Pregnancy care in Cambodia: Challenges in achieving the 5th Millennium Development Goal

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A paper submitted for consideration for the European Population Conference 2012 Meeting.

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Introduction

Over the past decade, Cambodia has made remarkable efforts in improving health outcomes among its population. While the health care system has recorded significant progress, maternal mortality level remained very high for this country. Recent statistics show an estimated maternal mortality ratio of 540 maternal deaths per 100,000 live births (WHO, 2010), which is one of the highest in the Southeast Asia. Alongside this huge death toll of mothers, children's health outcomes are also markedly poor, with an infant and under-five mortality rates of 70 and 91 deaths for 1,000 live births respectively (UNICEF, 2009). With Cambodia still facing the challenge of successfully addressing the issue of reproductive-ill health, the 2015 deadline to meet the Millennium Development Goal 5 (MDG) for reducing maternal mortality could be compromised. The potential failure to achieve the MGD 5 would also have an impact on other MDG targets specially the MDG 4 to reduce child mortality.

The Safe motherhood program initiated in 1987 has increased attention on strategies to prevent pregnancy-related deaths, particularly in developing countries settings. Antenatal care and delivery care have been consistently identified as critical interventions to improve the heath and well-being of mothers and their children (World Bank, 2010). The World Health Organization (WHO) indicates that both timing and frequency of antenatal care checkups are critical to the health and the survival of the mother and the child, because antenatal care provides opportunity for preventive treatments, early detection of diseases and timely care (WHO, 2003). Alternatively, delivery care should include childbirth in a health facility or childbirth attended by trained medical personnel, which is crucial in reducing both maternal and neonatal deaths through adequate case management, referral and effective emergency obstetric care. But, these critical components of maternal health remain far from universal among women of reproductive age in

Cambodia, despite Safe Motherhood being a high priority program in the country. Factors leading to lack of or low use of maternal care services in the developing world have been well documented in the published literature, with most attention being oriented towards the influence of individual characteristics. However, in recent years, a handful of studies have gone beyond assessing the individual characteristics associated with the usage of maternal health care services to analyzing the effects of contextual factors. To date, there has been little discussion about the correlates of maternal health care usage in Cambodia. This study takes advantage of the most recent national survey to examine the influence of individual factors and community context on maternal health care usage in Cambodia.

Data and methods

Data for this study come from the 2005 Cambodia Demographic Health Survey (CDHS), a nationally representative household survey that collected data on a wide range of information including background characteristics, reproductive health issues and utilization of maternal and child health services. The survey utilized a two–stage-sampling design, with sample clusters selected in the first stage, and households selected in the second stage. Individual questionnaire were successfully administered to 16,823 women and 6731 men, yielding response rates of 98 percent and 93 percent respectively. Our study focuses on responses from the women individual questionnaire and is restricted to 6,140 women who had given birth during the five years preceding the survey.

The outcomes variables in this paper are: receipt of four or more antenatal checkups, timing of first antenatal visit, delivery in a medical facility and delivery by trained medical personnel. These variables were measured according to WHO standards of appropriate maternal care. The community-level factors included in this study were constructed by aggregating the individual characteristics of respondents to the primary sampling unit (PSU) level, except for community type. Our statistical analyses include descriptive statistics and multilevel logistic

regressions performed using the survey command in Stata version 9.0, which adjust for the complex sample design of the survey (StataCorp, 2005).

Results

Table 1 presents the characteristics of the sample. As can be seen in Table 1, only 27% of women have received four or more antenatal checkups, 32% have done their first antenatal care during the first trimester of pregnancy, 23% of women have delivered their children in a medical facility, and about 46% of women were assisted at delivery by trained medical personnel.

Table 2 and Table 3 present the results of antenatal and delivery care utilization respectively. Age at birth is associated with the use of maternal care services except for timing of first antenatal visit. Older women appear significantly more likely to get the recommended four antenatal visits, to deliver at a medical facility and to give birth assisted by trained personnel than women aged less than 20 years. Parity is found to have a significant impact on all outcomes. Women of parity 2 to 4 and women of parity 5 or more have lower odds of using all maternal health services than women of parity 1. The education of a woman increases the odds of receiving four or more prenatal visits, giving birth in a medical setting and being assisted at delivery by trained personnel. Alternatively, husband's education is positively associated with all outcomes. The woman's socioeconomic status represented by household wealth index has a significant impact on all outcomes with the exception of the timing of first antenatal visit. Living in households that fall in the first four quintiles (i.e. poorest, poor, middle and rich) reduces significantly the odds of receiving four or more prenatal visits, giving birth in a medical setting and being assisted at delivery by trained personnel than living households in the richest quintile. Husband's education is significantly related to delivery care outcomes only. Women whose husband works in the professional and in the manual sector are more likely to delivery in a medical institute and to give birth attended by trained personnel. Women who read newspapers at least once a week have a higher likelihood of using the two antenatal care services and being assisted at delivery by

skilled personnel. While listening to radio at least once a week is significantly associated with the receipt of four or more antenatal care visits only, watching television at least once a week is found to be significantly related to both receipt of four or more antenatal care visits and skilled attendance at delivery. Being exposed to counseling about pregnancy complications during prenatal care is protective against poor delivery care. Women who received information about pregnancy complication during prenatal care have higher likelihood of giving birth in medical facility and being assisted at delivery by trained personnel than women who received no information during antenatal visit.

Moreover, as shown in Table 2 and Table 3, community type has a significant effect on delivery in a medical facility. Women who live in urban areas have 1.39 higher odds of giving birth in a medical setting than their counterparts who live in rural communities. Poverty concentration in a community has an influence on all outcomes, but the receipt of antenatal care during the first trimester of pregnancy. Women living in areas with low and medium concentration of poverty have a higher odds of receiving four or more antenatal care visits, delivering in a medical facility and giving birth assisted by trained personnel as opposed to women living in communities with high concentration of poverty. Higher education in a community is significantly associated with all outcomes. Women living in communities with medium or higher education concentrations are more likely to use maternal care services than women living in communities with low higher education concentration. Prevalence of large family size in a community has significant impact on the receipt of four or more antenatal visits. Prevalence of large family size in a community has significant impact on the receipt of four or more antenatal visits. Surprisingly, the odds of receiving four or more prenatal checkups are significantly lower in communities with low (OR= 0.279) and medium (OR=0.287) prevalence of large family size compared to communities with high prevalence of large family norm. Prenatal care uptake has a significant effect on the two delivery care outcomes. Women living in communities with high concentration of prenatal uptake have 2.01 higher odds of giving birth in a medical facility and 1.66 higher odds of

being assisted at delivery by a trained person than women living in communities with low antenatal care uptake. Distance as barrier to health care seeking is negatively associated with all outcomes, except for skilled attendance at delivery. Women living in communities with medium and high incidence of report of distance as barrier to health care seeking are less likely to receive four or more antenatal care visits, to deliver in a health clinic and to deliver assisted by trained personnel.

Table 4 shows the intra-community correlation and variances of the random intercept. The intra-community correlation or intra-class correlation refers to the total variance in using maternal services in the community that is explained by the community where the respondent lives. The findings indicate that 32% of the total variance in the receipt of four or more prenatal checkups is attributable to the differences across communities. The receipt of antenatal visit in the first trimester shows low intra-class correlation of 7.2%, which means that most of the variation in this outcome is explained by the individual characteristics. Delivery in medical facility and professional attendance at delivery exhibit an intra-community correlation of 0.516 and 0.557, indicating that a considerable proportion of the total variance for these outcomes is attributable to the differences across communities. After controlling for individual- and community-level variables, intra-community correlations have been reduced for all outcomes but antenatal in the first trimester This suggest that while individual and contextual covariates account for more of the community clustering of the receipt of four or more antenatal visits, delivery in a medical facility and delivery attended by trained personnel, they account for little of the community clustering of the timing for first antennal visit.

Discussion

Taken together, the findings demonstrate the importance of both individual- and community-level characteristics in the utilization of maternal health services. Meeting the Millennium Development Goal to reduce maternal mortality and morbidity will be difficult in Cambodia if the individual and contextual correlates

identified in this research are not addressed from a larger policy perspective for providing health care services to women most in need of care.

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Tables

Table 1. Sample characteristics of women aged 15-49 with adjustment for survey design, 2005 Cambodia Demographic and Health Survey (n=6140)

Variables	Mean	Standard Error
Dependent variables		
Receipt of four or more antenatal checkups	0.270	0.011
Timing of first antenatal visit	0.322	0.010
Delivery in a medical facility	0.231	0.012
Delivery by trained medical personnel	0.464	0.015
Individual-level variables		
Age at birth		
Less than 20	0.066	0.004
20-29	0.507	0.008
30-39	0.350	0.008
40-49	0.076	0.004
Parity		
1	0.244	0.007
2-4	0.526	0.008
5 or more	0.231	0.008
Woman's education		
No education	0.231	0.010
Primary	0.594	0.010
Secondary or higher	0.175	0.010
Husband's education		
No education	0.134	0.007
Primary	0.522	0.010
Secondary or higher	0.344	0.011
Household wealth index		
Poorest	0.252	0.011
Poor	0.225	0.008
Middle	0.184	0.007
Rich	0.171	0.009
Richest	0.168	0.013
Husband's occupation		
Professional/Services	0.170	0.009
Skilled/Unskilled manual	0.208	0.010
Agricultural	0.622	0.014
Childcare burden		
Number of children under 5	1.422	0.012
Read news paper at least once a week		
Yes	0.224	0.009
No	0.776	0.009
Listen to radio at least once a week		
Yes	0.630	0.010
No	0.370	0.010

Table 1. Sample characteristics of women aged 15-49 with adjustment for survey design, 2005 Cambodia Demographic and Health Survey (n=6140)

Watch television at least once a week		
Yes	0.742	0.010
No	0.258	0.010
Pregnancy Complications		
No prenatal care	0.282	0.012
Prenatal care with no information about complications	0.282	0.009
Prenatal care with information about complications	0.436	0.011
Community-level variables		
Community type		
Urban	0.141	0.012
Rural	0.859	0.012
Poverty concentration		
Low	0.360	0.023
Medium	0.325	0.024
High	0.315	0.022
Higher education concentration		
Low	0.817	0.020
Medium	0.158	0.019
High	0.024	0.008
Prevalence of large family size		
Low	0.781	0.020
Medium	0.214	0.020
High	0.004	0.003
Prenatal care uptake		
Low	0.105	0.016
Medium	0.263	0.024
High	0.632	0.025
Distance barrier to care seeking		
Low	0.424	0.025
Medium	0.378	0.026
High	0.198	0.018

Table 2. Multilevel modeling regressions predicting antenatal care utilization, 2005 Cambodia Demographic and Health Survey (n=6,140)

	Four or more antenatal visits				Timing of first antenatal visit [a]			
	Model 1		Model 2		Model 1		Model 2	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Individual-level variables								
Age at birth (ref=less than 20)								
20-29	1.574**	(1.179, 2.100)	1.550**	(1.160, 2.068)	1.254	(0.943, 1.667)	1.257	(0.945, 1.671)
30-39	1.256	(0.902, 1.749)	1.211	(0.869, 1.686)	1.154	(0.833, 1.599)	1.147	(0.827, 1.588)
40-49	1.236	(0.798, 1.910)	1.164	(0.751, 1.800)	1.136	(0.739, 1.746)	1.125	(0.732, 1.728)
Parity (ref=1)								
2-4	0.564***	(0.467, 0.679)	0.565***	(0.469, 0.681)	0.714***	(0.593, 0.858)	0.713***	(0.592, 0.856)
5 or more	0.400***	(0.302, 0.529)	0.404***	(0.304, 0.535)	0.711*	(0.540, 0.936)	0.696*	(0.527, 0.918)
Woman's education (ref=no education)								
Primary	1.079	(0.884, 1.315)	1.051	(0.861, 1.281)	0.934	(0.767, 1.135)	0.921	(0.757, 1.121)
Secondary or higher	1.637***	(1.256, 2.133)	1.482**	(1.132, 1.939)	1.066	(0.822, 1.383)	1.017	(0.779, 1.325)
Husband's education (ref=no education)								
Primary	1.530**	(1.190, 1.966)	1.504**	(1.170, 1.933)	1.201	(0.942, 1.531)	1.191	(0.934, 1.516)
Secondary or higher	2.092***	(1.584, 2.763)	2.037***	(1.542, 2.688)	1.344*	(1.025, 1.759)	1.325*	(1.012, 1.739)
Household wealth index (ref=richest)								
Poorest	0.370***	(0.274, 0.498)	0.506***	(0.363, 0.704)	0.756	(0.565, 1.009)	0.870	(0.624, 1.210)
Poor	0.420***	(0.316, 0.556)	0.549***	(0.402, 0.748)	0.916	(0.699, 1.199)	1.041	(0.766, 1.413)
Middle	0.424***	(0.323, 0.557)	0.529***	(0.394, 0.707)	1.023	(0.787, 1.329)	1.119	(0.839, 1.491)
Rich	0.547**	(0.426, 0.700)	0.637**	(0.491, 0.825)	0.967	(0.757, 1.233)	1.029	(0.794, 1.338)
Husband's occupation (ref=agricultural)								
Professional/Services	1.195	(0.966, 1.478)	1.131	(0.912, 1.401)	1.133	(0.921, 1.392)	1.120	(0.909, 1.379)
Skilled/Unskilled manual	1.044	(0.860, 1.265)	0.969	(0.796, 1.177)	0.851	(0.703, 1.029)	0.826	(0.680, 1.002)
Childcare burden								
Number of children under 5	0.906	(0.814, 1.008)	0.904	(0.812, 1.006)	0.967	(0.868, 1.076)	0.962	(0.864, 1.070)
Read news paper at least once a week (ref=no)	1.343**	(1.125, 1.602)	1.323**	(1.109, 1.578)	1.194*	(1.003, 1.420)	1.188	(0.998, 1.413)
Listen to radio at least once a week (ref=no)	1.338***	(1.137, 1.574)	1.337***	(1.136, 1.573)	0.997	(0.851, 1.167)	0.990	(0.846, 1.159)
Watch television at least once a week (ref=no)	1.358**	(1.119, 1.646)	1.287*	(1.061, 1.560)	1.021	(0.851, 1.224)	0.998	(0.832, 1.197)
Community-level variables								
Community type (ref=rural)								
Urban			0.875	(0.676, 1.133)			0.812	(0.659, 1.010)
Poverty concentration (ref=high)								
Low			1.427*	(1.030, 1.976)			1.277	(0.976, 1.668)

Medium		1.388* (1.062, 1.812)		1.120 (0.903, 1.387)
Higher education concentration (ref=low)				
Medium		1.402* (1.044, 1.881)		1.036 (0.815, 1.315)
High		2.429* (1.230, 4.794)		1.694* (1.003, 2.861)
Prevalence of large family size (ref=high)				
Low		0.279* (0.086, 0.897)		0.719 (0.283, 1.825)
Medium		0.287* (0.088, 0.927)		0.805 (0.315, 2.051)
Distance barrier to care seeking (ref=low)				
Medium		0.674** (0.532, 0.853)		0.855 (0.708, 1.031)
High		0.646** (0.479, 0.872)		0.865 (0.682, 1.097)
Wald chi^2	517.44***	552.54***	73.45***	87.57***
-2 log likelihood	-2886.66	-2864.58	-2613.67	-2606.62

***p<0.001 **p<0.01 *p<0.05

[a] Sample is restricted to woman who have had antenatal care

Table 3. Multilevel modeling regressions predicting delivery care utilization, 2005 Cambodia Demographic and Health Survey (n=6140)

	Delivery at medical facility				Delivery by trained medical personnel			
	Model 1		Model 2		Model 1		Model 2	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Individual-level variables								
Age at birth (ref=less than 20)								
20-29	1.538*	(1.080, 2.186)	1.533*	(1.075, 2.184)	1.384*	(1.018, 1.881)	1.365*	(1.002, 1.858)
30-39	2.144***	(1.435, 3.201)	2.022**	(1.351, 3.024)	1.717**	(1.207, 2.440)	1.613**	(1.132, 2.296)
40-49	2.990***	(1.782, 5.016)	2.849***	(1.695, 4.788)	2.544	(1.636, 3.954)	2.331***	(1.496, 3.630)
Parity (ref=1)								
2-4	0.388***	(0.308, 0.487)	0.383***	(0.304, 0.481)	0.503***	(0.406, 0.622)	0.497***	(0.401, 0.615)
5 or more	0.301***	(0.214, 0.423)	0.309***	(0.219, 0.435)	0.368***	(0.273, 0.493)	0.377***	(0.279, 0.506)
Woman's education (ref=no education)								
Primary	1.255	(0.969, 1.622)	1.229	(0.949, 1.590)	1.383**	(1.136, 1.683)	1.342***	(1.101, 1.634)
Secondary or higher	1.569**	(1.129, 2.178)	1.450*	(1.039, 2.022)	2.503***	(1.864, 3.360)	2.173***	(1.613, 2.925)
Husband's education (ref=no education)								
Primary	0.957	(0.706, 1.295)	0.925	(0.682, 1.254)	1.073	(0.850, 1.354)	1.040	(0.823, 1.313)
Secondary or higher	1.071	(0.767, 1.494)	1.050	(0.752, 1.466)	1.220	(0.933, 1.594)	1.169	(0.893, 1.529)
Household wealth index (ref=richest)								
Poorest	0.136***	(0.094, 0.196)	0.274***	(0.183, 0.409)	0.087***	(0.060, 0.125)	0.190***	(0.129, 0.278)
Poor	0.170***	(0.121, 0.238)	0.309***	(0.215, 0.443)	0.108***	(0.075, 0.153)	0.212***	(0.147, 0.305)
Middle	0.219***	(0.159, 0.301)	0.356***	(0.255, 0.497)	0.153***	(0.108, 0.215)	0.274***	(0.192, 0.388)
Rich	0.375***	(0.284, 0.494)	0.521***	(0.392, 0.691)	0.286***	(0.205, 0.397)	0.437***	(0.313, 0.609)
Husband's occupation (ref=agricultural)								
Professional/Services	2.440***	(1.911, 3.113)	2.162***	(1.688, 2.768)	2.184***	(1.731, 2.756)	1.964***	(1.554, 2.482)
Skilled/Unskilled manual	1.714***	(1.367, 2.147)	1.429**	(1.136, 1.797)	1.624***	(1.328, 1.985)	1.338**	(1.091, 1.640)
Childcare burden								
Number of children under 5	0.994	(0.873, 1.131)	0.984	(0.863, 1.120)	0.989	(0.885, 1.104)	0.982	(0.878, 1.098)
Read news paper at least once a week (ref=no)	1.201	(0.974, 1.479)	1.151	(0.933, 1.418)	1.253*	(1.025, 1.529)	1.211	(0.991, 1.479)
Listen to radio at least once a week (ref=no)	0.885	(0.726, 1.078)	0.886	(0.726, 1.081)	0.931	(0.787, 1.100)	0.919	(0.776, 1.087)
Watch television at least once a week (ref=no)	1.166	(0.916, 1.483)	1.074	(0.843, 1.368)	1.260*	(1.042, 1.524)	1.180	(0.975, 1.425)
Pregnancy Complications (ref=prenatal care no told)								
No prenatal care	0.319***	(0.237, 0.428)	0.346***	(0.255, 0.469)	0.419***	(0.338, 0.519)	0.450***	(0.360, 0.560)
Prenatal care with information about complications	1.536***	(1.266, 1.863)	1.515***	(1.249, 1.838)	1.420***	(1.190, 1.694)	1.402***	(1.174, 1.672)
Community-level variables								
Community type (ref=rural)								

Table 3. Multilevel modeling regressions predicting delivery care utilization, 2005 Cambodia Demographic and Health Survey (n=6140)

Urban		1.392*	(1.016, 1.904)	1.195	(0.867, 1.647)
Poverty concentration (ref=high)					
Low		2.297***	(1.517, 3.475)	3.183***	(2.186, 4.635)
Medium		1.184	(0.825, 1.697)	1.525**	(1.118, 2.078)
Higher education concentration (ref=low)					
Medium		0.893	(0.618, 1.288)	2.003**	(1.349, 2.971)
High		4.292**	(1.724, 10.682)	14.537*	(1.597,132.281)
Prevalence of large family size (ref=high)					
Low		4.929	(0.412, 58.886)	2.995	(0.610, 14.698)
Medium		4.352	(0.362, 52.319)	2.925	(0.591, 14.468)
Prenatal care uptake (ref=low)					
Medium		1.668	(0.886, 3.137)	1.384	(0.849, 2.253)
High		2.012*	(1.090, 3.711)	1.665*	(1.041, 2.664)
Distance barrier to care seeking (ref=low)					
Medium		0.663**	(0.491, 0.893)	0.741*	(0.555, 0.988)
high		0.545**	(0.364, 0.815)	0.452***	(0.314, 0.648)
Wald chi^2	696.22***	721.87***		812.79***	867.43***
-2 log likelihood	-2137.85	-2088.62		-2766.51	-2681.56

***p<0.001 **p<0.01 *p<0.05

Table 4. Intra-community correlation and individual and community-level variances for random intercepts, 2005 Cambodia Demographic and Health Survey

	Receipt of four or more antenatal checkups	Antenatal visit in the first trimester	Delivery in medical facility	Professional attendance at delivery
Intra-community correlation				
Empty model	0.320*	0.072*	0.516*	0.557*
Individual and community-level model	0.167*	0.056*	0.242*	0.266*
Variance of random intercept				
Empty model	1.548	0.258	3.512	4.137
Individual-level model	0.733	0.222	1.195	1.503
Individual and community-level model	0.661	0.196	1.053	1.192

*$p<0.05$