

## **Applying an Equity Lens to Maternal Health Care Continuum in Rural Communities of Cambodia, Guatemala, Kenya, and Zambia**

### **Authors**

<sup>1</sup>Anbrasi Edward,  
<sup>2</sup>Younghee Jung, <sup>3</sup>Grace  
Ettyang, <sup>4</sup>Jane Chege,  
<sup>5</sup>Annette E Ghee

### **Affiliations**

<sup>1</sup> Department of  
International Health,  
Associate Scientist,  
Johns Hopkins  
University

<sup>2</sup> Department of  
International Health,  
Research Assistant,  
Johns Hopkins  
University

<sup>3</sup> Dean, Moi University  
School of Public Health,  
Kenya

<sup>4</sup> Senior Director,  
Monitoring and  
Evaluation, World  
Vision International

<sup>5</sup> Technical Director,  
Monitoring and  
Evaluation, World  
Vision International

### **Correspondence**

Anbrasi Edward  
[aedward1@jhu.edu](mailto:aedward1@jhu.edu)

### **2.2 Abstract**

Background: The continuum of care (CoC) has been prioritized to be of paramount importance in improving maternal newborn and child health. Effective community based program interventions can enhance the timely utilization of facility based services, and improved health outcomes. Methods: A quasi experimental study with matched comparison groups was conducted in four countries to determine the levels of the continuity of care for maternal health. Households in two districts/sub districts in each country received a package of community based interventions which included targeted community health worker health promotion for maternal newborn and child health, and institution of social accountability mechanisms for effective community engagement. Two comparison districts/sub districts received ongoing routine interventions. Women 15-49 years who delivered in the previous two years were selected and care seeking practices for maternal newborn and child health were obtained. Results: The study included 2995 women in Cambodia, 1992, in Guatemala, 2581, in Kenya, and 1057, in Zambia. More than 85% of the women reported antenatal care visits, with a significantly higher proportion of women reporting four or more visits in the intervention sites for Cambodia (81.2% vs 57.9%,  $p<0.001$ ) and Kenya (70.5% vs 62%,  $p<0.001$ ). Skilled birth attendance was also significantly higher in the intervention sites for Cambodia (99.1% vs 84.9%,  $p<0.001$ ). CoC completion rates were also significantly higher in the intervention sites for Cambodia (76% vs 42%,  $p<0.001$ ), and Kenya (28% vs 21%,  $p<0.001$ ). Women with higher education, higher wealth quintile, those from intervention sites (except Guatemala) had significantly higher odds of CoC completion, though the results varied between the country contexts. Conclusions: Concerted efforts for contextually appropriate integrated health promotion strategies at the household, community and primary health facility level are essential to enable appropriate and timely healthcare and effectively mitigate the barriers to care seeking for maternal and newborn health.

**Keywords:** Maternal, Newborn and Child Health, Continuum of Care, ANC, PNC, SBA, Cambodia, Kenya, Guatemala and Zambia

Internal Medicine Review  
Applying an Equity Lens to Maternal Health Care Continuum in Rural Communities of  
Cambodia, Guatemala, Kenya, and Zambia  
February 2018

## 2.3 Main Text

### 2.3.1 Introduction

Major investments by the global community over the past decade resulted in impressive achievements in reducing Maternal, neonatal and child mortality<sup>1</sup>. However, many low and middle-income countries failed to achieve the Millennium Development Goals, and are still challenged with a high disease burden, with a maternal mortality ratio of 546 per 100,000 live births in Sub Saharan Africa. An estimated 94.4 million children under 5 years are projected to die, globally, between 2016-2030 if current rates remain unchanged<sup>2,3</sup>. Neonatal deaths, which comprise 45% of under 5 deaths, have not shown expected improvements, and pose a greater challenge<sup>4</sup>. The mortality rates in women and children have been associated with inadequate access to quality healthcare services during the pre-pregnancy, delivery and postnatal periods<sup>5-7</sup>. A number of studies have illustrated improved health outcomes, reducing the risk of maternal deaths with adequate antenatal care (ANC), skilled birth attendance (SBA) and postnatal care (PNC) in Africa and South-East Asia<sup>5,6,8-12</sup>.

The continuum of care for maternal, newborn and child health (MNCH) was originally postulated to encompass the spectrum of services, initiating from adolescence, pregnancy, delivery, post-delivery and childhood life cycle, and therefore considered a key program strategy for maternal new born and child health<sup>13,14</sup>. Several individual and contextual factors including maternal age, parity, socio economic status, education, cultural beliefs and practices influence the care-seeking practices of women, especially in rural communities<sup>15-19</sup>. Effective community based strategies ensuring universal access and care quality can improve appropriate maternal, neonatal and child health outcomes, and mitigate some of the barriers to care seeking<sup>20-22</sup>. These studies effectively mobilized community health providers to enhance knowledge and health care seeking behaviors of women. Social accountability mechanisms like community voice and action (CVA) and community scorecards (CSC) have also been successfully integrated in many contexts to strengthen local governance of health systems, by creating a culture of accountability and improving community participation while enhancing appropriate utilization and quality

Internal Medicine Review  
Applying an Equity Lens to Maternal Health Care Continuum in Rural Communities of  
Cambodia, Guatemala, Kenya, and Zambia  
February 2018

of health care services<sup>23-25</sup>. There is also substantive evidence on the effectiveness of functional, well managed local health facility committees and community councils who foster linkages with the community and providers at primary care facilities<sup>26,27</sup>.

For over 5 decades, World Vision, a Christian Relief and Development Organization, has made considerable investments in community based healthcare. The programs are designed for providing comprehensive services, ranging from water and sanitation, health and nutrition, education, child protection, and food security and livelihood interventions through comprehensive Area Development Programs (ADP), which target a population of 19,000-25,000. Aside from supporting the training and oversight of a cadre of community health providers, they also equip local leaders through social accountability mechanisms integrating CVA/CSC to enhance community governance and public services accountability to create a shared vision and ensure community awareness of public entitlements, improve service utilization and support health facility operations. This study was designed to determine if a package of community based interventions training community health

workers (CHWs) to provide timed and targeted home visits and counseling to women and their families during the pregnancy-delivery-postnatal periods and community engagement strategies with CVA/CSC could improve the MNCH care pathway of care seeking behaviors in rural communities of Cambodia, Guatemala, Kenya and Zambia.

### 2.3.2 Methods

The Multi-country research study was designed and conducted collaboratively by Johns Hopkins University, and four research institutions in the country of implementation; National Institute of Public Health in Cambodia, Institute of Nutrition of Central America and Panama in Guatemala, Moi University School of Public Health in Kenya and the Institute of Economic and Social Research at the University of Zambia.

#### *Study Design*

As described earlier, the World Vision ADP is designed for comprehensive multifaceted interventions with each ADP covering a distinctive geographic area, representing a district or sub-district, with a population ranging from 19,000 to 25,000. The study was designed as a quasi-experimental trial

**Internal Medicine Review**  
**Applying an Equity Lens to Maternal Health Care Continuum in Rural Communities of**  
**Cambodia, Guatemala, Kenya, and Zambia**  
**February 2018**

with baseline and final evaluations. Four ADPs were selected in each country and matched to intervention and comparison arms (Box 1). The intervention sites received a) timed and targeted counseling by CHWs, a household health promotion strategy which involve timed and specific counseling based on stage of pregnancy and early childhood and b) Establishment of social accountability mechanisms; CVA/CSC to strengthen linkages between community and facilities, enhance community knowledge of health facility entitlements and support of facility performance and enhance governance and accountability. In both intervention and comparison sites, facility and community councils or management committees were formed and/or existing committees received

training and supportive supervision from World Vision and other organizations including district ministries to foster community engagement and service utilization. Communities in the comparison sites, received routine interventions from World Vision, government and other NGOs, including the establishment and/or strengthening of CHW health services and facility and community councils. Community management committees were aligned with the Global Fund’s Community Systems Strengthening Framework<sup>28</sup>, which are designed to empower community entities and strengthen community systems to contribute to, and to ensure an enabling and supportive environment for positive health outcomes.

Box 1: Selected Study Sites in Each Country – Districts/Sub districts

<i>Study Arm</i>	<i>Cambodia</i>	<i>Guatemala</i>	<i>Kenya</i>	<i>Zambia</i>
Intervention	Chulkiri	Comapa	Karemo	Luampa
Intervention	Pouk	Nuevo Amanecer	Katito	Magoye
Comparison	Prasath Balang	Apas	Kegonga-Ntimaru	Choongo
Comparison	Tbeng Meanchey	Tinamit Junam	Magunga	Nyimba

A mixed methods evaluation was conducted at baseline, between 2013-2014, and final evaluations were performed between 2016-2017. To mitigate bias due to seasonal

variations, the evaluations were conducted during the same periods. A multi-stage sampling strategy was employed to select communities in proportion to population

Internal Medicine Review  
Applying an Equity Lens to Maternal Health Care Continuum in Rural Communities of  
Cambodia, Guatemala, Kenya, and Zambia  
February 2018

size, and eligible households were randomly selected for the interviews from each sampling unit, from the household listing. One eligible woman, 15-49 years, who was pregnant or delivered in the past two years, and one eligible child under 5 years were selected randomly from each household. Sample size was calculated to detect an increase in skilled birth attendance. A two-sided alpha of .05 ( $\alpha = 0.05$ ) and power of 0.80 ( $1 - \beta = 0.80$ ) was considered to calculate the required sample size. Adjustments for non-response rate (5%) and design effect of 1.2, was factored and updated household listings were obtained for the final sample size estimates. Women 15-49 years who reported a live birth in the past two years were selected from the final evaluation data for the analysis on care continuum. As there were minor variations in the baseline instruments, only post evaluation results are presented in this analysis.

Validated instruments used by the Demographic Health Surveys<sup>29</sup> were modified for this research study and structured interviews were administered to the head of households to obtain basic socio-demographic data. Subsequently, interviews were conducted with eligible women, to

obtain information on reproductive history, and care-seeking practices for maternal, newborn and child health. Survey teams with experience in conducting household surveys, were trained on field procedures, ethics and informed consent procedures and conducted the evaluations with appropriate supervision. Standard quality control measures were employed in the design, translation, field testing, and data collection, and ensure participant confidentiality.

#### *Care Continuum Measurements*

In this study, ANC was defined as pregnancy-related care at a health facility or hospital and 4 or more visits as ANC4+. Women who delivered with assistance from a doctor, nurse, or trained midwife were considered to have SBA. Early PNC was defined as women who received facility or hospital care within 24 hours of delivery as standardized by World Health Organization (WHO) and used in another multi-country research<sup>15</sup>. We selected all women who were in the age group of 15-49 years, who reported a delivery within the past two years with a live child. Care Continuum index was constructed using ANC4+, SBA, Early PNC (<24h after delivery), facility deliveries, Newborn Care (NBC) and BCG vaccination

Internal Medicine Review  
Applying an Equity Lens to Maternal Health Care Continuum in Rural Communities of  
Cambodia, Guatemala, Kenya, and Zambia  
February 2018

of the child to have a wider spectrum of the care continuum process. ANC4+, SBA, and early PNC were included in the Continuum of Care variable in the regression analysis to enable standardized comparisons with other settings.

### *IRB*

The research was approved by the John's Hopkins Bloomberg School of Public Health's Institutional Review Board and the ethical boards of the research institutions in each country.

### *Data Analysis*

Data obtained from the final evaluation was used constructing the analysis on care continuum. Data was cleaned, verified and analyzed using STATA V14<sup>30</sup>. Descriptive analysis was performed computing frequencies across the Intervention and Comparison sites, and *t* tests were performed to determine differences between intervention and comparison sites. These were not controlled for secular trends. A principle component analysis using 12 household assets (television, radio, bicycle etc) and household type (roofing, drinking water source, type of sanitation etc) was used to construct the wealth quintiles.

Univariate and multivariable logistic regression models were constructed to determine factors associated with care-seeking for ANC, SBA and PNC. A CoC regression model was constructed using 4+ANC, Early PNC, and SBA. Collinearity of independent variables used in the regression models was also tested.

### 2.3.3 Results

Table 1 illustrates selected background characteristics of eligible women 15-49 years; 2995, for Cambodia, 1992, in Guatemala, 2581, in Kenya and 1057, in Zambia. More than 85% of the households were headed by males, except in Zambia where >50% of the households were headed by women, in the intervention sites. A majority of the mothers were 20-36 years of age, with a higher proportion of teenage mothers in Zambia. In comparison to Cambodia and Kenya, a higher proportion of women were unmarried in Guatemala and Zambia, and more than 35% of the women were primipara in Cambodia. Women in Kenya had higher educational levels, and health insurance was reported by one fourth of the women included in the study in Cambodia. In all countries, of the women

Internal Medicine Review  
Applying an Equity Lens to Maternal Health Care Continuum in Rural Communities of  
Cambodia, Guatemala, Kenya, and Zambia  
February 2018

who reported CHW visits, more than 30% reported 3 or more visits, with the highest proportion in Kenya. Significant differences were apparent between comparison and intervention sites for some of the background variables for mean family size (Cambodia, Guatemala and Kenya), marital status (Guatemala and Kenya), parity (Zambia), and CHW visits (Cambodia, Kenya and Zambia).

*Levels of Service Utilization along the Care Continuum*

A high proportion of ANC coverage was evident in all countries in both intervention and comparison sites, >85% (Table 2). However, the WHO standard of ANC4+ was significantly higher in Cambodia and Kenya in the intervention sites (Cambodia 81.2% vs 57.9%,  $p < 0.001$ , Kenya (70.5% vs 62%,  $p < 0.001$ ), and for Zambia in the comparison sites (59.4% vs 71.7%,  $p < 0.001$ ). Early ANC care was significantly different, with women in intervention sites accessing ANC earlier in Cambodia. Quality of ANC visits was determined based on type of services received. Though a significantly higher proportion of women reported receiving both doses of tetanus toxoid vaccinations in the intervention groups in Guatemala and Kenya, overall the coverage for this

vaccination was <50% in all countries, with Zambia recording the lowest (<20%). About 90% of the women reported receiving iron supplements during ANC, with significantly higher rates in intervention sites for Cambodia and Kenya and in the comparison sites for Guatemala. Screening for hypertension was also high, about 80%, in all countries. Similar patterns were evident with weight measurements, with over 90% reporting being weighed during the ANC visit, except for the intervention sites in Guatemala (80.5%). Proportion of women receiving blood tests, urine tests and nutrition advice varied significantly, with intervention sites reporting higher levels in Cambodia and Kenya, comparison sites in Guatemala, and Zambia (urine tests only). In all countries except Guatemala, there was a significantly higher proportion of women reporting bleeding as a danger sign for urgent care seeking in the intervention sites. There were varied results for knowledge on fever as a danger sign during pregnancy, but swelling, was recognized as a danger sign was mentioned by a significantly higher proportion of women in all countries in the intervention sites. More than 90% of the women who were offered HIV tests, received tests during their ANC visits in all countries.

Internal Medicine Review  
Applying an Equity Lens to Maternal Health Care Continuum in Rural Communities of  
Cambodia, Guatemala, Kenya, and Zambia  
February 2018

Assistance from a doctor, nurse or trained midwife during delivery was significantly higher for Cambodia, in the intervention sites (99.1% vs 84.9,  $p < 0.001$ ), and over 90% for Kenya and Zambia with no significant differences between the two study arms. For Guatemala, the comparison sites had a significantly higher proportion reporting SBA, (43.4% vs 66.6%,  $p < 0.001$ ), though the proportions were much lower than other countries. Facility deliveries also showed a similar pattern, except for Zambia, where intervention sites reported slightly higher, but significant levels (89.9% vs 82.5,  $p < 0.001$ ), with respect to the comparison sites.

Self-reported thermal care, and clean cord practice for the newborn was over 90% in all countries, but immediate breastfeeding (within 1h of birth) was significantly higher in the intervention sites for Guatemala and Zambia (Guatemala 82.8% vs 72.9%,  $p < 0.001$ . Zambia 94.9% vs 82.6%,  $p < 0.001$ ), and in the comparison site for

Kenya (90% vs 96.4%). Likewise, early PNC (<24h after birth) was also significantly higher in the intervention groups, for Cambodia and Zambia (Cambodia 93.9% vs 86.1%, Zambia 57.2% vs 15.3%,  $p < 0.001$ ), and in the comparison site for Guatemala (65.8% vs 82.9%,  $P < 0.001$ ). BCG vaccination was selected as one of the child health care-seeking indicators, which was also above 90% in all countries, except for the comparison site for Kenya (83.1%).

The major causes for not seeking facility care for ANC and delivery were; not considering it necessary (>55% in Guatemala), geographic distances and lack of or expensive transport. Other minor causes were inconvenient service hours, unfriendly staff, lack of an escort etc. Service cost was reported to be the second major reason for not seeking ANC for Guatemala, with 25% of the women reporting it in the intervention and 43% in the comparison sites.



Internal Medicine Review  
Applying an Equity Lens to Maternal Health Care Continuum in Rural Communities of  
Cambodia, Guatemala, Kenya, and Zambia  
February 2018

**Table 1. Selected Characteristics of Study population – Post Evaluation**

Characteristics	Cambodia (N=2995)			Guatemala (N=1992)			Kenya (N=2581)			Zambia (N=1057)		
	Intervention N(%)	Comparison N(%)	p- value	Intervention N(%)	Comparison N(%)	p- value	Intervention N(%)	Comparison N(%)	p- value	Intervention N(%)	Comparison N(%)	p- value
Male Headed Households	1125(89.9)	1553(89.5)	0.759	814(90.6)	1013(92.6)	0.120	1269(86.4)	973(89.6)	0.014	261(45.2)	318(68.8)	0.000
Mean Family Size	1254(5.1)	1741(4.8)	0.000	898(4.8)	1094(5)	0.009	1484(4.9)	1095(4.8)	0.021	588(5.3)	466(5.2)	0.173
Mother age												
15-19y	49(3.9)	81(4.7)	0.317	69(7.7)	95(8.7)	0.417	129(8.7)	79(7.2)	0.167	92(15.6)	77(16.4)	0.735
20-36y	1107(88.3)	1508(86.6)	0.174	711(79.2)	866(79.2)	0.993	1250(84.2)	947(86.4)	0.112	419(71.3)	342(72.9)	0.549
37-49y	98(7.8)	152(8.7)	0.368	118(13.1)	133(12.2)	0.512	106(7.1)	70(6.4)	0.451	77(13.1)	50(10.7)	0.222
Mother Marital status												
Married	1232(98.2)	1709(98.2)	0.865	586(65.3)	596(54.6)	0.000	1235(83.5)	1012(92.7)	0.000	402(68.7)	347(74)	0.059
Single/Divorced/Widow	22(1.8)	32(1.8)	0.865	312(34.7)	496(45.4)	0.000	244(16.5)	80(7.3)	0.000	183(31.3)	122(26)	0.059
Mother Parity												
First Parity	504(40.2)	672(38.6)	0.379	-	-	-	71(4.8)	41(3.7)	0.191	55(9.4)	96(20.5)	0.000
≥ 2	750(59.8)	1069(61.4)	0.379	-	-	-	1413(95.2)	1055(96.3)	0.191	533(90.6)	372(79.5)	0.000
Mother education												
None	192(15.5)	435(25.2)	0.000	248(27.9)	301(27.9)	1.000	16(1.2)	50(5.1)	0.000	38(7.8)	63(16.7)	0.000
Primary	671(54.2)	755(43.8)	0.000	502(56.5)	637(59)	0.251	940(69.3)	705(72)	0.150	246(50.2)	196(51.9)	0.631
Secondary or more	374(30.2)	534(31)	0.666	139(15.6)	141(13.1)	0.107	401(29.6)	224(22.9)	0.000	206(42)	119(31.5)	0.001
Mother Health Insurance	330(26.3)	526(30.2)	0.019	-	-	-	-	-	-	-	-	-
Child gender												
Male	627(50.4)	898(51.7)	0.462	476(53)	562(51.4)	0.480	774(52.4)	598(54.8)	0.226	310(53.1)	254(55.3)	0.468
Female	618(49.6)	838(48.3)	0.462	422(47)	531(48.6)	0.480	703(47.6)	493(45.2)	0.226	274(46.9)	205(44.7)	0.468
Child age												
0-11m	597(47.6)	784(45)	0.163	358(39.9)	335(30.6)	0.000	616(41.5)	368(33.6)	0.000	249(42.3)	203(43.3)	0.760
12-23m	558(44.5)	792(45.5)	0.590	314(35)	318(29.1)	0.005	590(39.7)	408(37.2)	0.196	231(39.3)	187(39.9)	0.847
24-59m	99(7.9)	165(9.5)	0.127	226(25.2)	441(40.3)	0.000	279(18.8)	320(29.2)	0.000	108(18.4)	79(16.8)	0.518
CHW visit - last pregnancy	892(71.9)	603(35.1)	0.000	36(4)	48(4.4)	0.675	816(55.7)	340(31.8)	0.000	148(25.2)	53(11.3)	0.000
3 or more CHW visits	357(40.6)	247(41.5)	0.718	11(31.4)	21(45.7)	0.195	508(67.7)	169(52.5)	0.000	72(50.3)	26(54.2)	0.650
Wealth Quintile												
1 <sup>st</sup>	201(16)	618(35.5)	0.000	246(27.4)	222(20.3)	0.000	234(15.8)	256(23.4)	0.000	157(26.7)	81(17.3)	0.000
2 <sup>nd</sup>	154(12.3)	351(20.2)	0.000	167(18.6)	257(23.5)	0.007	299(20.1)	259(23.6)	0.034	93(15.8)	95(20.3)	0.064
3 <sup>rd</sup>	274(21.9)	347(19.9)	0.204	154(17.1)	223(20.4)	0.065	260(17.5)	208(19)	0.341	109(18.5)	104(22.2)	0.146
4 <sup>th</sup>	330(26.3)	252(14.5)	0.000	181(20.2)	226(20.7)	0.782	286(19.3)	206(18.8)	0.767	151(25.7)	109(23.2)	0.359
5 <sup>th</sup>	295(23.5)	173(9.9)	0.000	150(16.7)	166(15.2)	0.354	406(27.3)	167(15.2)	0.000	78(13.3)	80(17.1)	0.090

February 2018

Table 2. Maternal, Newborn and Child Care Seeking Characteristics - Post Evaluation

Care Characteristics	Cambodia (N=2995)			Guatemala (N=1992)			Kenya (N=2581)			Zambia (N=1057)		
	Interventio n N(%)	Comparison N(%)	p- value	Interventio n N(%)	Comparison N(%)	p- value	Interventio n N(%)	Comparison N(%)	p- value	Interventio n N(%)	Comparison N(%)	p- value
Pre-partum Care												
1 + facility ANC	1218(99.8)	1605(99.9)	0.236	253(99.2)	494(99.8)	0.324	1389(98.2)	928(97.5)	0.271	505(92.3)	300(86.5)	0.007
4+ facility ANC	989(81.2)	929(57.9)	0.000	172(68)	353(71.5)	0.332	979(70.5)	575(62)	0.000	300(59.4)	215(71.7)	0.000
Mean Month of 1 <sup>st</sup> ANC	1217(2.4)	1601(2.8)	0.000	251(3)	491(3.1)	0.650	1377(4.4)	926(4.3)	0.004	505(4.2)	300(3.8)	0.000
ANC services												
2 Tetanus toxoid vaccinations	531(42.6)	704(42.3)	0.846	402(48.7)	417(39.6)	0.000	401(27.8)	218(22.9)	0.006	80(14.6)	80(18.2)	0.132
Received iron tablets	1235(99.1)	1608(96.4)	0.000	716(87.5)	946(90.8)	0.026	1348(94.6)	703(77.7)	0.000	529(97.4)	416(97.7)	0.818
Received antimalarials	19(1.5)	17(1)	0.236	6(0.7)	51(4.8)	0.000	1024(71.1)	709(74.5)	0.069	531(96.7)	421(96.1)	0.615
Weight measured	1165(93.6)	1444(90.2)	0.001	211(80.5)	484(95.1)	0.000	1409(99.4)	848(90)	0.000	537(99.1)	344(99.1)	0.928
Blood Pressure Measure	1215(97.7)	1456(90.9)	0.000	213(81.3)	473(92.9)	0.000	1373(96.8)	747(79.3)	0.000	502(92.6)	334(96.3)	0.017
Urine test	666(53.5)	393(24.5)	0.000	171(65.3)	397(78)	0.000	1260(88.9)	651(69.1)	0.000	171(31.5)	152(43.8)	0.000
Blood test	1065(85.6)	977(61)	0.000	162(61.8)	395(77.6)	0.000	1235(87.1)	608(64.5)	0.000	520(95.9)	330(95.1)	0.559
Nutrition advice	1177(94.7)	1440(90)	0.000	171(65)	353(69.5)	0.213	1152(81.1)	734(78.9)	0.194	512(95)	317(91.6)	0.056
Informed of signs of pregnancy complications	1137(91.3)	1336(80.5)	0.000	620(75.2)	627(59.7)	0.000	1241(86.4)	738(77.4)	0.000	508(93.4)	399(92.4)	0.540
Knowledge of danger signs to seek immediate care	1123(90.1)	1240(74.6)	0.000	544(65.9)	497(47.2)	0.000	1296(90.3)	809(85.2)	0.000	502(92.4)	402(93.7)	0.442
Fever	338(30.2)	457(36.9)	0.000	354(65.1)	201(40.5)	0.000	662(51.3)	360(44.6)	0.003	124(24.9)	76(18.9)	0.030
Bleeding	917(81.8)	968(78.2)	0.028	470(86.4)	440(88.7)	0.259	1194(92.6)	610(75.5)	0.000	458(92)	351(87.3)	0.024
Swelling of body	700(62.4)	680(54.9)	0.000	280(51.5)	84(16.9)	0.000	530(41.1)	285(35.3)	0.007	294(59)	171(42.5)	0.000
headaches	499(44.5)	514(41.5)	0.142	372(68.4)	270(54.4)	0.000	615(47.7)	259(32.1)	0.000	175(35.1)	100(24.9)	0.001
Offered HIV test	1055(84.7)	1121(67.2)	0.000	349(42.3)	196(18.6)	0.000	1422(98.7)	934(98.1)	0.284	550(99.6)	428(98.2)	0.034
Received test	1039(98.6)	1109(98.9)	0.460	330(95.4)	182(92.9)	0.245	1421(100)	930(99.9)	0.318	550(100)	425(99.3)	0.083
Delivery Care												
Skilled birth attendance	1242(99.1)	1478(84.9)	0.000	390(43.4)	729(66.6)	0.000	1358(92.4)	971(91.4)	0.390	553(94.5)	446(95.1)	0.680
Facility Delivery	1240(99)	1380(79.3)	0.000	393(43.8)	724(66.2)	0.000	1303(88.8)	942(88.8)	0.985	526(89.9)	387(82.5)	0.001
New Born Care												
Thermal care	1250(99.8)	1716(98.6)	0.000	865(96.5)	1059(96.8)	0.748	1429(97.3)	987(93)	0.000	575(98.5)	465(99.1)	0.300
Clean cord practice	1244(99.3)	1682(96.9)	0.000	871(97.1)	1080(98.8)	0.009	1442(98.1)	999(94.1)	0.000	578(99)	461(98.9)	0.943
Immediate breastfeeding (<1h of birth)	961(77.6)	1338(78.1)	0.725	724(82.8)	783(72.9)	0.000	1285(90)	974(96.4)	0.000	537(94.9)	381(82.6)	0.000

Note, N's in this table denote those who reported receiving care

<sup>a</sup> p-value not computed - small samples

February 2018

Table 2. Maternal, Newborn and Child Care Seeking Characteristics - Post Evaluation, Continued

Care Characteristics	Cambodia (N=2995)			Guatemala (N=1992)			Kenya (N=2581)			Zambia (N=1057)		
	Interventio n N(%)	Comparison N(%)	p- value	Interventio n N(%)	Comparison N(%)	p- value	Interventio n N(%)	Comparison N(%)	p- value	Interventio n N(%)	Comparison N(%)	p- value
Post-partum care												
Received PNC	1228(98.8)	1550(89.4)	0.000	354(39.5)	895(82.2)	0.000	1282(87.9)	839(78.7)	0.000	541(93.4)	391(83.9)	0.000
Early PNC (<24hrs)	1163(93.9)	1340(86.1)	0.000	233(65.8)	745(82.9)	0.000	573(44.3)	379(44.1)	0.929	311(57.2)	60(15.3)	0.000
Child Vaccination												
BCG	549(98.4)	716(90.4)	0.000	308(98.1)	316(99.4)	0.151	534(90.5)	339(83.1)	0.001	215(93.1)	173(92.5)	0.827
Measles	497(89.1)	569(71.8)	0.000	239(76.1)	262(82.4)	0.052	493(83.6)	298(73)	0.000	195(84.4)	166(88.8)	0.192
Full Vaccination <sup>b</sup>	452(81)	485(61.2)	0.000	199(63.4)	235(73.9)	0.004	335(56.8)	88(21.6)	0.000	123(53.2)	122(65.2)	0.013
<b>Continuum of care index<sup>c</sup></b>	1254(4.9)	1741(4.1)	0.000	898(2.4)	1094(3.3)	0.000	1485(4)	1093(3.7)	0.000	587(4.1)	469(3.5)	0.000
Reasons for Not Seeking facility- ANC												
Didn't think it was necessary	1(100)	30(50)		350(62.5)	325(60.2)		6(26.1)	1(7.1)		None	6(8.8)	
Transport too expensive	None	2(3.3)		40(7.1)	15(2.8)		1(4.3)	3(21.4)		None	20(29.4)	
Too far, no transportation	None	12(20)		28(5)	24(4.4)		7(30.4)	2(14.3)		1(50)	46(67.6)	
Services too expensive	None	1(1.7)		138(24.6)	234(43.3)		2(8.7)	0(0)		0(0)	0(0)	
Other <sup>d</sup>	None	None		None	1(0.2)		0(0)	0(0)		None	1(1.5)	
Reasons for not Delivering at Facility												
Didn't think it was necessary	1(7.7)	46(13)		278(55)	218(59.1)		17(10.8)	13(11.5)		4(11.4)	9(16.4)	
Transport too expensive	-	6(1.7)		59(11.7)	6(1.6)		9(5.7)	4(3.5)		4(11.4)	19(34.5)	
Too far, no transportation	2(15.4)	56(15.8)		30(5.9)	15(4.1)		19(12.1)	21(18.6)		13(37.1)	30(54.5)	
Services too expensive	-	5(1.4)		101(20)	145(39.3)		8(5.1)	3(2.7)		1(2.9)	-	
Inconvenient service hours	-	2(0.6)		0(0)	10(2.7)		61(38.9)	49(43.4)		-	1(1.8)	
Other												

Note, N's in this table denote those who reported receiving care

a p-value not computed - small samples

b Full vaccination: Children 12-23 months with BCG, DPT 1-3, OPV 1-3, and measles

c Continuum of care index: 4 or more facility-based ANC visits + facility delivery + SBA + PNC within 1 day + all three NBC tasks + BCG

Other d : No female provider at facility, unfriendly staff, inconvenient service hours, religious belief, no one to accompany

Internal Medicine Review  
Applying an Equity Lens to Maternal Health Care Continuum in Rural Communities of  
Cambodia, Guatemala, Kenya, and Zambia  
February 2018

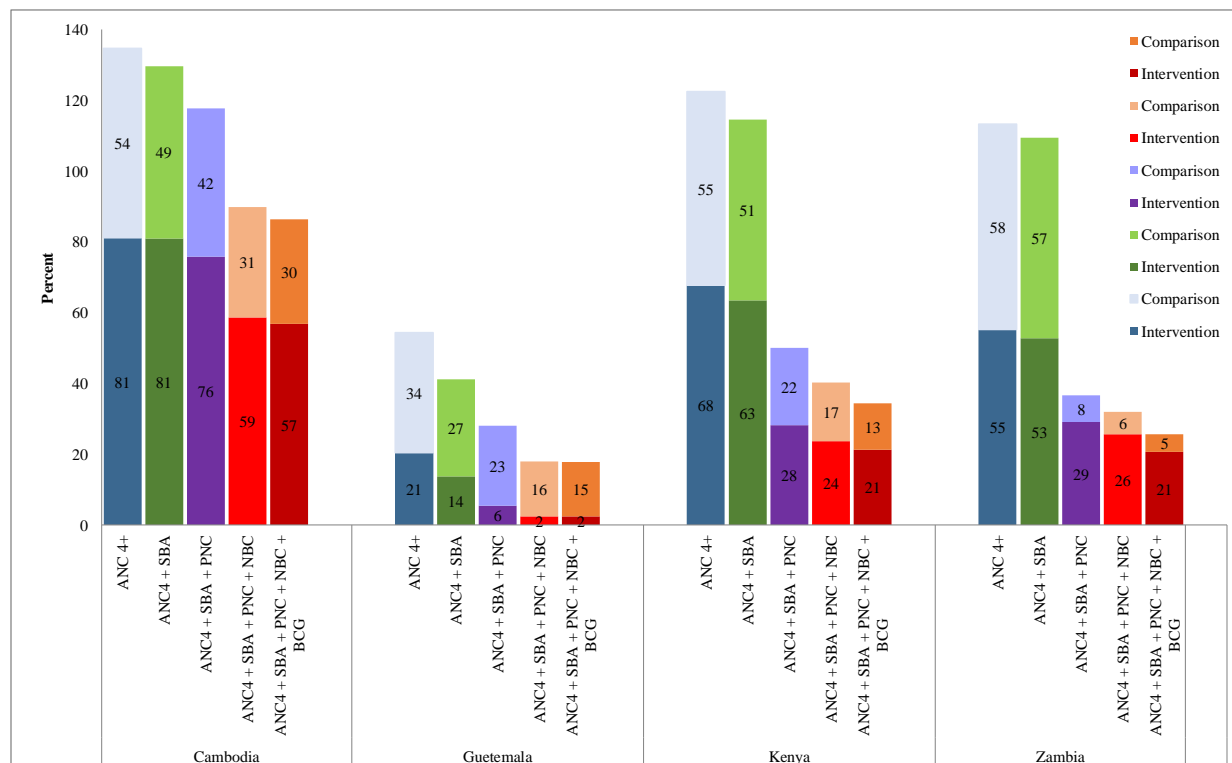
*Continuum of Care Index*

A composite CoC index was computed to determine CoC; ANC4+, SBA, facility delivery, early PNC, three newborn care practices, and BCG. Differences were highly significant, with a higher CoC index in the intervention sites in all countries except for Guatemala, where the comparison sites performed significantly better (2.4 vs 3.3,  $p < 0.001$ ). We also constructed the MNCH CoC for individual and cumulative care components for the variables selected for the CoC (Table 3, Figure 1). A significantly higher proportion of women for Cambodia and Kenya with ANC4+ also had SBA in the interventions sites compared to the comparison sites (Cambodia 81% vs 48.6%,  $p < 0.001$ , Kenya 63.4% vs 51.1%,  $p < 0.001$ ), with a reverse trend in Guatemala where comparison sites had significantly higher proportion of women reporting both ANC4+ visits and SBA (13.8% vs 27.4%  $p < 0.001$ ).

A much lower proportion completed ANC4+, SBA and early PNC especially in the intervention sites for Kenya and Zambia (<30%). For Guatemala, a significantly higher proportion in the comparison sites reported all three services, compared to the intervention sites (5.5% vs 22.6%,  $P < 0.001$ ). Women reporting all services; ANC4+, SBA, PNC, NBC was much lower across all countries, with intervention sites performing significantly better, except for Guatemala where comparison sites had better outcomes. When BCG was included as an indicator for child health, there was a further decline in completion of care, with intervention sites performing significantly better than comparison, except for Guatemala. The highest CoC completion rates were reported for the Cambodia intervention sites, 56.6%. The greatest decline in the care continuation occurred between SBA and PNC for Kenya (35.2% in the intervention sites) and Zambia (49.2% in the comparison sites).

Internal Medicine Review  
 Applying an Equity Lens to Maternal Health Care Continuum in Rural Communities of  
 Cambodia, Guatemala, Kenya, and Zambia  
 February 2018

**Figure 1. Maternal Neonatal and Child Continuum of Care Completion by Country and Intervention**



February 2018

**Table 3. Levels of Maternal and Child Health Care Continuum by Country – Post Evaluation Results**

Characteristics	Cambodia (N=2995)			Guatemala (N=1992)			Kenya (N=2581_)			Zambia (N=1057)		
	Intervention	Comparison	p-value	Intervention	Comparison	p-value	Intervention	Comparison	p-value	Intervention	Comparison	p-value
Total N	N(%) 1254	N(%) 1741		N(%) 898	N(%) 1094		N(%) 1485	N(%) 1096		N(%) 588	N(%) 469	
ANC 4+	1017(81.1)	932(53.5)	0.000	184(20.5)	370(33.8)	0.000	1005(67.7)	601(54.8)	0.000	325(55.3)	272(58)	0.375
FBD	1240(98.9)	1380(79.3)	0.000	393(43.8)	724(66.2)	0.000	1303(87.7)	942(85.9)	0.184	526(89.5)	387(82.5)	0.001
SBA	1242(99)	1478(84.9)	0.000	390(43.4)	729(66.6)	0.000	1358(91.4)	971(88.6)	0.018	553(94)	446(95.1)	0.453
Early PNC (<24h)	1171(93.4)	1347(77.4)	0.000	234(26.1)	749(68.5)	0.000	579(39)	386(35.2)	0.050	314(53.4)	60(12.8)	0.000
NBC	956(76.2)	1298(74.6)	0.291	702(78.2)	764(69.8)	0.000	1248(84)	887(80.9)	0.041	525(89.3)	375(80)	0.000
BCG	1212(96.7)	1531(87.9)	0.000	870(96.9)	1069(97.7)	0.258	1319(88.8)	873(79.7)	0.000	498(84.7)	410(87.4)	0.202
ANC4 + SBA	1016(81)	846(48.6)	0.000	124(13.8)	300(27.4)	0.000	942(63.4)	560(51.1)	0.000	310(52.7)	266(56.7)	0.195
ANC4 + SBA + PNC	951(75.8)	729(41.9)	0.000	49(5.5)	247(22.6)	0.000	419(28.2)	239(21.8)	0.000	171(29.1)	35(7.5)	0.000
ANC4 + SBA + PNC + NBC	736(58.7)	543(31.2)	0.000	22(2.4)	171(15.6)	0.000	352(23.7)	181(16.5)	0.000	151(25.7)	29(6.2)	0.000
ANC4 + SBA + PNC + NBC + BCG	712(56.8)	513(29.5)	0.000	22(2.4)	169(15.4)	0.000	316(21.3)	144(13.1)	0.000	122(20.7)	23(4.9)	0.000

N's denote the entire sample

ANC, Antenatal care;FBD, Facility Based Delivery;PNC, Post Natal Care;SBA, Skilled Birth Attendance;NBC, New Born Care

### *Regression Analysis*

The regression analysis excluded women with key missing data (<10%) for the selected independent variables. As the contextual factors varied, analysis was performed individually for each country (Table 4). A univariate analysis was first performed with key independent variables to determine significant associations for each CoC variable and subsequently a multivariate logistic regression was conducted to adjust for confounders. For Cambodia, women who were married, with primary or secondary education, older (>24 years), primipara, higher wealth quintiles, 3 or more CHW visits during pregnancy, and from intervention study sites, had significantly higher odds of ANC4+ visits. The results were different for Guatemala, where higher educational status, higher wealth quintile and comparison sites had significantly higher odds of ANC4+. In the Kenyan context, women who were married, in the highest quintiles, or in the intervention sites had significantly higher odds of ANC4+. Except for the intervention sites, there were no other factors significantly associated with ANC4+ for Zambia.

For Cambodia, the odds of SBA at delivery also showed similar results as ANC4+,

except for marital status, which was not a significant predictor. ANC4+ was also significantly associated with SBA for Cambodia. For Guatemala, being unmarried had significantly higher odds of SBA, along with higher educational status, higher wealth quintiles, ANC4+ visits and comparison sites. For Kenya, women had significantly higher odds of SBA, if they had ANC4+ and higher educational status. ANC4+ was the only significant predictor of SBA for women in Zambia.

Early PNC was significantly associated with women who had SBA during delivery, from the intervention sites, and in the middle wealth quintile for Cambodia, and for Guatemala, women who were older (>24 years), had SBA at delivery and comparison sites had significantly higher odds of early PNC. In the Kenyan sites, women in the higher wealth quintiles, and those who had ANC4+ and SBA had significantly higher odds of early PNC. The results from Zambia also indicated that higher wealth quintiles, higher education and intervention sites were significantly associated with early PNC.

Parity, SBA and early PNC and lower age (<24 years) were the only significant predictors for NBC for Cambodia. The results were very different for Guatemala as

**Internal Medicine Review**  
**Applying an Equity Lens to Maternal Health Care Continuum in Rural Communities of**  
**Cambodia, Guatemala, Kenya, and Zambia**  
**February 2018**

unmarried women, older women (24 years), those with primary school education, lower wealth quintile, and no SBA at delivery had higher odds of NBC. Likewise for Zambia, women in the lower quintile, those with SBA and intervention sites had higher odds of essential NBC practices. Women in the Kenya sites had higher odds of NBC if they

had higher educational levels, SBA or did not report PNC. Other independent variables, like health insurance, 3 or more CHW visits, that were significant in the unadjusted regression analysis, were no longer significant in the multivariate logistic model.

**Table 1. Multivariate Logistic Regression of Factors Associated with Careseeking Practices for Maternal and New Born Care by Country –Final Evaluation**

	<i>Cambodia</i>	<i>Guatemala</i>	<i>Kenya</i>	<i>Zambia</i>
<b>Facility ANC</b>	<i>OR(95%CI)</i>	<i>OR(95%CI)</i>	<i>OR(95%CI)</i>	<i>OR(95%CI)</i>
Marital status (ref, Single/divorced/widowed)	1.00	1.00	1.00	1.00
Married	1.95 [1.07,3.56] *	1.19 [0.95,1.49]	1.46 [1.11,1.93] **	1.02 [0.74,1.40]
Caretaker Education (ref, none)	1.00	1.00	1.00	1.00
Primary	1.38 [1.12,1.70] **	1.59 [1.20,2.01] **	0.69 [0.41,1.16]	0.77 [0.48,1.22]
Secondary or more	2.04 [1.60,2.61] ***	3.83 [2.65,5.52] ***	0.99 [0.57,1.70]	0.83 [0.50,1.37]
Caretaker age (ref, <24y)	1.00	1.00	1.00	1.00
≥24y	1.64 [1.32,2.03] ***	0.87 [0.69,1.11]	0.93 [0.77,1.12]	0.94 [0.68,1.29]
Parity (ref, 2 or more)	1.00		1.00	1.00
1 <sup>st</sup> pregnancy	1.38 [1.13,1.69] **	-	1.61 [1.00,2.59] *	1.02 [0.65,1.60]
Health insurance (ref, none)	1.00	-	-	-
Health insurance	0.91 [0.76,1.1]	-	-	-
Wealth Quintile (ref, lowest)	1.00	1.00	1.00	1.00
Low	1.36 [1.08,1.73] *	0.92 [0.66,1.30]	1.38 [1.05,1.79] *	0.90 [0.58,1.40]
Middle	2.16 [1.70,2.73] ***	0.86 [0.60,1.23]	1.34 [1.01,1.78] *	0.91 [0.60,1.39]
High	2.11 [1.63,2.72] ***	1.36 [0.97,1.90] **	1.44 [1.09,1.90] *	0.89 [0.58,1.34]
Highest	2.27 [1.70,3.04] ***	2.54 [1.79,3.59] ***	1.68 [1.27,2.24] ***	0.79 [0.48,1.29]
CHW visits during pregnancy (ref, <3 visits)	1.00	1.00	1.00	1.00
3 or more visits	1.79 [1.43,2.24] ***	2.05 [0.97,4.35]	1.08 [0.88,1.33]	1.14 [0.71,1.83]
Treatment (Ref, Comparison)	1.00	1.00	1.00	1.00
Intervention	2.84 [2.37,3.41] ***	0.43 [0.35,0.54] ***	1.66 [1.38,2.00] ***	1.38 [1.03,1.84] *
Constant	0.16 [0.08,0.32]	0.25 [0.17,0.36]	0.89 [0.50,1.58]	1.55 [0.88,2.73]
Total N	2934	1941	2261	850
<b>SBA</b>				
Marital status (ref, Single/divorced/widowed)	1.00	1.00	1.00	1.00
Married	0.55 [0.16,1.90]	0.79 [0.64,0.97] *	1.04 [0.64,1.67]	0.78 [0.38,1.62]
Caretaker Education (ref, none)	1.00	1.00	1.00	1.00
Primary	1.86 [1.37,2.53] ***	1.70 [1.35,2.14] ***	1.74 [0.87,3.48]	1.35 [0.56,3.23]
Secondary or more	2.90 [1.92,4.38] ***	3.93 [2.67,5.80] ***	5.14 [2.28,11.56] ***	1.33 [0.50,3.57]
Caretaker age (ref, <24y)	1.00	1.00	1.00	1.00
≥24y	1.74 [1.21,2.50] **	1.07 [0.85,1.34]	0.84 [0.61,1.17]	0.48 [0.21,1.07]
Parity (ref, 2 or more)	1.00		1.00	1.00
1 <sup>st</sup> pregnancy	2.55 [1.78,3.67] ***	-	1.40 [0.55,3.58]	0.58 [0.20,1.67]
Health insurance (ref, none)	1.00	-	-	-
Health insurance	1.39 [1.03,1.88] *	-	-	-



**Internal Medicine Review**  
**Applying an Equity Lens to Maternal Health Care Continuum in Rural Communities of**  
**Cambodia, Guatemala, Kenya, and Zambia**  
**February 2018**

Wealth Quintile (ref, lowest)	1.00	1.00	1.00	1.00
Low	1.13[0.803,1.59]	1.15 [0.86,1.53]	0.76 [0.49,1.17]	1.07 [0.43,2.70]
Middle	2.17 [1.42,3.31] ***	1.15 [0.85,1.55]	0.86 [0.54,1.38]	1.67 [0.62,4.50]
High	2.32 [1.41,3.82] ***	1.93 [1.43,2.61] ***	0.98 [0.60,1.58]	0.70 [0.31,1.57]
Highest	3.21 [1.61,6.40] ***	3.65 [2.54,5.26] ***	1.14 [0.68,1.92]	2.39 [0.63,9.10]
CHW visits during pregnancy (ref, <3 visits)	1.00	1.00	1.00	1.00
3 or more visits	1.15 [0.76,1.74]	0.82 [0.37,1.79]	1.26 [0.88,1.79]	0.56 [0.24,1.26]
ANC (ref <4ANC)	1.00	1.00	1.00	1.00
4+ANC	2.36 [1.76,3.16] ***	2.52 [1.96,3.23] ***	2.62 [1.93,3.55] ***	2.27 [1.24,4.15] **
Treatment (Ref, Comparison)	1.00	1.00	1.00	1.00
Intervention	11.56 [6.21,21.53] ***	0.37 [0.30,0.46] ***	0.89 [0.65,1.23]	0.80 [0.42,1.52]
Constant	1.32 [0.35,4.89]	0.76 [0.55,1.05]	3.47 [1.51,7.96]	20.49 [5.81,72.31]
Total N	2934	1941	2250	850
<b>PNC</b>				
Marital status (ref, Single/divorced/widowed)	1.00	1.00	1.00	1.00
Married	0.66[0.27,1.62]	1.12 [0.90,1.40]	1.07 [0.80,1.42]	1.17 [0.79,1.73]
Caretaker Education (ref, none)	1.00	1.00	1.00	1.00
Primary	1.24 [0.95,1.62]	1.10 [0.85,1.40]	0.87 [0.50,1.50]	3.09 [1.44,6.60] **
Secondary or more	1.29 [0.95,1.77]	1.20 [0.82,1.74]	1.24 [0.70,2.18]	3.21 [1.47,7.02] **
Caretaker age (ref, <24y)	1.00	1.00	1.00	1.00
≥24y	1.13 [0.86,1.49]	1.28 [1.01,1.62] *	1.15 [0.95,1.40]	0.68 [0.46,1.00] *
Parity (ref, 2 or more)	1.00		1.00	1.00
1 <sup>st</sup> pregnancy	0.89 [0.69,1.15]	-	1.29 [0.84,1.99]	1.02 [0.58,1.81]
Health insurance (ref, none)	1.00	-	-	-
Health insurance	1.25 [0.98,1.59]	-	-	-
Wealth Quintile (ref, lowest)	1.00	1.00	1.00	1.00
Low	1.23 [0.91,1.67]	1.16 [0.86,1.58]	1.11 [0.84,1.48]	1.47 [0.83,2.61]
Middle	1.68 [1.22,2.32] **	1.19 [0.86,1.64]	1.71 [1.27,2.29] ***	3.36[1.98,5.69] ***
High	1.28 [0.92,1.79]	0.92 [0.66,1.26]	1.37 [1.02,1.84] *	5.28 [3.14,8.90] ***
Highest	1.36 [0.92,2.00]	1.30 [0.91,1.86]	1.22 [0.91,1.63]	8.00[4.29,14.92] ***
CHW visits during pregnancy (ref, <3 visits)	1.00	1.00	1.00	1.00
3 or more visits	1.29 [0.95,1.75]	0.79 [0.35,1.77]	1.21 [0.99,1.49]	0.92 [0.52,1.62]
ANC (ref <4ANC)	1.00	1.00	1.00	1.00
4+ANC	1.17 [0.93,1.47]	1.04 [0.81,1.33]	1.52 [1.26,1.84] ***	1.05 [0.75,1.49]
SBA (ref, no SBA)	1.00	1.00	1.00	1.00
SBA	4.92 [3.69,6.57] ***	3.26 [2.61,4.07] ***	5.39 [3.31,8.76] ***	1.90 [0.86,4.21]
Treatment (Ref, Comparison)	1.00	1.00	1.00	1.00
Intervention	2.57 [1.95,3.38] ***	0.18 [0.15,0.23] ***	1.11 [0.92,1.35]	11.25 [7.44,17.03] ***
Constant	0.81 [0.30,2.16]	0.71 [0.50,1.00]	0.06 [0.03,0.12]	0.01 [0.00,0.03]
Total N	2933	1940	2244	845
<b>NBC</b>				
Marital status (ref, Single/divorced/widowed)	1.00	1.00	1.00	1.00
Married	0.59 [0.28,1.23]	0.76 [0.60,0.95] *	0.69 [0.46,1.04]	0.99 [0.62,1.58]
Caretaker Education (ref, none)	1.00	1.00	1.00	1.00
Primary	1.12 [0.89,1.42]	1.33 [1.02,1.74] *	1.93 [1.06,3.52] *	1.47 [0.77,2.79]
Secondary or more	0.93 [0.72,1.21]	1.02 [0.71,1.48]	1.74 [0.92,3.29]	1.51 [0.74,3.08]
Caretaker age (ref, <24y)	1.00	1.00	1.00	1.00
≥24y	0.75 [0.60,0.94] *	1.30 [1.02,1.66] *	1.24 [0.97,1.60]	1.40 [0.86,2.27]
Parity (ref, 2 or more)	1.00		1.00	1.00
1 <sup>st</sup> pregnancy	0.55 [0.45,0.68] ***	-	0.72 [0.42,1.24]	0.72 [0.40,1.29]
Health insurance (ref, none)	1.00	-	-	-
Health insurance	1.19 [0.97,1.45]	-	-	-
Wealth Quintile (ref, lowest)	1.00	1.00	1.00	1.00
Low	1.13 [0.86,1.49]	0.62 [0.43,0.88] **	0.77 [0.54,1.11]	0.44 [0.22,0.88] *
Middle	1.03 [0.79,1.34]	0.47 [0.33,0.68] ***	0.87 [0.59,1.29]	0.51 [0.25,1.03]
High	1.01 [0.77,1.33]	0.54 [0.37,0.77] ***	1.13 [0.76,1.68]	0.69 [0.34,1.40]
Highest	0.77 [0.58,1.03]	0.39 [0.27,0.57] ***	1.16 [0.78,1.74]	0.59 [0.26,1.32]

**Internal Medicine Review**  
**Applying an Equity Lens to Maternal Health Care Continuum in Rural Communities of**  
**Cambodia, Guatemala, Kenya, and Zambia**  
**February 2018**

CHW visits during pregnancy (ref, <3 visits)	1.00	1.00	1.00	1.00
3 or more visits	1.10 [0.88,1.38]	1.75 [0.69,4.43]	1.19 [0.89,1.58]	1.44 [0.63,3.27]
ANC (ref <4ANC)	1.00	1.00	1.00	1.00
4+ANC	1.02[0.84,1.24]	1.02 [0.80,1.31]	0.86 [0.67,1.11]	1.15 [0.76,1.73]
SBA (ref, no SBA)	1.00	1.00	1.00	1.00
SBA	1.45 [1.06,1.98] *	0.35 [0.27,0.45] ***	4.03 [2.85,5.69] ***	5.17 [2.58,10.36] ***
Early PNC(ref, no early PNC)	1.00	1.00	1.00	1.00
Early PNC	1.43 [1.13,1.81] **	0.92 [0.72,1.17]	0.60 [0.46,0.77] ***	0.84 [0.49,1.43]
Treatment (Ref, Comparison)	1.00	1.00	1.00	1.00
Intervention	0.98 [0.81,1.20]	1.27 [1.00,1.62]	1.04 [0.81,1.34]	2.41 [1.47,3.94] ***
Constant	4.05 [1.78,9.25]	7.53 [4.94,11.48]	1.43 [0.67,3.04]	0.89 [0.30,2.63]
Total N	2920	1928	2219	836

Note \* p<0.05, \*\* p<0.01, \*\*\* p<0.001

When complete CoC was defined as ANC4+, SBA and PNC, women in higher wealth quintiles, and intervention sites, had significantly higher odds of complete CoC for Cambodia, Kenya and Zambia. The other

significant predictors were 3+ CHW visits and educational status (Cambodia), marital status (Kenya) and highest wealth quintile, educational status and comparison sites (Guatemala) (Table 5).

**Table 2. Multivariate Logistic Regression of Factors Associated with Complete Care Continuum; ANC4+, SBA and PNC**

	<i>Cambodia</i>	<i>Guatemala</i>	<i>Kenya</i>	<i>Zambia</i>
<b>Complete CoC ANC4+, SBA, PNC</b>	<b>OR(95%CI)</b>	<b>OR(95%CI)</b>	<b>OR(95%CI)</b>	<b>OR(95%CI)</b>
Marital status (ref, Single/divorced/widowed)	1.00	1.00	1.00	1.00
Married	1.42 [0.78,2.59]	1.13 [0.85,1.49]	1.53 [1.11,2.10] **	0.76 [0.50,1.13]
Caretaker Education (ref, none)	1.00	1.00	1.00	1.00
Primary	1.54 [1.25,1.90] ***	2.31 [1.55,3.45] ***	0.80 [0.44,1.45]	5.63 [1.70,18.65] **
Secondary or more	2.05 [1.62,2.60] ***	5.80 [3.61,9.32] ***	1.31 [0.71,2.42]	5.33 [1.59,17.92] **
Parity (ref, 2 or more)	1.00		1.00	1.00
1 <sup>st</sup> pregnancy	1.18 [1.00,1.40]		1.40 [0.89,2.19]	1.05 [0.59,1.88]
Wealth Quintile (ref, lowest)	1.00	1.00	1.00	1.00
Low	1.38 [1.09,1.75] **	0.95 [0.59,1.53]	1.27 [0.92,1.76]	1.28 [0.67,2.47]
Middle	2.29 [1.82,2.88] ***	0.97 [0.60,1.56]	1.77 [1.28,2.46] ***	1.82 [1.01,3.29] *
High	2.09 [1.64,2.66] ***	1.45 [0.92,2.28]	1.56 [1.13,2.17] **	2.88 [1.64,5.04] ***
Highest	2.17 [1.66,2.84] ***	2.83 [1.80,4.45] ***	1.49 [1.07,2.06] *	3.75 [1.95,7.22] ***
CHW visits (ref, <3 visits)	1.00	1.00	1.00	1.00
3 or more visits	1.56 [1.27,1.91] ***	1.16 [0.43,3.09]	1.20 [0.96,1.49]	1.13 [0.63,2.03]
Treatment (Ref, Comparison)	1.00	1.00	1.00	1.00
Intervention	3.41 [2.87,4.05] ***	0.17 [0.12,0.23] ***	1.39 [1.13,1.72] **	6.89 [4.23,11.22] ***
Constant	0.19 [0.10,0.36]	0.09 [0.06,0.14]	0.14 [0.07,0.28]	0.01 [0.00,0.03]
Total N	2936	1940	2244	845

Note \* p<0.05, \*\* p<0.01, \*\*\* p<0.001

#### 2.3.4 Discussion

Addressing the global burden of MNCH has been prioritized to be of paramount importance for the Sustainable Development Goals agenda. Based on WHO estimates, 303,000 maternal deaths occurred in 2015, a majority in low and middle income economies. This, in addition to the 5.9 million deaths in children under 5, which includes the 2.7 million neonatal deaths, due to preventable causes warrants an aggressive strategy and concerted efforts of governments and their stakeholders, including community entities<sup>31</sup>. Cost effective strategies, encompassing a lifecycle approach like the integrated MNCH CoC, can effectively address the various contextual challenges by effectively linking efforts at the household, community and health facility level. Each stage of the CoC, has critical life-saving elements and adds value ensuring that women and children don't drop off in the care pathway. National health systems, including Cambodia, Guatemala, Kenya and Zambia have renewed their commitment to reinforce investments for universal coverage and quality for maternal newborn and child health.

This study provides some evidence of the effectiveness of targeted community based interventions for health promotion activities using CHW volunteers and other community engagement mechanisms, to improve healthcare seeking and enhance the CoC.

Contextual factors play a critical role in enabling women to seek appropriate and timely care which may be related to geographic access, responsive primary healthcare facilities and effective community mobilization strategies to improve utilization and mitigate the barriers to appropriate care. Women in the intervention sites had significantly higher coverage of ANC4+, SBA, and early PNC for Cambodia and Kenya, whereas in the Guatemala context, comparison sites had better coverage for ANC4+, SBA and early PNC. For Zambia, women in intervention sites had a significantly higher proportion delivering in facilities, reporting early PNC and NBC. An examination of program documentation from the four countries indicated that women in the comparison sites also received CHW services during pregnancy though the health promotion strategies differed primarily with respect to timing and educational content of CHW

Internal Medicine Review  
Applying an Equity Lens to Maternal Health Care Continuum in Rural Communities of  
Cambodia, Guatemala, Kenya, and Zambia  
February 2018

visits. Previously established community and facility management committee infrastructures were also very instrumental in both intervention and comparison sites in mobilizing communities to improving health behaviors and enhancing utilization of health services. In Zambia, another initiative for saving mothers and new born lives was launched in the comparison sites, which made considerable investments in systems strengthening strategies for improving the health facility capacity and provider competency and trained community volunteers to improve health promotion and careseeking practices of mothers. Hence both the intervention and comparison sites received health promotion services at the community and household level in Zambia. Security concerns were reported by CHWs in Comapa, an intervention site in Guatemala, preventing them from conducting regular household visits, and also preventing women from accessing facility based services. During the project implementation, a doctor's strike and nurse's strike occurred in Kenya, which may have posed a barrier to care-seeking in some communities. Though causal associations cannot be determined, it is imperative to make appropriate considerations for factors related to the healthcare context, which may

be strong impediments to careseeking for rural populations.

A study in Ghana examined the coverage of MNCH services following a community based health planning and service initiative<sup>32</sup>. Only 8% had CoC completion with the greatest gaps occurring between delivery and PNC. Factors associated with CoC completion were beliefs about illness, marital status, education, type of transportation and geographic location and conversely factors that were related to low CoC were location, marital status, education, socio-economic status, transport to facility and cultural beliefs. A 27% CoC completion was reported in Pakistan, with only 38% reporting ANC4+. Older primiparous women, those with fewer children, high education and richest quintile with more autonomy, and exposure to mass media being significant predictors of CoC completion<sup>33</sup>. In another Cambodian study, age, education, household wealth, and low birth order were associated with women's use of ANC and subsequent use of SBA<sup>17</sup>, and health insurance was strongly associated with ANC utilization. In this study health insurance was not a significant predictor of ANC4+ but significant for SBA for

Cambodia in the multi regression model. Compared to the coverage reported in the previous study in Cambodia<sup>17</sup>, the levels reported in this study were higher for ANC and SBA, and similar for PNC, and considerably higher compared to the levels reported in another multi-country study<sup>15</sup>.

Education and wealth status emerged as strong predictors of completion of CoC in the multi regression models, as in other previously cited studies<sup>15,17,33,34</sup>. This raises concerns of equitable coverage as socioeconomic disparities emerge as major barriers to access for the vulnerable segments of the community. Even in Kenya, where routine services for maternal health are free, wealth quintiles were significant predictors of CoC.

The effect of the intervention was evident for Cambodia, as women who were exposed to the timed and targeted counseling and other community engagement strategies were more likely to receive complete CoC, as were those who received 3 or more CHW visits during pregnancy. As in the Ghana study<sup>32</sup>, marital status was associated with completion of CoC in Kenya, and ANC4+ in Kenya and Cambodia, highlighting the need to focus additional efforts on improving care

seeking practices for women who were not married. In Guatemala, unmarried women had higher odds of NBC, than married women, which was not consistent with findings for other country contexts, and warrants further investigation. These determinants on CoC provide key insights for additional targeting of program interventions to mothers who are unmarried (married in Guatemala), or have minimal education, and from lower socio-economic backgrounds.

Though access and transport were not included in the regression models, the major reported barriers for not seeking facility services, were geographical access and transport. However, for Guatemala, 60% of the women who did not seek facility care for ANC, felt it was not necessary, and 50% felt it was not necessary to deliver at a facility. Additional efforts to enhance the knowledge and practices at the community level are critical, to ensure that women appreciate the importance of appropriate care seeking during and immediately following pregnancy. Ensuring quality of care at the facility, essential commodities and adequate and competent staffing are also essential to facilitate the CoC, aside from the household

Internal Medicine Review  
Applying an Equity Lens to Maternal Health Care Continuum in Rural Communities of  
Cambodia, Guatemala, Kenya, and Zambia  
February 2018

level interventions and civil society engagement at the community level.

In the Ghana study, PNC within 48 hours of delivery was only 25%<sup>32</sup> and another study in Cambodia reported wealth status, urine sample at ANC service, and facility delivery were significantly associated with the continuation of care to PNC<sup>17</sup>. Since women are discharged the day after delivery in most rural contexts, we considered early PNC, within 24 hours in the CoC model. In this study, Cambodia reported the highest early PNC coverage (>70%), in both intervention and comparison sites. The results varied in Guatemala and Zambia with the comparison sites performing better in Guatemala and intervention sites in Zambia. Early PNC coverage in Kenya was above 35% in this study. Reinforcing ANC during pregnancy can have a positive effect on the CoC for SBA and early PNC, as reported in another multi-country study in rural settings in Africa<sup>35</sup>.

Increasing equitable access to reproductive care services is crucial, but ensuring optimal structural and clinical quality with adequate system readiness, with competent providers at the facility level is a critical challenge that

health systems face in effectively addressing maternal and newborn health, as highlighted in a recent study in Kenya<sup>36</sup>. Two of the key objectives stated in the Kenyan Health Policy document, include the enhanced provision of health services within the devolved healthcare system and encouragement of public participation<sup>37</sup>.

The study has several limitations, the most important of which is the cross-sectional nature of the analysis, which prevent attributions of causality. The comparison ADP sites were matched on several contextual characteristics, but were not true comparisons, due to the ongoing activities of the ministry of health and other NGOs, including World Vision's ADP interventions. The broad spectrum of health and developmental activities in the comparison sites may have obscured the true effect of the interventions. Regional variations which were reported in other studies were not factored in the analysis. Women's self-report of care seeking and quality of care received at the health facilities adds another level of recall bias to the study. Other factors like distance to health facility, quality of ANC, decision making autonomy, exposure to mass media

have been shown to be significant predictors of care seeking in other settings<sup>17,32,33</sup> These were not considered in the analysis and may be useful to examine in future research on CoC in these contexts.

### 2.3.5 Conclusions

The study provides key findings on the levels and determinants of CoC for maternal health and some evidence of the effectiveness of the intervention strategies especially in Cambodia and Kenya. As ANC4+ emerged as a significant predictor for subsequent SBA and PNC, additional efforts must be made to ensure ANC early in pregnancy. Following the recommendations for enhancing community based health care to ensure universal access to essential maternal and child health services, national ministries of health and non-governmental agencies have bolstered efforts to engage communities in a shared vision for achieving the sustainability developmental goals. Efforts must be made to craft contextually appropriate health promotion and service delivery mechanisms to engage local communities and healthcare providers to effectively address the barriers to care-seeking and the CoC for MNCH. The engagement of CHWs and community

entities is paramount in the first phase of seeking ANC4+, and ensuring patient centered quality care at facilities, can foster facility deliveries with SBA and subsequently appropriate PNC and NBC. Service delivery systems must be configured to optimize strategies for household health promotion, community engagement and equitable access to quality care at primary health care facilities to improve the continuity of care for women, newborns and children.

### 2.4 List of Acronyms

ADP Area Development Program, ANC Ante Natal Care, CoC Continuum of Care, CSC Community Scorecards, CVA Community Voice and Action, MNCH Maternal Newborn Child Health, NBC New Born Care, PNC Post Natal Care, SBA Skilled Birth Attendance

### 2.5 Acknowledgements

The authors acknowledge the important contributions Drs Chea Chhorvann, Manuel Ramirez, Mubiana Macwan'gi, and Sydney Malama and the research and survey teams from the National Institute of Public Health, Cambodia, Institute of Nutrition of Central

Internal Medicine Review  
Applying an Equity Lens to Maternal Health Care Continuum in Rural Communities of  
Cambodia, Guatemala, Kenya, and Zambia  
February 2018

America and Panama, Guatemala, Moi University School of Public Health, Kenya and Institute of Economic and Social Research, Zambia. We also want to thank the National and District Ministries of Health, World Vision program staff and global and country research teams for their support, and more importantly the study participants for their engagement. Our thanks to the reviewers for their insightful comments and recommendations.

## 2.6 Funding

The study was supported by a research grant to Johns Hopkins University from World Vision International.

## 2.7 Conflict of Interest

The authors report no financial conflict of interest. AE, YJ, and GE were supported by the research grant, and JC and AG were employed by World Vision.



## 2.8 References

1. Requejo J, Victora C, Bryce J. Countdown to 2015: A decade of tracking progress for maternal newborn and child survival. The 2015 Report. 2015.
2. Alkema L, Chou D, Hogan D, et al. Global, regional, and national levels and trends in maternal mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Maternal Mortality Estimation Inter-Agency Group. *The Lancet*. 2016;387(10017):462-474.
3. You D, Hug L, Ejdemyr S, et al. Global, regional, and national levels and trends in under-5 mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Inter-agency Group for Child Mortality Estimation. *The Lancet*. 2015;386(10010):2275-2286.
4. Liu L, Hill K, Oza S, et al. Levels and causes of mortality under age five years. *Reproductive, Maternal, Newborn, and Child Health*. 2016:71.
5. Carroli G, Rooney C, Villar J. How effective is antenatal care in preventing maternal mortality and serious morbidity? An overview of the evidence. *Paediatric and perinatal Epidemiology*. 2001;15(s1):1-42.
6. Li X, Fortney J, Kotelchuck M, Glover L. The postpartum period: the key to maternal mortality. *International Journal of Gynecology & Obstetrics*. 1996;54(1):1-10.
7. Organization WH, UNICEF. *Reduction of maternal mortality: a joint WHO/UNFPA/UNICEF/World Bank statement*. World Health Organization; 1999.
8. CHEN XK, Wen SW, Yang Q, Walker MC. Adequacy of prenatal care and neonatal mortality in infants born to mothers with and without antenatal high-risk conditions. *Australian and New Zealand Journal of Obstetrics and Gynaecology*. 2007;47(2):122-127.
9. Graham WJ, Bell JS, Bullough CH. Can skilled attendance at delivery reduce maternal mortality in developing countries? *Safe motherhood strategies: a review of the evidence*. 2001.
10. McDonagh M. Is antenatal care effective in reducing maternal morbidity and mortality? *Health policy and planning*. 1996;11(1):1-15.
11. Organization WH. Making pregnancy safer: the critical role of the skilled attendant: a joint statement by WHO, ICM and FIGO. 2004.
12. De Brouwere V, Tonglet R, Van Lerberghe W. Strategies for reducing maternal mortality in developing countries: what can we learn from the history of the industrialized West? *Tropical medicine & international health*. 1998;3(10):771-782.
13. Kerber KJ, de Graft-Johnson JE, Bhutta ZA, Okong P, Starrs A, Lawn JE. Continuum of care for maternal, newborn, and child health: from slogan to service delivery. *The Lancet*. 2007;370(9595):1358-1369.
14. Organization WH. Every Newborn: an action plan to end preventable deaths. 2014.
15. Singh PK, Rai RK, Alagarajan M, Singh L. Determinants of maternity care services utilization among

- married adolescents in rural India. *PLoS one*. 2012;7(2):e31666.
16. Babalola S, Fatusi A. Determinants of use of maternal health services in Nigeria-looking beyond individual and household factors. *BMC pregnancy and childbirth*. 2009;9(1):43.
  17. Wang W, Hong R. Levels and determinants of continuum of care for maternal and newborn health in Cambodia-evidence from a population-based survey. *BMC pregnancy and childbirth*. 2015;15(1):62.
  18. Fort AL, Kothari MT, Abderrahim N. Postpartum care: levels and determinants in developing countries. 2006.
  19. Islam N, Islam MT, Yoshimura Y. Practices and determinants of delivery by skilled birth attendants in Bangladesh. *Reproductive health*. 2014;11(1):86.
  20. Hanson C, Manzi F, Mkumbo E, et al. Effectiveness of a home-based counselling strategy on neonatal care and survival: a cluster-randomised trial in six districts of rural southern Tanzania. *PLoS medicine*. 2015;12(9):e1001881.
  21. Gilmore B, McAuliffe E. Effectiveness of community health workers delivering preventive interventions for maternal and child health in low-and middle-income countries: a systematic review. *BMC Public Health*. 2013;13(1):847.
  22. August F, Pembe AB, Mpembeni R, Axemo P, Darj E. Effectiveness of the Home Based Life Saving Skills training by community health workers on knowledge of danger signs, birth preparedness, complication readiness and facility delivery, among women in Rural Tanzania. *BMC pregnancy and childbirth*. 2016;16(1):129.
  23. Edward A, Osei-Bonsu K, Branchini C, Shah Yarghal T, Arwal SH, Naeem AJ. Enhancing governance and health system accountability for people centered healthcare: an exploratory study of community scorecards in Afghanistan. *BMC health services research*. 2015;15(1):299.
  24. Schaaf M, Topp SM, Ngulube M. From favours to entitlements: community voice and action and health service quality in Zambia. *Health Policy and Planning*. 2017;32(6):847-859.
  25. Blake C, Annorbah-Sarpei NA, Bailey C, et al. Scorecards and social accountability for improved maternal and newborn health services: A pilot in the Ashanti and Volta regions of Ghana. *International Journal of Gynecology & Obstetrics*. 2016;135(3):372-379.
  26. George A, Scott K, Garimella S, Mondal S, Ved R, Sheikh K. Anchoring contextual analysis in health policy and systems research: a narrative review of contextual factors influencing health committees in low and middle income countries. *Social Science & Medicine*. 2015;133:159-167.
  27. Singh A. Supply-side barriers to maternal health care utilization at health sub-centers in India. *PeerJ*. 2016;4:e2675.
  28. Global Fund. Community systems strengthening framework Revised edition. *Geneva: The Global Fund*. 2014.
  29. Demographic Health Survey. DHS Overview. 2015; <https://www.dhsprogram.com/What->

- We-Do/Survey-Types/DHS.cfm. Accessed Dec 17, 2017.
30. *Stata 14* [computer program]. Texas, USA2015.
  31. World Health Organization U. Trends in maternal mortality: 1990-2015: estimates from WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. 2015.
  32. Yeji F, Shibamura A, Oduro A, et al. Continuum of care in a maternal, newborn and child health program in Ghana: Low completion rate and multiple obstacle factors. *PloS one*. 2015;10(12):e0142849.
  33. Iqbal S, Maqsood S, Zakar R, Zakar MZ, Fischer F. Continuum of care in maternal, newborn and child health in Pakistan: analysis of trends and determinants from 2006 to 2012. *BMC health services research*. 2017;17(1):189.
  34. McDougal L, Rusch ML, Silverman JG, Raj A. Linkages Within the Reproductive and Maternal Health Continuum of Care in Bangladesh. *Asia Pacific Journal of Public Health*. 2016;28(5):423-437.
  35. Adjiwanou V, LeGrand T. Does antenatal care matter in the use of skilled birth attendance in rural Africa: a multi-country analysis. *Social science & medicine*. 2013;86:26-34.
  36. Owili PO, Muga MA, Mendez BR, Chen B. Quality of maternity care and its determinants along the continuum in Kenya: A structural equation modeling analysis. *PloS one*. 2017;12(5):e0177756.
  37. Ministry of Health. *Kenya Health Policy 2014–2030 Towards attaining the highest standard of health*. Nairobi: Ministry of Health;2014.