system involving both public and private sectors could be a solution to improving maternal and infant health.

1. INTRODUCTION

Cambodia has achieved remarkable progress in child health in the past decade and is one of the countries on track to meet the Millennium Development Goal (MDG) 4 for reducing child mortality. Data from the Cambodia Demographic and Health Surveys (CDHS) show that under-five mortality has declined dramatically, from 124 deaths per 1,000 live births in 2000 to 54 per 1,000 in 2010 (National Institute of Public Health et al. 2006; National Institute of Statistics et al. 2011). Infant mortality also declined from 95 to 45 deaths per 1,000 live births during this period. Full immunization coverage in 2010 was 79 percent nationwide and 86 percent in urban areas, a remarkable increase from 2000, when only 40 percent of children in Cambodia were fully vaccinated.

Despite these improvements, Cambodia still has one of the highest levels of maternal mortality in the region. In the 2010 CDHS the maternal mortality ratio was estimated at 206 deaths per 100,000 live births. While this marked a dramatic decline from 472 deaths per 100,000 live births in 2005, the country still faces the challenge of achieving MDG 5, to reduce the maternal mortality ratio by three-quarters by 2015. Moreover, in contrast to infant mortality and under-five mortality that have substantially declined in the past few years, neonatal mortality in Cambodia has not changed much, at 28 deaths per 1,000 live births in 2005 and 27 per 1,000 in 2010. Neonatal mortality contributed to half of the total under-five mortality in 2010 compared with about 30 percent in 2000 and 2005.

High rates of maternal and neonatal mortality are associated with inadequate and poor-quality maternal health care, including antenatal, delivery, and postnatal care (Li et al. 1996; WHO 1999; Carroli et al. 2001). Antenatal care is considered as a key maternal service in improving a wide range of health outcomes for women and children (McDonagh 1996; Carroli et al. 2001; Chen et al. 2007). Antenatal care represents an opportunity to deliver interventions for improving maternal nutrition, providing health education, and encouraging skilled attendance at birth and use of health facilities for emergency obstetric care (EMOC). All of these interventions could contribute to reducing maternal mortality and improving newborn survival.

Timing and content of antenatal care are important for identifying and treating illness and problems during pregnancy, as well as for preparing women to go to a health facility for delivery. The World Health Organization (WHO) recommends a minimum of four antenatal care visits (Villar et al. 2001). WHO guidelines also specify the content of antenatal care visits, which should include blood pressure measurement, urine testing for bacteriuria and proteinuria, and blood testing to detect syphilis and severe anemia (WHO 2001). Other services, including giving tetanus immunization, providing iron and folate tablets, and teaching women about danger signs of pregnancy complications, are also important to improve both maternal and newborn health.

Skilled attendance at birth and access to emergency obstetric care are key factors in reducing the risk of maternal death (de Brouwere et al. 1998; Graham et al. 2001; WHO et al. 2004). WHO has defined a skilled attendance as "an accredited health professional—such as a midwife, doctor, or nurse—who has been educated and trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth, and the immediate postnatal period, and in the identification, management, and referral of complications in women and newborns" (WHO 1999). Providing skilled attendants for delivery care, along with the equipment, drugs, and supplies necessary for effective prevention and management of obstetric complications, has been advocated as the most important intervention in preventing maternal deaths (WHO 1999).

Postnatal care, especially within the first 48 hours after birth, is critical to the management of postpartum hemorrhage, a leading cause of maternal deaths in many developing countries, including

Cambodia. In developing countries more than 60 percent of maternal deaths occur in the six weeks post-delivery, and 80 percent of postpartum deaths are caused by obstetric factors occurring in the first week postpartum (Li et al. 1996). Postnatal care is also key to neonatal survival, through the prevention of neonatal sepsis and asphyxia/hypothermia, which are the leading causes of neonatal deaths in developing countries. Postnatal care also helps to promote healthy maternal behaviors, such as exclusive breastfeeding and proper care of babies with low birth weight.

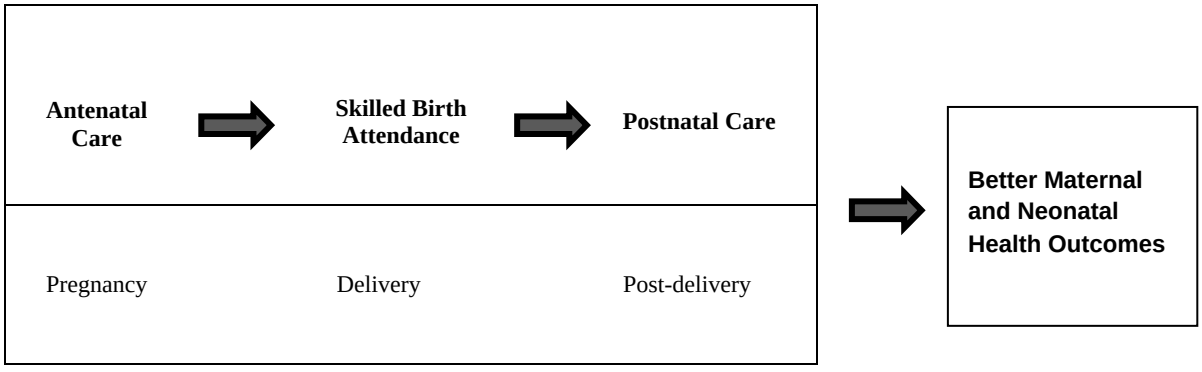
Given the importance of each of the three maternal health services, it is essential to provide all of them in a continuum of care to ensure the health of the mother and the newborn child. The term "continuum of care" for maternal, newborn health, and child health usually refers to continuity of care throughout the lifecycle—adolescence, pregnancy, childbirth, post-delivery period, and childhood (Kerber et al. 2007). The concept implies that the health of women, newborns, and children are closely linked and thus should be managed in an integrated way. The continuum of care has two dimensions 1) a time dimension—continuity of care over time for women, newborns, and children; 2) a place dimension—integrated service delivery provided by health facilities and communities (Tinker et al. 2005; WHO 2005; de Graft-Johnson et al. 2006).

In our analysis we apply a narrowed scope of continuum of care, focusing on women during the period from pregnancy to childbirth and after delivery. During pregnancy, all women should have adequate and high-quality antenatal care; at delivery, they should have skilled birth attendance to proficiently manage normal delivery and to refer complications; and they should have continued care after delivery for themselves and their newborns postpartum, the critical time for reducing neonatal mortality. Overall, completion of the continuum of care leads to better health outcomes for mothers and babies. Figure 1 shows the pathway for the continuum of care.

The continuum of care has become one of the key program strategies for reducing maternal and newborn deaths and improving maternal and neonatal health and wellbeing (Kerber et al. 2007). Successful program implementation to improve the continuum of care relies on a better understanding of where the gaps are in seeking care along pregnancy, delivery, and post-delivery and what factors contribute to these gaps.

This study examines the use of maternal health services along the continuum of care among Cambodian women. Research questions are: what proportions of women receive the three types of maternal and newborn health services that constitute the continuum of care—antenatal care, skilled birth attendance, and postnatal care? At what stage do women drop out of the course? How are women who complete the continuum of care different from those who do not? What variables predict the completion of the continuum of care?

Figure 1. Pathway for continuum of care



2. COUNTRY PROFILE

Cambodia, located in Southeast Asia, has an area of about 181,035 kilometers and a total population of 13.4 million. Over 80 percent of the population lives in rural areas. Cambodia is one of the poorest countries in Asia. The GDP per capita is US$558 (in constant year 2000 US dollars), estimated in 2010, and 28 percent of the total population lives under the national poverty line. The average adult literacy rate is 78 percent, with a much lower literary rate among women than men—71 percent versus 85 percent. As of 2010, life expectancy was 60 years for males and 65 years for females. Table 1 shows selected development and health indicators of the country.

Table 1. Population, health, and development indicators in Cambodia

Indicators	
Total population (millions)	14.1
Annual population growth rate	1.14%
Adult literacy rate (2009)	74%
GDP per capita (constant 2000 US$)	558
Annual GDP growth	5.96%
% of population with access to improved sanitation facilities	35.4%
% of population with access to improved water source	64.0%
Life expectancy at birth (years)	62.5
Total fertility rate	3.0
Infant mortality rate (per 1000 live births)	45
Under-five mortality rate (per 1000 live births)	54
Maternal mortality ratio (per 100,000 live births)	206
Adult (age 15–49) HIV prevalence rate	0.5%
Per capita total expenditure on health (PPP int. $)	17
Per capita government expenditure on health (PPP int. $)	45
Govt. expenditure on health as a percentage of total expenditure on health	37.2%
Out-of-pocket expenditure as a percentage of private expenditure on health	64.3%
Hospital beds (per 1,000 people)	0.84
Physicians (per 100,000 population)	0.23
Density of pharmaceutical personnel (per 10,000 population)	0.38

Data sources include 2010 CDHS, UNESCO, WHO, the World Bank;
all data are as of 2010 unless noted otherwise.

The health service delivery system in Cambodia includes public and private sectors (Ministry of Health Cambodia and WHO 2012). The public sector has two levels of health facilities: health centers and referral hospitals. Health centers primarily provide the minimum package of services including initial consultation, primary diagnosis, maternal and child care (antenatal care, normal delivery, vaccination, etc.), contraception, and other basic health services. Referral hospitals are classified into three levels: national, provincial, and district referral hospitals according to number of staff, beds, medicines, equipment, and clinical activities. Private providers include independent practitioners, workplace care, and international NGOs, which deliver a limited range of services.

Utilization of the public sector for general health services is low. The 2010 CDHS shows that among people who sought treatment for illness or injury, less than one-third went to a public facility for their first treatment. The private sector in Cambodia, comprising private hospitals, clinics, private doctors,

nurses, and trained health workers, plays an important role in delivering general health services. Over 60 percent of people who sought care for their recent illness or injury went to a private provider.

Cambodia's health financing system has gone through reforms in the past decade. In addition to the traditional user-fee system, the government has implemented several other models to meet different financing and service delivery goals including Health Equity Funds (HEFs), community-based health insurance (CBHI), performance-based contracting for services, and voucher mechanism. HEFs and CBHI are intended to improve access to health care for the poor. However, the coverage of health insurance is limited. As of 2010, about 10 percent of the population was covered by HEFs or CBHI.

3. DATA AND METHODS

3.1. Data

Data for this study are from the 2010 Cambodia Demographic and Health survey (CDHS), a nationally representative survey. DHS surveys typically adopt a two-stage sample design. The first stage involves randomly selecting clusters with probability proportional to size from a national master sample frame. At the second stage a systematic sample of households is drawn from a listing of households in each of the sampled clusters. In the 2010 CDHS women age 15-49 in the selected households were interviewed about the care that they received during pregnancy, at delivery, and after delivery. Data on antenatal and postnatal care were collected only for the most recent live birth in the five years preceding the survey, while information on delivery care was collected for all live births in the five-year reference period. Questions on postnatal care were asked both for women who delivered their last birth at a health facility and women who delivered elsewhere.

In this study we use the woman as the unit of analysis and focus on the most recent live birth. In the 2010 CDHS, 6,472 women age 15-49 reported a live birth in the five years preceding the survey. Table 2 shows background characteristics of these women. Most women included in this study had their most recent birth at age 20-34. Less than 10 percent were younger than age 20 when they had the most recent birth. For one-third of the women, the most recent birth was their first child, while about 40 percent already had two or more children. Most women had completed primary education and 26 percent had secondary or higher education. Eighty-four percent of women lived in rural areas. Most women reported having regular access to various types of media—more than 60 percent watched television, listened to radio, or read a newspaper at least once a week. Only about 14 percent of women were covered by health insurance, of which more than 80 percent reported enrollment in Health Equity Funds.

Table 2. Background characteristics of women who had a live birth in the five years preceding the survey, Cambodia 2011

	Number of women	Percentage
Mother's age at birth		
<20	555	8.6
20-34	4,917	76.0
35+	999	15.4
Birth order		
1	1,980	30.6
2	1,786	27.6
3	1,146	17.7
4 or more	1,561	24.1
Mother's education		
None	1,133	17.5
Primary	3,635	56.2
Secondary or higher	1,703	26.3
Residence		
Urban	1,050	16.2
Rural	5,421	83.8

(Continued...)

Table 2. – *Continued*

	Number of women	Percentage
Province		
Banteay mean chey	243	3.8
Kampong cham	795	12.3
Kampong chhnang	285	4.4
Kampong speu	392	6.1
Kampong thom	332	5.1
Kandal	628	9.7
Kratie	176	2.7
Phnom penh	538	8.3
Prey veng	514	7.9
Pursat	206	3.2
Siem reap	441	6.8
Svay rieng	233	3.6
Takeo	417	6.4
Otdar mean chey	86	1.3
Battambang & pailin	451	7.0
Kampot & kep	296	4.6
Preah sihanouk & kaoh kong	144	2.2
Preah vihear & steung treng	170	2.6
Mondol kiri & rattanak kiri	124	1.9
Wealth quintile		
Lowest	1,585	24.5
Second	1,380	21.3
Middle	1,229	19.0
Fourth	1,155	17.8
Highest	1,123	17.4
Exposure to mass media[1]		
Yes	4,020	62.1
No	2,452	37.9
Health insurance coverage		
Covered by a health insurance	875	13.5
Not covered	5,596	86.5
Total	6,472	100.0

[1]Refers to read a newspaper or watch TV or listen to radio at least once a week

3.2. Measurements

The key indicators for this analysis are antenatal care, skilled birth attendance, and postnatal care. They are measured according to the WHO definitions. Antenatal care refers to pregnancy-related health care check-ups that a pregnant woman had either at a health facility or at home. In the 2010 CDHS woman's questionnaire, women who had a live birth in the five years preceding the survey were asked, *When you were pregnant with (NAME OF LAST CHILD), did you see anyone for antenatal care for this pregnancy?* Following this question, data on sources of care, timing of the first visit, total number of visits, and specified care received during visits were then collected.

Skilled birth attendance is defined as delivery assistance provided by a doctor, nurse, or midwife. In the 2010 CDHS, women were asked, for each of their births in the five years preceding the survey, *Who assisted with the delivery of (NAME OF CHILD)?* If the respondent reported more than one person attending during delivery, only the most qualified person is considered in this analysis. For example, if a woman reported both doctor and nurse, she is recorded as having received care from a doctor. In addition, women were also asked where they delivered each birth, whether at a health facility or elsewhere.

Postnatal care usually comprises checkups by a health professional or others within 41 days or six weeks of childbirth. This analysis focuses on postnatal care within 48 hours after birth, because this is a critical period for identifying and managing postpartum hemorrhage. Thus, references to postnatal care in the analysis should be interpreted as postnatal care within 48 hours after delivery. Data on postnatal care were collected by asking separate questions for women who delivered at a health facility and those who did not.

For women who delivered at a health facility, postnatal care is determined based on the responses to three questions:

1) *After you gave birth to (NAME OF LAST CHILD), did anyone check on your health while you were still in the facility?*

2) *Did anyone check on your health after you left the facility?*

3) *How long after the delivery did the first check take place?*

If a woman responded yes to either of the first two questions and the first check took place within 48 hours, she is considered to have postnatal care within 48 hours after delivery.

Women who did not deliver at a health facility were asked the following two questions:

1) *After you gave birth to (NAME OF LAST CHILD), did anyone check on your health?*

2) *How long after the delivery did the first check take place?*

Their postnatal care status is determined by the responses to these two questions.

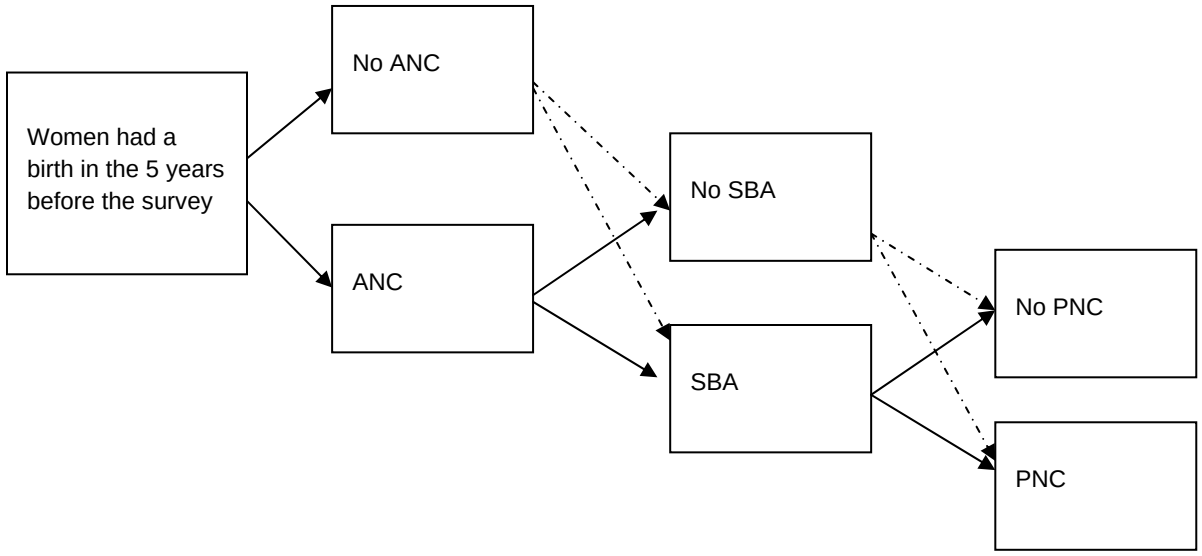
3.3. Analysis

We first describe the level of use for individual services and compare Cambodia with selected countries in the South/Southeast Asia region. We also examine the patterns of service use along the continuum of care as well as differentials in use according to women's background characteristics.

Based on the pathway for the continuum of care, Figure 2 shows the possible paths that a woman can follow to use three types of services during pregnancy, at delivery, and after delivery. Based on this diagram, we use three regression models to identify factors facilitating the continuation of care along the pathway. To identify factors associated with use of antenatal care at the stage of pregnancy, we fit Model I with receiving antenatal care as the outcome. It is coded 1 if a woman received any antenatal care and 0 otherwise. Among women who received antenatal care, some went on to receive skilled birth attendance; some did not. We fit Model II among women who received antenatal care to determine the factors associated with the continuity from having antenatal care to having skilled birth attendance. The outcome for Model II is 1 for receiving antenatal care and skilled birth attendance, and 0 for receiving antenatal care but not skilled birth attendance. After delivery, some women received postnatal care and some did

not. Thus we fit Model III among women who received antenatal care and skilled birth attendance to identify factors associated with completion of the continuum of care. The two categories of the outcome for Model III are 1 for receiving antenatal care, skilled birth attendance, and postnatal care, and 0 for receiving antenatal care and skilled birth attendance but not postnatal care.

Figure 2. Women's use of maternal health services



For all three models, random-effects logit regressions are fitted to account for the clustering effect of the data. The 2010 CDHS data are in a hierarchical structure with individuals nested within clusters and clusters nested within provinces. Because women living in the same cluster or province may not have independent behaviors, the estimates from the regular regression analyses assuming all individuals are independent will not be efficient. The random-effects model accounts for the fact that people who live in the same area share similar characteristics (Raudenbush and Bryk 2002). The random-effects model also enables partitioning of the total variation in the outcome into within-group and between-group components, which allows distinguishing the relative contributions of individual-level and group-level variables. Lastly, random-effects models allow for simultaneous investigation of the effects of predictors at different levels. In this analysis we are interested in two levels—the individual level and the province level. Despite the unavailability of provincial-level predictors in this analysis, random-effects models provide information on the proportion of total variation that is explained by provincial factors (unobserved). In the 2010 CDHS, several small provinces are grouped together to make 19 survey domains. For the convenience of presenting results, we still call them provinces although some could be the group of provinces.

Predictors in the models include women's socio-demographic characteristics, urban-rural residence, household wealth quintile, health insurance coverage, and exposure to mass media. In addition, the content of antenatal care provides an indication of the quality of care. Therefore, variables related to services received during antenatal care are included in Model II and Model III, and place of delivery is also included in Model III.

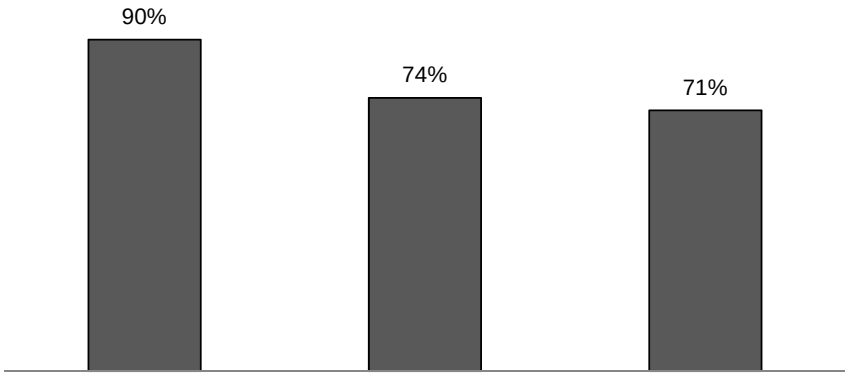
4. RESULTS

This section first presents levels of use for each of the three maternal services, as components of the continuum of care, as well as service use by women's characteristics, and finally the results of multiple regression analyses.

4.1. Overall Use of Maternal Health Services in Cambodia and Comparisons with Other South/Southeast Asian Countries

Figure 3 shows the overall use of antenatal care, skilled birth attendance, and postnatal care in Cambodia, and Table 3 provides comparisons with selected countries in South and Southeast Asia.

Figure 3. Utilization of maternal health services in Cambodia, 2010 DHS



Cambodia has achieved a wide reach of antenatal care. Over 90 percent of women who had a live birth in the five years preceding the survey had at least one antenatal care visit during the pregnancy, and nearly 60 percent had the WHO-recommended four or more visits. Compared with other countries in the region, Cambodia has one of the highest antenatal care coverage rates.

Table 3. Comparison with other South/Southeast Asian countries

	ANC			
	1 or more visits	4 or more	SBA	PNC
Cambodia 2010	**90%**	**59%**	**74%**	**71%**
Indonesia 2007	96%	82%	62%	70%
Philippines 2008	96%	78%	62%	77%
Timor-Leste 2009-10	88%	55%	30%	25%
Nepal 2011	85%	50%	36%	45%
Bangladesh 2011	68%	26%	31%	27%
Pakistan 2006-07	65%	28%	39%	39%

Data sources: STATComplier, http://statcompiler.com/, February 2013

Table 4 shows that among women who received antenatal care two-thirds started care in the first trimester, and 30 percent in the second trimester. Among women who received antenatal care, 80 percent were informed of signs of pregnancy complications and 91 percent had their blood pressure measured. However, a much smaller percentage of women had urine samples and blood samples taken, at 36 and 45 percent, respectively. The public sector provided the great majority of antennal care; 93 percent of women visited a public sector facility for their antenatal care. Midwives were the main providers of antenatal care, reported by 88 percent of women compared with 11 percent reporting doctors and 1 percent reporting nurses as their antenatal care provider.

Table 4. Percent distribution of women with antenatal care by timing of the first visit, content of care, place and provider of care, Cambodia 2011

Antenatal care related variables	Percentage
Timing of the first ANC visit	
<4	66.2
4-6 months	29.2
7 months or later	4.4
Don't know/missing	0.2
Informed of signs of pregnancy complications	
Yes	80.0
No	20.0
Blood pressure measured	
Yes	90.6
No	9.4
Urine sample taken	
Yes	36.4
No	63.6
Blood sample taken	
Yes	44.5
No	55.5
Place of antenatal care	
Public sector	92.6
Private sector	4.3
Home or other	3.1
Provider	
Doctor	10.5
Nurse	1.0
Midwife	87.9
Other	0.6
Total	100.0
Number of women with ANC	5,804

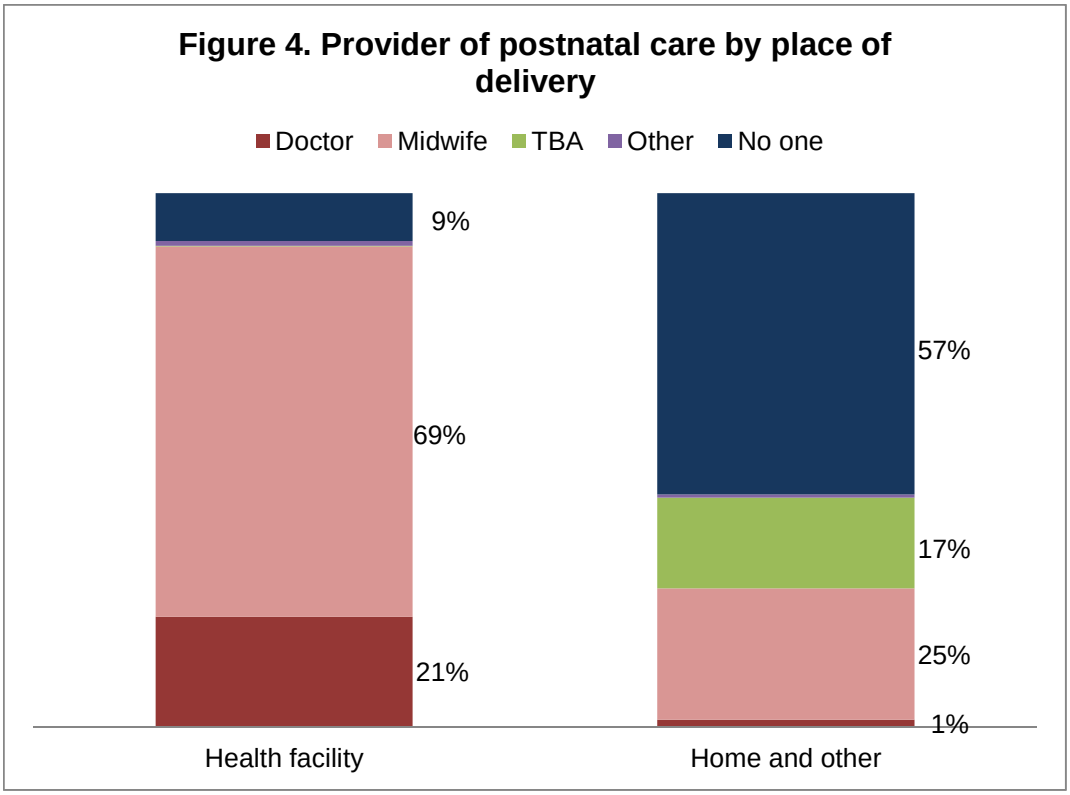
Delivery care attended by skilled health personnel is crucial for safe motherhood. In Cambodia 74 percent of the women were attended by a skilled health provider (doctor, nurse, or midwife) at delivery for their most recent birth in the five years preceding the survey. This percentage is the highest among the 9 countries in South/Southeast Asia with DHS data.

When the CDHS asked women where they gave birth, 57 percent reported a health facility—47 percent a public health facility and 10 percent a private health facility. Almost all women who delivered at a health facility were attended by a doctor, nurse, or midwife. In contrast, among women who gave birth at home only about 40 percent were attended by a skilled health provider (mostly by a midwife), while 59 percent were attended by a traditional birth attendant.

Postnatal care, especially within the first 48 hours after birth, is essential for management of postpartum hemorrhage. Overall, 71 percent of women, regardless of where they delivered, received a health checkup within two days of delivery, of which 87 percent had the first checkup within the first 24 hours. Cambodia has the second highest level of postnatal care in the Asian region, after the Philippines.

Use of postnatal care differs between women who delivered at a health facility and women who delivered elsewhere. Figure 4 shows that about 90 percent of women who delivered at a health facility had postnatal care within 48 hours after delivery compared with 43 percent of women who delivered at home. Postnatal care for women who delivered at home was provided primarily by midwives (25 percent) and traditional birth attendants (17 percent).

Figure 4. Provider of postnatal care by place of delivery



4.2. The Continuum of Care

Figure 5 shows that while 90 percent of women received antenatal care, 19 percent did not continue on the pathway to receive skilled birth attendance. In other words, 71 percent who received antenatal care were attended by a skilled health provider at delivery. After delivery, another 11 percent did not go on to receive postnatal care. Overall, 60 percent of women had the full range of services for the continuum of care.

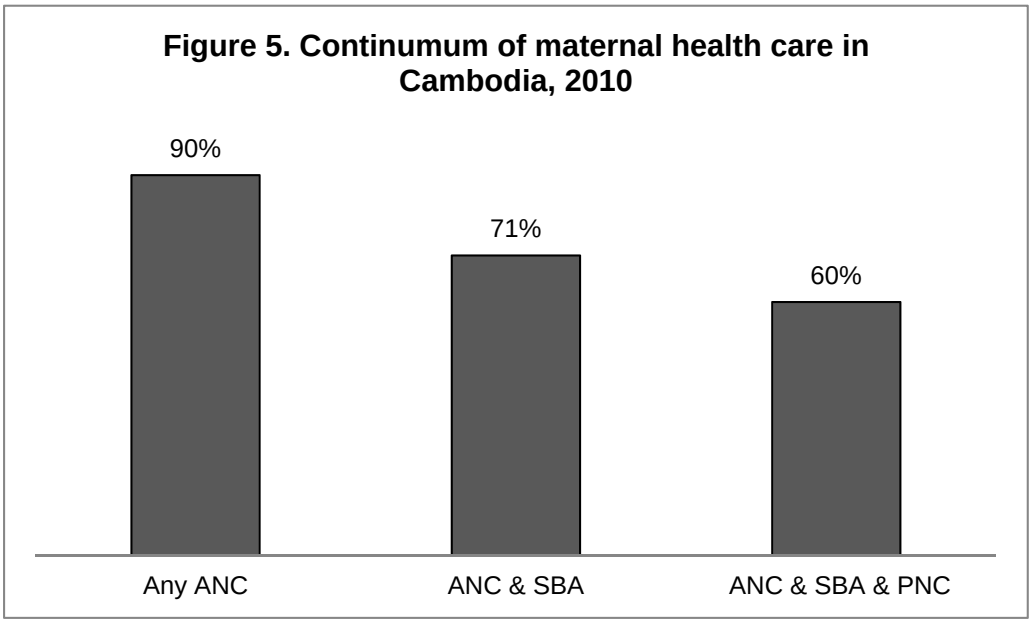


Table 5 shows the percentages of women who received the various possible combinations of maternal services. Six percent of women did not receive any of the three services; 12 percent did not go on to receive the other two services after receiving antenatal care; 7 percent had antenatal care and postnatal care but were not attended by a skilled birth attendant at delivery. As might be expected, few women received skilled birth attendance or postnatal care or both without first having received antenatal care.

Table 5. Percent distribution of women by different types of maternal health services received for the most recent birth, Cambodia 2011

ANC	SBA	PNC	%
-	**-**	**-**	5.5
+	-	-	11.9
+	+	-	10.9
+	+	+	59.8
+	-	+	7.2
-	+	-	1.2
-	-	+	1.5
-	+	+	2.1
Total			100.0
Total number of women			6,472

+ Received the service

- Did not receive the service

4.3. Differentials in Receiving Maternal Health Care Services by Women's Background Characteristics and Antenatal Care Received

Table 6 shows the percentage of women who received different types of services by their background characteristics. Older women were less likely than younger women to have received all three services. Only 48 percent of women age 35 or older received antenatal care, skilled birth attendance, and postnatal care compared with 62 percent of women age 20-35 and 64 percent of women under age 20. A higher proportion of women age 35 or older did not use any of the three services. High birth order is associated with low likelihood of completing the continuum of care. Mothers were least likely to get all three maternal health services for birth orders 4 or higher and most likely not to receive any of the services, or to receive antenatal care only.

Table 6. Percent distribution of women who had a live birth in the five years preceding the survey by types of maternal health services received according to selected background variables, Cambodia 2011

	ANC & SBA & PNC	ANC & SBA only	ANC & PNC only	ANC only	Other	None	Total	Total number of women
Mother's age at birth								
<20	64.0	11.5	7.2	9.5	3.4	4.3	99.9	555
20-34	61.6	10.9	7.2	11.5	4.2	4.6	100.0	4,917
35+	48.1	10.6	7.1	15.1	8.5	10.6	100.0	999
Birth order								
1	70.6	11.4	6.0	7.8	2.1	2.0	99.9	1,980
2	65.0	10.7	6.2	10.9	3.6	3.7	100.1	1,786
3	56.6	9.9	7.6	14.4	5.5	5.9	99.9	1,146
4 or more	42.2	11.2	9.5	16.3	9.0	11.8	100.0	1,561
Mother's education								
None	35.9	10.2	9.5	21.9	8.0	14.5	100.0	1,133
Primary	57.2	11.8	8.2	12.5	5.4	4.8	99.9	3,635
Secondary	80.2	9.6	3.6	4.1	1.4	1.2	100.1	1,599
Higher	95.8	3.7	0.0	0.0	0.5	0.0	100.0	104
Residence								
Urban	86.9	6.7	1.2	2.2	2.0	1.0	100.0	1,050
Rural	54.5	11.7	8.3	13.7	5.3	6.4	99.9	5,421
Province								
Banteay mean chey	58.0	7.0	11.0	12.4	6.3	5.4	100.1	243
Kampong cham	62.2	6.4	8.9	10.7	8.2	3.6	100.0	795
Kampong chhnang	58.9	1.9	4.0	25.9	2.7	6.7	100.1	285
Kampong speu	67.6	0.9	17.7	5.1	7.7	1.0	100.0	392
Kampong thom	46.8	3.4	11.8	24.1	4.2	9.7	100.0	332
Kandal	59.0	22.6	2.2	5.2	6.8	4.1	99.9	628
Kratie	17.8	24.9	0.2	22.6	4.9	29.6	100.0	176
Phnom penh	95.6	2.3	0.6	0.6	0.9	0.0	100.0	538
Prey veng	48.2	12.4	5.2	26.3	2.4	5.5	100.0	514
Pursat	54.2	19.9	1.7	17.0	2.5	4.7	100.0	206
Siem reap	74.9	1.2	13.7	4.3	4.5	1.4	100.0	441
Svay rieng	56.1	30.2	1.7	5.3	4.6	2.0	99.9	233
Takeo	73.4	11.1	8.0	5.1	2.2	0.3	100.1	417
Otdar mean chey	42.6	26.1	1.5	21.2	1.1	7.5	100.0	86
Battambang & pailin	55.6	18.9	10.1	8.9	4.5	2.0	100.0	451

(Continued...)

Table 6. – *Continued*

	ANC & SBA & PNC	ANC & SBA only	ANC & PNC only	ANC only	Other	None	Total	Total number of women
Kampot & kep	56.5	6.3	13.8	9.8	8.2	5.4	100.0	296
Preah sihanouk & kaoh kong	63.8	13.1	2.1	9.7	4.8	6.5	100.0	144
Preah vihear & steung treng	14.1	16.4	6.6	29.7	3.6	29.5	99.9	170
Mondol kiri & rattanak kiri	24.0	14.7	0.9	23.1	4.4	32.9	100.0	124
Wealth quintile								
Lowest	38.6	10.8	10.4	20.2	7.2	12.8	100.0	1,585
Second	49.4	11.8	9.6	15.4	6.5	7.3	100.0	1,380
Middle	59.4	12.8	8.0	12.3	4.7	2.8	100.0	1,229
Fourth	72.6	12.2	4.5	6.3	3.0	1.4	100.0	1,155
Highest	89.4	6.4	1.7	1.0	1.2	0.3	100.0	1,123
Exposure to mass media								
No	48.7	10.5	10.2	14.7	7.0	9.0	100.1	2,452
Yes	66.5	11.1	5.4	10.1	3.5	3.4	100.0	4,020
Health insurance coverage								
No	61.0	11.0	7.2	11.0	4.6	5.1	99.9	5,596
Yes	51.9	9.8	7.0	17.4	6.0	7.9	100.0	875
Total	59.8	10.9	7.2	11.9	4.8	5.5	100.1	6,472

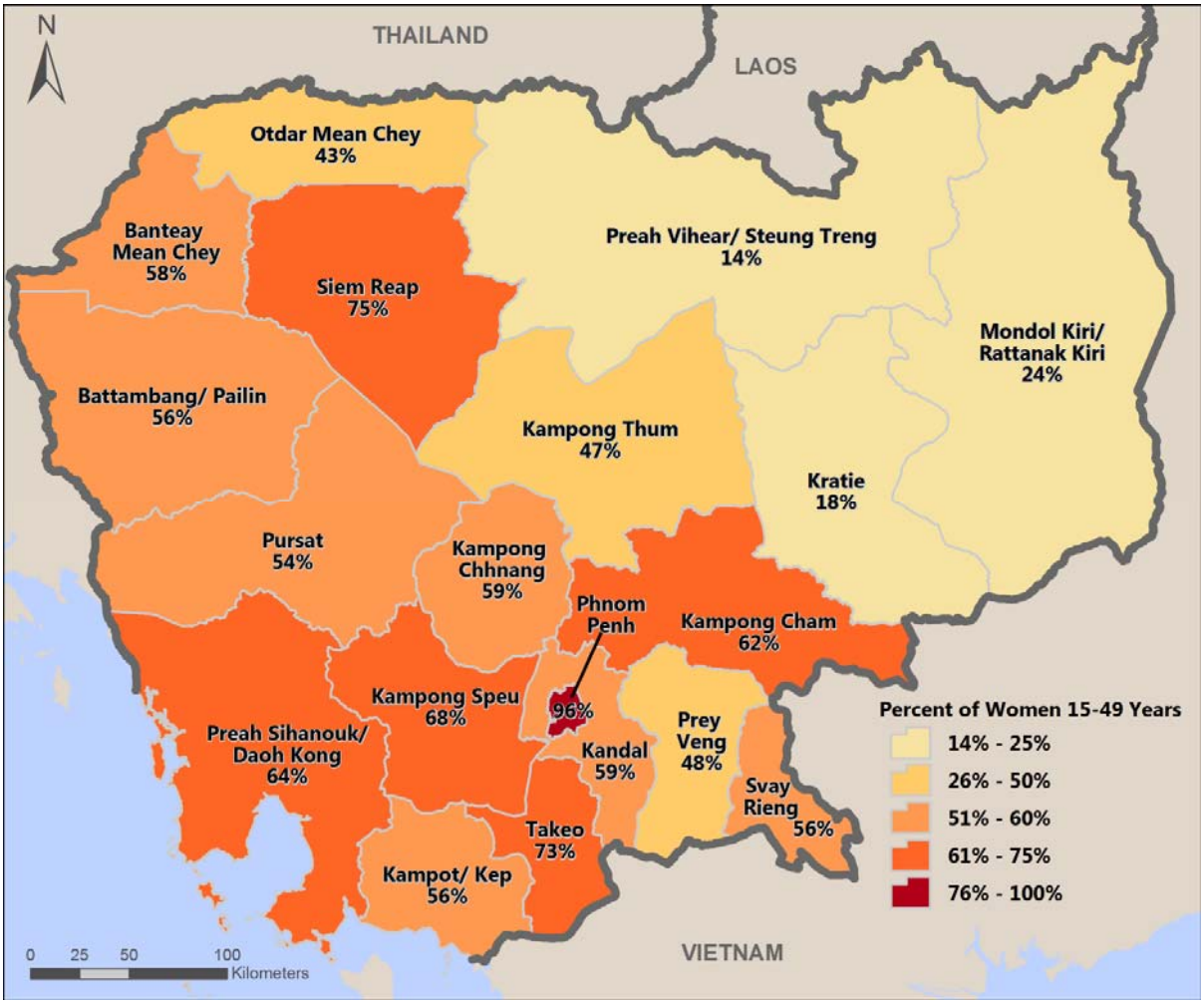
The likelihood of receiving all three services was also associated with women's educational attainment. The more schooling a woman had the more likely she was to complete the continuum of care. Almost all the women with higher than secondary education reported antenatal care, skilled birth attendance, and postnatal care; but fewer than half the women without any education did so. Women with no education were more likely to receive antenatal care only compared with other women.

Achieving a continuum of care was more common in urban than rural areas. Eighty-seven percent of women in urban areas reported receiving all three services compared with 55 percent in rural areas. Cambodia's regions varied substantially in the completeness of care. Figure 6 shows the percentage of women in each province who received all three services. In the capital city, Phnom Penh, 96 percent of women received antenatal care, skilled birth attendance, and postnatal care. Women in several other provinces around Phnom Penh—Takeo, Kampong Speu, Preah Sihanouk/Daoh Kong, and Kampong Cham—also reported receiving continuity of care, ranging from 62 to 73 percent. Also, in Siem Reap, a province in the north, three in every four women reported receiving antenatal care, skilled birth attendance, and postnatal care. Three provinces in the northeast, however—Preah Vihear/Steung Treng, Mondol Kiri/Ratttanak Kiri, and Kratie—had the lowest percentage of women with the continuum of care. These three provinces also reported the lowest level of use for each individual service. For example, in Preah Vihear/Steung Treng only 32 percent of women reported skilled birth attendance and 23 percent reported postnatal care, far below the national averages.

Completion of the continuum of care was associated with household wealth. Women from the richest households were most likely to report receiving all three maternal services. In contrast, women from the poorest households were least likely to have received any of the maternal services.

Being covered by health insurance did not seem to help women achieve a continuum of care. In fact, a higher proportion of women who were not covered by health insurance completed the continuum of care compared with women who were covered.

Figure 6. Continuum of care by province



The antenatal care received influenced women's subsequent use of delivery care and postnatal care. Table 7 shows the percentage of women who received skilled birth attendance and/or postnatal care, or neither of the two, by number and content of antenatal care visits received. Overall, there was a strong positive association between having four or more antenatal visits and the use of skilled birth attendance and postnatal care. Three in every four women who had four or more antenatal visits also received skilled birth attendance and postnatal care at their last birth. In contrast, for women who had fewer than four antenatal care visits, only half also received both skilled birth attendance and postnatal care.

The likelihood of having both skilled birth attendance and postnatal care was consistently associated with the content of antenatal care that women received. For example, 70 percent of women who were informed of signs of pregnancy complications during antenatal care received both subsequent maternal services compared with 55 percent of women who were not informed of signs of pregnancy complications. Similarly, having blood pressure measured, urine sample taken, or blood sample taken was associated with more use of skilled birth attendance and postnatal care. In contrast women who had fewer than four antenatal care visits and who did not get the specific antenatal care services associated with good-quality care were less likely to receive skilled birth attendance and postnatal care.

Table 7. Among women who received antenatal care for the most recent birth, the percentage who received various types of services by ANC services received, Cambodia 2011

	ANC & SBA & PNC	ANC & SBA only	ANC & PNC only	ANC only	Total	Total number of women who received antenatal care
Had 4 or more ANC visits						
No	49.6	14.3	12.6	23.5	100.0	1,962
Yes	75.3	11.0	5.7	8.0	100.0	3,842
Informed of signs of pregnancy complications						
No	55.0	16.4	10.8	17.8	100.0	1,160
Yes	69.5	11.1	7.3	12.1	100.0	4,645
Blood pressure measured						
No	43.0	16.7	15.1	25.1	99.9	547
Yes	69.1	11.6	7.3	12.0	100.0	5,257
Urine sample taken						
No	58.8	14.5	9.2	17.5	100.0	3,693
Yes	80.3	8.0	5.9	5.8	100.0	2,111
Blood sample taken						
No	58.2	14.3	9.7	17.9	100.1	3,224
Yes	77.2	9.4	6.0	7.4	100.0	2,580
Total	66.6	12.1	8.0	13.2	99.9	5,804

4.4. Results of Multiple Regressions

As described in the methods section, three random-effects logit regression models are fitted to identify facilitators (or inhibitors) for women to receive maternal health services along the continuum of care. Table 8 shows the estimated odds ratios and 95% confidence intervals for the variables included in each model. In each model *rho* is the intra-class correlation coefficient, which measures the proportion of variation in the use of maternal services that is between provinces.

Model I analyzes the association between use of antenatal care and women's background characteristics, including age at delivery, birth order, education, residence, household wealth quintile, exposure to mass media, and health insurance coverage. The results show that use of antenatal care is significantly associated with age 25-34, lower birth order, educational attainment, urban residence, wealth, health insurance coverage, and exposure to mass media.

Education and household wealth have relatively stronger effects than the other predictors. The odds of using antenatal care are almost five times higher for women with secondary or higher education than for women with no education. The wealthier the household a woman lives in, the more likely she is to report antenatal care. A woman covered by a health insurance has 30 percent greater odds of having antenatal care. Regular access to mass media (reading a newspaper, or watching television, or listening to radio at least once a week) increases the odds of antenatal care by 40 percent. In this model *rho* is 0.12, meaning that between-province variation accounts for 12 percent of the total variation in use of antenatal care. That is, most of the variation in antenatal use is attributable to differences in individual characteristics rather than residence in a particular province.

Model II analyzes the predictors of continuation of care from pregnancy to delivery among women who received antenatal care. Variables related to antenatal care services (indicators of the quality of care) are introduced to this model in addition to individual characteristics. All of the variables related to women's characteristics remain significant predictors except for exposure to mass media and insurance coverage. Higher birth order is associated with a lower likelihood of skilled birth attendance. Compared with birth order 1, women's odds of reporting a skilled health provider at birth are reduced by half at birth order 4 or higher.

The results from model II indicate the importance of having four or more antenatal care visits and receiving higher quality of antenatal care for subsequent use of skilled birth attendance. Women with four or more antenatal visits have twice the odds of receiving skilled birth attendance compared with women with fewer than four visits. The likelihood of having skilled birth attendance increases by 30 to 50 percent for women who received blood pressure measurement, urine sample taken, and blood sample taken as part of antenatal services. *rho* in this model is 0.10, meaning that between-province variation accounts for just 10 percent of the total variation in continuation from antenatal care to skilled birth attendance.

Model III estimates the effects of predicators on the continuation of care from delivery to the post-delivery period among women who received both antenatal care and skilled birth attendance. All of the variables related to women's characteristics and all of the variables related to antenatal care remain in the model, while place of delivery (delivery at a health facility or not) is added. Only three predictors are significant in this model—household wealth, urine sample taken during antenatal care, and place of delivery. Women from wealthier households are more likely to receive postnatal care than women from poorer households, although the effect of wealth on postnatal care does not appear to be as strong as its effect on antenatal care and skilled birth attendance. Delivering in a health facility is strongly associated with postnatal care—at over six times higher compared with not delivering in a health facility. Individual variables do not appear to explain much variation in use of postnatal care.

In this model *rho* is 0.35, much larger than in the other two models. This level of *rho* indicates that differences between provinces account for more than one-third of the total variation in use of postnatal care among women who received both antenatal care and skilled birth attendance.

Table 8. Results of the random-effects models

	Model I		Model II		Model III	
	ANC		ANC & SBA		ANC & SBA & PNC	
	Odds ratio	95% CI	Odds ratio	95% CI	Odds ratio	95% CI
Mother's age at birth (ref.= age <20)						
20-34	1.7***	1.2 - 2.4	1.3*	1.0 - 1.8	1.0	0.7 - 1.4
35+	1.2	0.8 - 1.9	1.5**	1.0 - 2.2	0.9	0.6 - 1.5
Birth order (ref.=1)						
2	0.6***	0.4 - 0.8	0.8**	0.6 - 1.0	1.2	1.0 - 1.6
3	0.4***	0.3 - 0.6	0.7***	0.5 - 0.9	1.4	1.0 - 1.8
4 or more	0.3***	0.2 - 0.4	0.5***	0.4 - 0.7	1.1	0.8 - 1.6
Mother's education (ref.= no education)						
Primary	2.0***	1.7 - 2.4	1.5***	1.3 - 1.9	1.1	0.9 - 1.5
secondary or higher	4.8***	3.3 - 7.0	2.8***	2.1 - 3.6	1.2	0.9 - 1.7
Residence (ref.=urban)						
Rural	0.8*	0.6 - 1.0	0.4***	0.3 - 0.5	1.0	0.8 - 1.3

(Continued...)

Table 8. – *Continued*

	Model I ANC		Model II ANC & SBA		Model III ANC & SBA & PNC	
	Odds ratio	**95% CI**	**Odds ratio**	**95% CI**	**Odds ratio**	**95% CI**
Wealth quintile (ref.= lowest)						
Second	1.5***	1.2 - 1.9	1.2**	1.0 - 1.5	1.4**	1.0 - 1.8
Middle	2.3***	1.8 - 3.0	1.7***	1.3 - 2.1	1.4**	1.0 - 1.9
Fourth	3.0***	2.2 - 4.2	2.9***	2.2 - 3.8	1.9***	1.4 - 2.7
Highest	6.5***	3.9 - 10.9	7.8***	5.1 - 12.1	2.7***	1.8 - 3.9
Exposure to FP messages (ref.= No)						
Yes	1.4***	1.2 - 1.7	1.0	0.8 - 1.2	0.9	0.7 - 1.1
Health insurance coverage (ref.= No)						
Yes	1.3***	1.1 - 1.7	1.2	1.0 - 1.4	1.1	0.8 - 1.4
Had 4 or more ANC visits (ref.= No)						
Yes			2.0***	1.7 - 2.4	1.2	1.0 - 1.4
Informed of signs of complications (ref.= No)						
Yes			1.0	0.9 - 1.3	1.2	1.0 - 1.5
Blood pressure measured (ref.= No)						
Yes			1.3**	1.1 - 1.7	1.1	0.8 - 1.5
Urine sample taken (ref.= No)						
Yes			1.5***	1.2 - 1.8	1.6***	1.3 - 1.9
Blood sample taken (ref.= No)						
Yes			1.4***	1.2 - 1.6	1.1	0.9 - 1.4
Delivery at a facility (ref.= No)						
Yes					6.4***	5.2 - 7.9
rho	0.12***		0.10***		0.35***	
Number of women	6,448		5,633		4,432	

*** p<0.01, ** p<0.05

5. DISCUSSION

Continuum of care has become a key strategy of intervention programs for improving health and wellbeing of mothers and newborns. This strategy calls for a service delivery system connecting the three components of maternal care—antenatal, delivery, and postnatal services—with high-quality services at each of these levels. To facilitate designing and implementing such a system, it is necessary to understand where a country stands in the continuum of care, where women are lost along the pathway from one service to the next, and what should be the focus of efforts to improve the continuity of care. This analysis addressed these issues using data from the 2010 CDHS.

Cambodia has been successful in extending the reach of antenatal care, skilled birth attendance, and postnatal care. Over 90 percent of women studied had at least one antenatal care visit during pregnancy; 74 percent were attended by a doctor, nurse, or midwife at delivery; and more than 70 percent of women had a postnatal check up within 48 hours after delivery. Very few women (6 percent) did not receive any of the services.

The study found that 60 percent of pregnant women in Cambodia completed the continuum of care, receiving all three types of maternal services—antenatal care during pregnancy, skilled birth attendance at delivery, and postnatal care within 48 hours after delivery. This is a remarkable achievement for a country where 30 percent of the population lives below the poverty line, with 20 percent struggling to afford enough food. It reflects the program efforts of the government in collaboration with multiple international development partners to improve maternal care (UNICEF Cambodia 2012).

Nonetheless, the study found that after receiving antenatal care many women dropped out from the pathway of continued care and did not have a skilled birth attendant or postnatal care. More dropouts occurred between pregnancy and delivery than between delivery and the postnatal period. Among women who delivered with the assistance of a skilled birth attendant, 83 percent received postnatal care, as did 91 percent of women who delivered at a health facility. These findings demonstrate that increasing skilled birth attendance, and especially delivery at health facilities, could lead to more use of postnatal care and thus improve the continuity of care in Cambodia.

The finding that more women received skilled birth attendance than delivered at health facilities (74 percent versus 57 percent) differs from the pattern usually seen in other countries, where the two groups are quite similar in size (Wang et al. 2011). The fact that a substantial proportion of Cambodian women surveyed were attended by a skilled health provider even though they did not deliver at a health facility is in part because many health professionals, including doctors and midwives, who are employed in the public sector also practice in the private sector, to compensate for the low salaries offered by the public sector (Levine and Gardner 2008).

While this practice might improve health service coverage, it could cause problems for the public sector, which plays a dominant role in providing maternal health care services in Cambodia. Over 80 percent of women who received antenatal care and over 90 percent of women who delivered at health facilities reported receiving these services in the public sector. When health workers are busy with their own practice, they may not be available during work hours, or the quality of care in public facilities might be compromised (Collins 2000). Moreover, the quality of care that private practitioners provide is unknown. There is a concern that they may not adhere to treatment guidelines, due to lack of regulation (Berman and Laura 1996). The private sector is an important component of Cambodia's health system, as a major source of general health care. Thus the government needs to work toward building a public-private partnership in providing maternal health care and also ensuring the quality of care.

The study found substantial socioeconomic disparities in use of maternal health services in Cambodia. Women from the wealthiest households are over seven times more likely to report use of antenatal care and eight times more likely to report both antenatal care and skilled birth attendance compared with women from the poorest households. Although health insurance enrollment would be expected to improve access to health services in general, this study shows that health insurance coverage only affects women's use of antenatal care but not use of both antenatal care and skilled birth attendants and use of all three services together. Health insurance in Cambodia is still at the early stage and has limited nationwide coverage. Health Equity Funds, as the main insurance scheme, have primarily focused on several provinces, where they have started to have an effect, based on small-scale evaluations (University Research Co 2011).

The study found that the quality of antenatal care services that women receive, such as making at least four antenatal visits, is significantly associated with their subsequent use of skilled birth attendance. When women receive high-quality antenatal care, they become better informed about pregnancy and more likely to recognize the importance of skilled delivery care. This synergetic effect is also found between delivery in a health facility and receiving postnatal care, as discussed at the beginning of this section.

Among women who received antenatal care and skilled birth attendance, only a few socio-demographic characteristics are significantly associated with continuation to postnatal care, while differences by province account for a larger proportion. The regional variation in use of maternal health services overall is large. By mapping the level of continuum of care in Cambodia's provinces, we found geographic clustering of high use and low use of maternal services. High-use provinces are located around the capital city, where the use of all three services is almost universal. Its surrounding provinces—Takeo, Kampong Speu, and Kampong Cha—also demonstrate high levels of completion of continuum of care. These three provinces are more socioeconomically developed and have better access to a large number of health providers, including both public and private services. In contrast, three provinces in the northeast (Preah Vihear/Steung Treng, Kratie, and Mondol Kiri/Rattanak Kiri) have the lowest use of maternal services, in part because of the limited health resources available. More program efforts should be directed to these regions.

6. LIMITATIONS OF THE STUDY

The study is subject to several limitations. The DHS makes every effort to construct survey questions adequately to provide reliable information, but because women's answers to these questions are self-reported, the resulting data are open to the potential for bias. Information collected in the DHS for maternal health services is based on women's recall of events, which can be affected by the period of recall as well as the women's situation at the time of the event. In this study we focus on the last birth in the five years preceding the survey and expect that women are more likely to misreport or misclassify events the earlier the birth occurred. A woman in a critical situation shortly after delivery or a Cesarean section, for example, may be prone to misinterpreting or not realizing whether a contact with a health provider after birth was "postnatal care" or some other type of care. A woman may also not correctly identify the category or skill level of the care provider. This may occur because of poor recall, nonstandard provider uniform (or no uniform), or lack of knowledge of the types of provider offering these.

Another limitation is the quality of the data on postnatal care based on how they are collected. In DHS women are asked, "*After you gave birth to (NAME), did anyone check on your health*". Since the question does not specify the amount of time after delivery, women could misreport care that was part of delivery care as postnatal care. Misreporting might overstate the actual percentages of women receiving postnatal care. Moreover, the way that the question is phrased may not be clear enough for many women to understand. A study in Malawi and Bangladesh found that women often did not understand what was meant by "*check on your health*" (Yoder et al. 2010). Interviewers had to explain the question and the explanations could have varied among interviewers. The study suggested that the DHS adopt a standard question with specific examples of a checkup (i.e., a check of temperature, a check for bleeding) in order to obtain more reliable data on postnatal checkups.

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