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*Georgia State University*

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Maternal Mortality in Cambodia: Efforts to Meet the Millennium Development Goal for  
Maternal Health

by

Sarah Connell

A Capstone Submitted to the Graduate Faculty  
of Georgia State University in Partial Fulfillment  
of the  
Requirements for the Degree

MASTER OF PUBLIC HEALTH  
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2011

## ABSTRACT

Recent estimates of global maternal mortality indicate that for the first time since the Safe Motherhood Initiative of 1987, deaths due to pregnancy-related causes are on the decline. Defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, maternal mortality is one of the strongest health statistics showing the disparity between poor and rich countries. Although a global decline is documented, challenges to reducing maternal mortality, and meeting Millennium Development Goals (MDGs) for maternal health remain, particularly in many Sub-Saharan African and Southeast Asian countries.

This study presents an assessment of Cambodia's progress towards reaching the Millennium Development Goal of reducing maternal deaths by  $\frac{3}{4}$  by 2015. The report examines issues related to the improvement of maternal health, outlining the magnitude, determinants, and prevention methods of maternal mortality globally and in Cambodia.

Cambodia's health policies and contextual factors impacting the maternal mortality ratio such as dramatic increases of skilled health personnel for delivery, delivery in health facility, and use of antenatal care are identified as key contributors to MMR reduction.

Continued progress in reducing maternal mortality in Cambodia requires improvements to midwifery skill, competencies around normal and emergency birthing care, and salaries of midwives as well as an incentive for new graduates to work in the public sector. An increase in the cooperation between government health centers and hospitals are crucial to ensure obstetric referrals, supervision of health center staff, and an improvement in maternal death data collection. Finally a national priority to increase the use of family planning and safe abortion will significantly contribute to the continued reduction of MMR.

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I would like to thank the faculty and staff at Georgia State University's Institute of Public Health, especially Dr. Rodney Lyn who greatly contributed to building my public health knowledge and skill over the past two years.

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## ABBREVIATIONS

AMTSL: Active Management of the Third Stage of Labor  
ANC: Antenatal Care  
ASEAN: Association of Southeast Asian Nations  
BEmONC: Basic Emergency Obstetric Care  
CBD: Community-based Distribution  
CDHS: Cambodian Demographic Health Survey  
CEmONC: Comprehensive Emergency Obstetric Care  
CMDG: Cambodian Millennium Development Goal  
CNC: Cambodian National Census  
DHS: Demographic Health Survey  
DPHI: Department of Planning and Health Information  
HC: Health Center  
HSSP2: Health Sector Strategic Plan 2  
GEI: Gender Empowerment Index  
HDI: Human Development Index  
HIS: Health Information System  
ICD: International Classification of Disease  
MDG: Millennium Development Goal  
MIRA: Mother and Infant Research Activities  
MMR: Maternal Mortality Ratio  
MOH: Ministry of Health  
MOI: Ministry of the Interior  
MOP: Ministry of Planning  
NGO: Non-governmental Organization  
NMCHC: National Maternal and Child Health Center  
NRHP: National Reproductive Health Program  
OD: Operational District  
PHD: Public Health Department  
POPPHI: Prevention of Postpartum Hemorrhage Initiative  
PPH: Post-partum Hemorrhage  
RAMOS: Reproductive-age Mortality Studies  
RGC: Royal Government of Cambodia  
RH: Referral Hospital  
RHAC: Reproductive Health Association of Cambodia  
SBA: Skilled Birth Attendant  
TBA: Traditional Birth Attendant  
TFR: Total Fertility Ratio  
UN: United Nations  
UNFPA: United Nations Population Fund  
UNICEF: United Nations Children's Fund  
URC: University Research Co.  
WHO: World Health Organization



## I. INTRODUCTION

The inauguration of the Safe Motherhood Initiative in Nairobi (1987) first brought maternal mortality to the forefront of awareness in global health, galvanizing commitment from donors, governments, and development agencies to research and act on best strategies to tackle maternal deaths.<sup>1,2</sup> Globally, drastic improvements have been made in the reduction of infant mortality, however it is only recently that progress for the reduction of maternal mortality has been documented in the developing world. Decades after the initiative began to find solutions to maternal deaths, a study published in the *Lancet* shows that for the first time maternal mortality is declining globally. The study comprised of 181 country estimates, reports that in 2008 there were 342,900 maternal deaths around the globe. The study estimates a yearly decline of 1.5%, down from 526,300 in 1980.<sup>3</sup>

In light of this achievement, there are success stories to learn from, however dire challenges remain in many developing countries, particularly in Sub-Saharan Africa and Southeast Asia. The WHO defines maternal mortality as “the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes,” and the maternal mortality ratio is expressed as a number of maternal deaths per 100,000 live births.<sup>4</sup>

The death of a woman during pregnancy, childbirth, or after delivery is one of the strongest health statistics showing the disparity between poor and rich countries.<sup>5</sup> While the estimated risk of a woman dying a maternal death in Ireland is 1 in 48,000; the risk in

Niger is 1 in 6.<sup>6</sup> Improving the health of women during their reproductive years and reducing deaths related to pregnancy therefore should be a global priority.

A maternal death is a tragic event for the woman wherever it occurs, and leaves a mark on children and families, especially those young children who often will not survive without a mother's care. A study in Nepal found that infants of mothers who died during childbirth were 6 times more likely to die during the first week of life, 12 times more likely between 8 and 28 days, and 52 times more likely between 4 and 24 weeks, than infants whose mothers survived childbirth. This effect is especially apparent on the poor survival rates of young girls who have lost their mother.<sup>5</sup> Poor maternal health contributes to most infant, neonatal<sup>1</sup> and prenatal deaths as result of inadequate care during the intrapartum period, referring to during the time of delivery. Research suggests that obstetric complications during labor result in 58% of stillbirth and early neonatal deaths.<sup>7</sup> Further, morbidities relating to pregnancy are highly prevalent, though rarely accurately recorded in developed and developing countries. For every woman who dies at least 30 suffer injuries or permanent disabilities, and an estimated 1 in 4 women in developing countries suffer acute or chronic conditions related to pregnancy.<sup>5</sup>

## Millennium Development Goals

In September of 2000, the United Nations Millennium Summit represented the largest gathering of world leaders in history. The work of this Summit established a global commitment to shape the future of a world free of extreme poverty. The Summit attended by 189 heads of state and government, resulted in the drafting of eight time-

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<sup>1</sup> Neonatal mortality refers to death within the first 28 days of life.

bound development goals to reduce poverty, improve health, and promote peace, human rights, gender equality, and environmental sustainability.<sup>8</sup> The MDGs are the most comprehensive, broadly supported poverty reduction targets the world has ever known. In terms of international politics and economics, they are the frameworks on which policy, international development, and donor decisions are based.

This report analyses Cambodia's status in reaching the Millennium Development Goal for a reduction of maternal mortality by three-quarters by 2015. Today as many as 191 countries have committed themselves to the realization of the MDGs, and Cambodia's efforts to reduce maternal mortality have been significantly impacted by that framework. In 2003, the Royal Government of Cambodia (RGC) adapted the 8 universally agreed upon goals, to better suit the context of the country.<sup>9</sup> The primary focus of the RGC's Ministry of Health (MOH) is the reduction of a near stagnated MMR. Over the past decade there have been virtually no changes to the country's MMR, which in 2005 was 472 per 100,000 live births. The Cambodian Millennium Development Goal (CMDG) target for MMR is 140/100,000 by 2015. Much anticipation preceded the release of CDHS 2010 results for MMR, which found that MMR decreased by nearly half at 206 per 100,000 live births. The most recent results suggest that the country's investment in maternal mortality reduction have been effective. Considering a number of indicators of maternal health other than MMR, this report outlines Cambodia's progress towards reaching MDG 5, "Improve maternal mortality by 2015" (Table 1).

**Table 1: Selected CMDG5 Targets to Improve Maternal Health by 2015**

Reduce Maternal Mortality Ratio (MMR) to 140/100,000
Reduce Total Fertility Rate (TFR) to 3
Increase the Proportion of Births Attended by Skilled Health Personnel to 80%
Increase the Proportion of Married Women Using Modern Birth Spacing Methods to 60%
Increase the Proportion of Pregnant Women With 2 or More ANC With Skilled Health Personnel to 90%
Increase the Proportion of Women 15-49 Years with Iron Deficiency Anemia to 33%
Increase the Proportion of Pregnant Women Who Delivered by Caesarean Section to 4%

## METHODOLOGY

The report was developed based on a review of available literature and secondary data for Cambodia. Secondary data were primarily drawn from the Cambodian Demographic Health Surveys (CDHS) from years 2000, 2005, and 2010. Demographic health surveys are regarded as the gold standard for health statistics in many developing countries, and the CDHS was adapted from the well-regarded worldwide DHS program. The surveys collected data from a nationally representative sample on a broad range of demographic, social, and health issues including maternal mortality, fertility, and family planning. Three questionnaires (household, women, and men) were administered to men and women by trained field staff. The 2010 CDHS sampled a total of 18,754 women age 15-49 (6,228 urban and 13,009 rural) with a response rate of 97.5%.<sup>10</sup>

Data was drawn from UN, UNICEF, and WHO sources. Various documents on national maternal health programs and policies as well as published and unpublished reports of government and non-governmental organizations were reviewed. Information

was gathered from interviews with two prominent figures in Cambodia's reproductive health sector, Dr. Jerker Liljestrand, University Research Group, Phnom Penh (URC) and Dr. Chivorn Var, Associate Director of Reproductive Health Association of Cambodia (RHAC), whose insight especially contributed to the recommendations section of the report.

## II. CAMBODIA'S HISTORICAL AND SOCIAL CONTEXT

Cambodia is a small country, approximately the size of the state of Washington, located in mainland Southeast Asia. The country lies between the Gulf of Thailand to the southwest, Thailand to the west and north, Laos to the north, and Vietnam to the east (Figure 1). The country is firmly situated in the tropics where its southernmost points are only 10 degrees above the equator.<sup>11</sup> The dominating geographic features of the country are the Tonle Sap Lake and river system, the Mekong River, and the Dangrek and Cardamom Mountains. The Tonle Sap is the only river in the world known to seasonally reverse its flow, bringing nutrient rich waters to fertile plains where rice is cultivated, and nourishing fisheries where 80% of the country's consumed protein originates.<sup>12</sup>

The Kingdom of Cambodia is divided into 24 provinces, and the total population is estimated to be around 14.8 million. The capital city is Phnom Penh where approximately 1.3 million people live. The country remains largely rural, with only 21% of the population in urban environments; 4 in 5 Cambodians live in a rural area.<sup>10</sup> Approximately 90% of the population are Khmer, with minority groups such as Islamic Cham, Chinese, and Vietnamese comprising 10% of the population.<sup>13</sup> Khmer is the official language of Cambodia, spoken by 95% of the population.

Emerging from the horrific years of Pol Pot's regime (1975-1979), Cambodia is gaining grounds in becoming a more stabilized country. Nation-building efforts have been sustained with a more stabilized political climate and continued rapid economic growth. The country has seen a reduction in poverty and improvements in health and education.<sup>14</sup> Despite improvements the country still works to recover from the Khmer Rouge regime, and remains one of the poorest countries in Southeast Asia.



**Figure 1. Political Boundaries of the Kingdom of Cambodia**

Source: U.S. Department of State, <http://www.state.gov/p/eap/ci/cb/>

Khmer Rouge rose to power by seizing control of Phnom Penh in 1975, beginning a 5-year period where nearly half of Cambodia's population perished. The genocide was fueled by the quest for a utopian dream shaped by Marxist-Leninist ideology. Khmer Rouge engaged in a form of "social engineering" where the rural farmer was glorified, and members of the middle and upper classes were demonized.<sup>15</sup> Khmer Rouge sought to create an agrarian socialist society, eliminating the upper, middle, educated, and elite classes. Khmer Rouge transformed the population into an unpaid agricultural workforce,

without class distinctions. The regime forced people to wear peasant clothing, outlawed all money, religious practice, formal education, newspapers, and mail service. Cities and towns were evacuated, forcing people to travel to rice farms and labor camps. An overarching focus of the Khmer Rouge was the production of enough rice to feed the entire population, which at that time would have exceeded by two times the amount of rice grown in the highest producing regions of the country.<sup>16</sup>

The aftermath of Pol Pot's regime left widespread structural damages to health, education, and financial institutions and human resources. During this period a majority of Cambodia's doctors, teachers, and other key providers of services perished or fled the country. Only 45 out of Cambodia's 450 doctors survived the genocide.<sup>15</sup> An estimated 2.5 million, or at that time half of the population, died from warfare, starvation, exhaustion, disease, and execution. Pol Pot's regime gradually lost power and was finally ousted in 1979 after Vietnam's invasion and occupation in 1978. At that time the Association of Southeast Asian Nations (ASEAN) helped the country build a coalition to gain a seat at the United Nations (UN). After a decade of civil war and political turmoil the peace process finally began in 1989 and a peace treaty was signed in 1991. Cambodia held its first elections in 1993, establishing the Royal Government of Cambodia (RGC) a constitutional monarchy.<sup>15</sup>

Despite the last 20 years of reconstruction, approximately 35% of the population lives below the poverty line and 15% live in extreme poverty.<sup>17</sup> Poverty is a largely rural problem with the poorest living outside of cities. Cambodia ranked 124<sup>th</sup> in 2010 on the Human Development Index (HDI), signifying that more than half of the population are multidimensionally poor, or are seriously deprived of health, education, and income.<sup>18</sup>



Over 20% of the population do not get the minimum average of 2,100 calories per day to reach basic nutritional needs. A significant proportion of the population survives just above the poverty line especially in rural areas leaving them at risk to diseases such as malaria, dengue, diarrhea and waterborne diseases. Only 40% of the population has access to potable water, and among the poorest half of the rural population, less than 10%.<sup>19</sup>

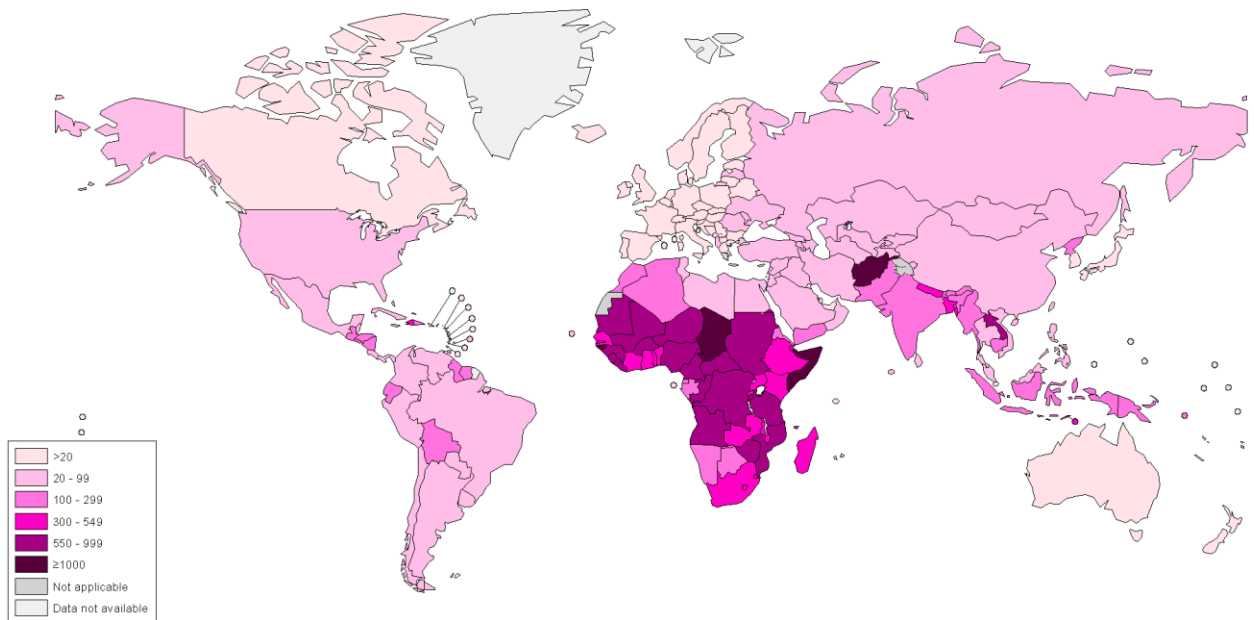
Access to health services is limited, unregistered drugs abound, and the quality of care is hindered by poor medical training and few incentives to work a low paying job. Although great challenges exist for the health sector, the RGC has demonstrated strong will to improve the health statistics of its country. HIV prevalence has fallen dramatically in the last decade from 2-3% of the population to around 0.6%.<sup>20</sup> Newborn, infant, and child mortality are falling, however maternal mortality has stagnated despite an extraordinary increase in births in facilities, ANC, and skilled attendants at birth.<sup>21,10</sup> Improvements in education have been made however 8% of men and 16% of women have never attended school. 49% of Cambodian women and 41% of men have attended some primary school without proceeding to secondary school. 1 in 2 men and 1 in 3 women have attended secondary school or higher education.<sup>10</sup>

During the previous decade, political, economic, and social changes have offered women opportunities to participate in Cambodia's development however inequalities in women's rights exist. The lesser role of women to men can be seen by few women holding positions of power in government and business, lower educational attainment for women and girls, and widespread practices of domestic violence against women.<sup>20</sup> The Gender Empowerment Index (GEI) is quite low, reflecting low levels of women in senior

public decision-making positions.<sup>19</sup> Women head approximately 29% of households, and rural women carry a disproportionately high share of family work. Though woman-dominated homes are not statistically poorer, they are often more vulnerable than male dominated households due to less land entitlement and positions of power in society.<sup>22</sup> In Cambodia as in many developing countries, children, elderly and extended family are dependent on the economic and nurturing inputs of women of reproductive age.<sup>20</sup> Research from the World Bank shows that globally avoiding maternal deaths has a significant benefit to household income, quality of household expenditures, survival of children, and educational achievements.<sup>23</sup> The status of women in society therefore is inseparable from the reproductive well being of women.

### III. MATERNAL MORTALITY: DETERMINANTS AND MAGNITUDE

The International Classification of Disease (ICD) defines a maternal death as “a death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.” Maternal death occurs most frequently in the developing countries of sub-Saharan Africa and Southeast Asia, accounting for 87% of maternal deaths worldwide in 2008 (Figure 2).<sup>24</sup> Maternal deaths occur in countries that struggle to provide antenatal, intrapartum, and postnatal care to women. Maternal mortality is viewed as sentinel indicator of a country’s overall health system because it is an indicator of the quality and availability of primary care.<sup>25</sup> Globally, low MMR is associated with high rates of family planning, skilled birth attendance, delivery in a health facility, and access to safe abortion.<sup>1</sup>



**Figure 2: Global Distribution of Maternal mortality Ratio per 100,000 (2008)**  
Source: WHO, 2010

It is globally recognized that the conditions contributing to a maternal death are post-partum hemorrhage (PPH), eclampsia and pre-eclampsia, obstructed labor, sepsis, and unsafe abortion.<sup>26</sup> Maternal deaths are concentrated around the time of childbirth and during the period after an unsafe abortion, and PPH accounts for nearly a quarter of all maternal deaths worldwide.<sup>27</sup> It is established that women who have had many children, especially with short interval spacing or complicated pregnancies in the past, are at increased risk for complications with future deliveries.

The age of the woman is also a critical consideration for the risk of pregnancy. Studies show that hypertension and pre-eclampsia are more common and carry a greater risk among older women in childbirth. Further, women of older age experience more problems with abnormal labor and hemorrhaging late in pregnancy, compared to younger women.<sup>28</sup> The location a woman resides in is also an important determinant of maternal death. The divide between urban and rural populations is a strong predictor of reproductive health outcomes, as it often reflects a disparity in access to services. One study comparing 24 countries with the world's highest MMRs found that an estimate for urban areas was 447 per 100,000 livebirths in urban areas compared to 640 in rural areas. In Afghanistan which has the world's highest MMR, the difference was even more dramatic; in Kabul MMR was 418 and in a rural remote district 6,507 per 100,000.<sup>29</sup>

## MATERNAL DEATH IN CAMBODIA

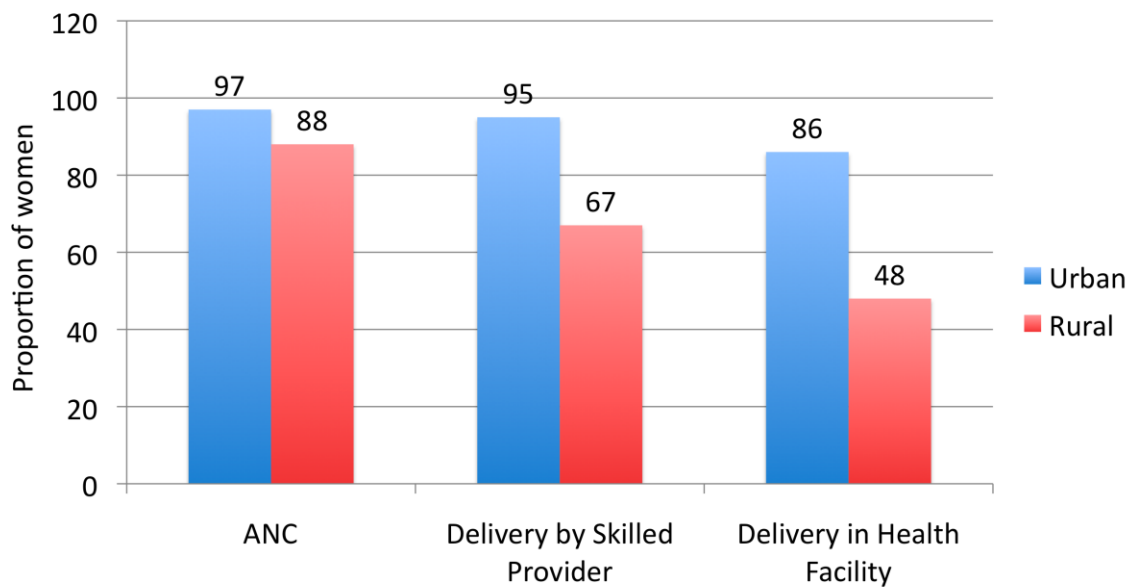
The MMR of a country is generally the most cited statistic reflecting maternal health, however it is also important to note the lifetime risk of maternal death, a statistic

calculated by dividing the age-standardized maternal mortality rate by the age-standardized general fertility rate, and measures the obstetric risk of each live birth. The maternal mortality ratio found by the CDHS 2005 was .02 or in other words a risk of 1 in 50 dying a maternal death.<sup>21</sup> Results from the CDHS 2005 showed that maternal deaths accounted for 17% of all deaths of Cambodian women between the ages of 15 and 49. The CDHS 2010 showed a drastic improvement to risk of maternal death, along with a greatly decreased MMR. In 2010 the risk of a woman dying a maternal death was 1 in 165, and maternal deaths accounted for 8.5% of all deaths to women age 15-49. In the 2000 CDHS and 2005 CDHS, respectively, maternal deaths accounted for 18 percent and 17 percent of all female deaths; today maternal deaths account for a far lower proportion (8.5%) of overall deaths than in the past.

The CDHS 2000 and 2005 show an unchanging maternal mortality ratio between the five years (around 470/100,000) and the 2008 Cambodian National Census (CNC) shows an MMR of 461. A 2010 UN estimate is as low as 290. The much relied upon CDHS revealed an MMR of 206 in 2010, markedly lower from the MMR of 2005. To obtain MMR, the CDHS asked women about deaths of siblings to determine adult mortality as well as pregnancy-related deaths of their sisters. Although MMRs are imprecise estimates, the decline from 472 in 2005 to 206 in 2010 is large enough to ensure confidence in an actual maternal death decrease.

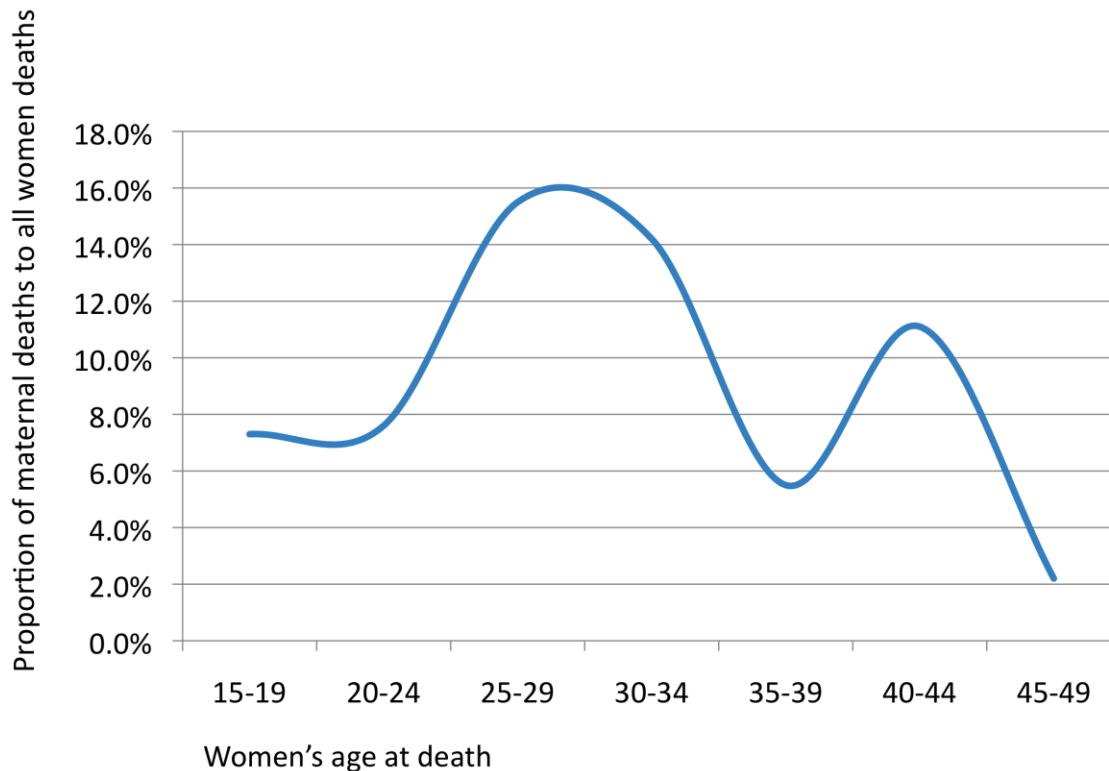
The clinical causes of maternal mortality in Cambodia are PPH (54%), eclampsia (18%), infection and abortion (6%), and uterus rupture (4%). Cambodia's MMR is impacted by the large proportion of the population living in rural or remote locations, and an insufficient number of skilled birth attendants (SBAs) (Figure 3). Four in five

Cambodians live in rural areas, and only 21% live in urban areas.<sup>10</sup> There are large variations in the health access between urban and rural areas, for instance in Phnom Penh (2005) 63% use of skilled birth attendance and in rural Kratie province only 19%.<sup>31</sup> According to the 2010 CDHS women living in rural areas with less access to medical care were more likely than wealthier or more educated women to suffer a maternal death.



**Figure 3: Maternal Health Indicators by Urban and Rural Residence, 2010**  
 Source: Data from CDHS 2010

The CDHS 2010 shows that women between the ages of 29 and 30 are more likely than other ages groups to suffer a maternal death (Figure 4). A spike in maternal deaths in women between ages 40 and 44 was also noted.

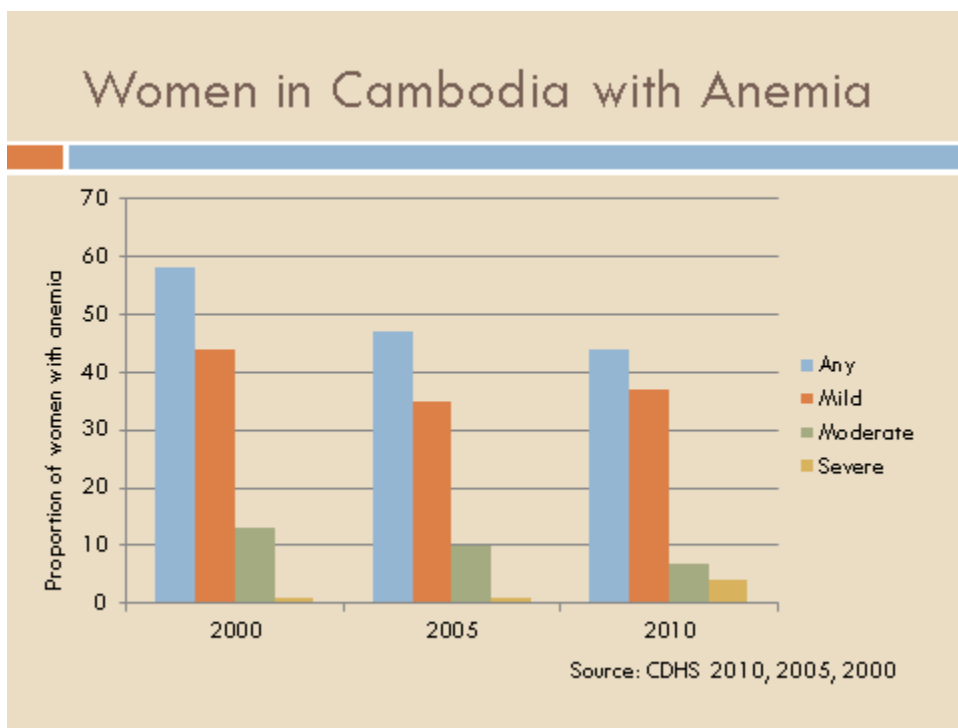


**Figure 4: Proportion of Maternal Deaths to all Female Deaths by Age, 2010**

Source: Data from CDHS 2010

It is estimated that anemia affects half of the world's pregnant women, contributing to PPH as a leader in causes of maternal death. Anemia, defined as a low level of hemoglobin in red blood cells, increases a woman's risk of dying from PPH by resulting in difficulties to cope with an excessive loss of blood.<sup>32</sup> Cambodian women experience high rates of anemia that have not changed much between 2000-2010. The CDHS 2005 showed that 47% of Cambodian women had any anemia, and in 2010 the figure had slightly decreased to 44% (Figure 5). In Cambodia, 57% of pregnant women have anemia.<sup>33</sup> Anemia in Cambodia is attributed to diets consisting of rice and fish with little red meat. Malaria endemicity and high prevalence of worming contribute to a deficiency of red blood cells, consistent with global reports on primary causes of

anemia.<sup>34</sup> Malarial infections are associated with excessive red blood cell destruction, displacing hemoglobin and preventing the transport of oxygen throughout the body. Further the high prevalence of helminth infections including hookworm, schistosomiasis, and trichuriasis results in excessive red blood cell loss leading to iron deficiency.<sup>35</sup> It is speculated that an excessive amount of thalassemia in the country, a genetic blood disorder that results in excessive destruction of red blood cells, may contribute to high rates of anemia.



**Figure 5: Proportion of women with anemia by CDHS year**

Source: Data from CDHS 2000, 2005, 2010



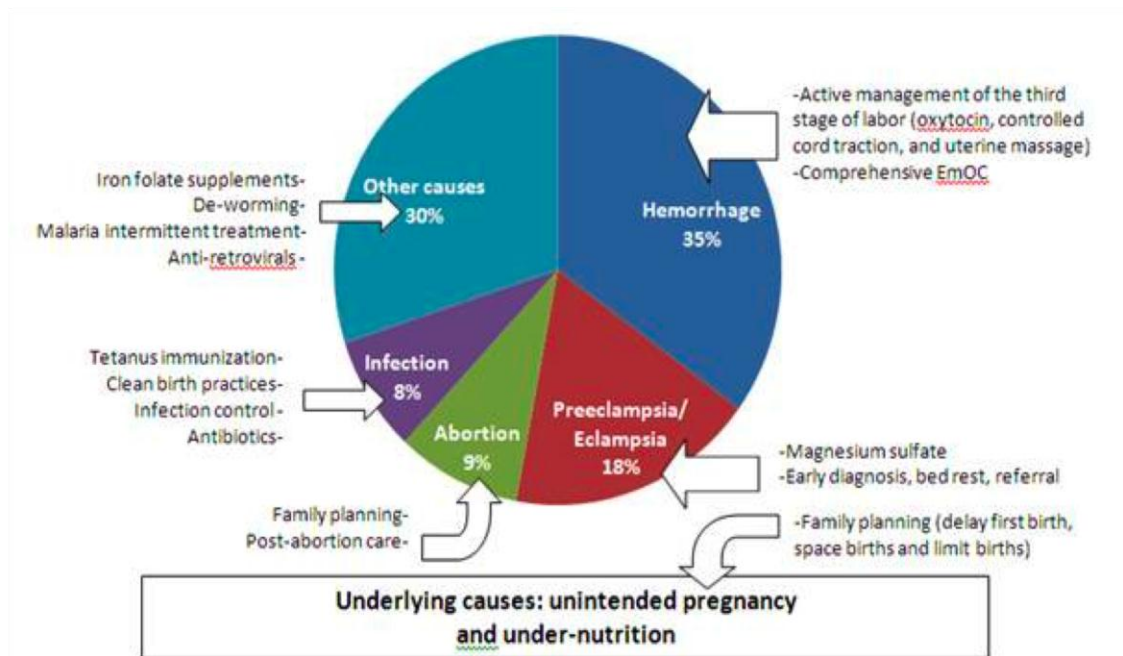
#### IV. METHODS OF PREVENTION AND INTERVENTION

According to the WHO 85% of pregnancies will be normal and without complications that require specialized medical attention. The other 15% however will develop potentially life-threatening conditions. Maternal mortality is a health issue often difficult to effect due to the nature of childbirth as a life event. Without a functioning health system providing primary care to pregnant women, complications in pregnancy are likely to advance to an emergency state where mortality is a possibility.<sup>1</sup> Out of all pregnancies, approximately 2% will die without medical intervention to deliver emergency obstetrical care.<sup>25</sup> Guidelines issued in 1997 by WHO, UNICEF and UNFPA recommend that for every 500,000 people (men and women) there should be 4 facilities prepared to offer basic emergency obstetric care (BEmONC): antibiotics, oxytocin, anticonvulsants, removal of placenta, and assisted vaginal delivery with forceps or vacuum extractor. Comprehensive emergency obstetrical care (CEmONC) should include the same services with the addition of blood transfusion and caesarean section.<sup>4</sup>

Most maternal deaths occur during labor, delivery, or during the 24 hours after birth, and most complications cannot be predicted.<sup>1</sup> As a result, most strategies to prevent maternal death require policy decisions to assure a public health infrastructure that functions to provide emergency obstetric care. Obstetric techniques to save the mother's life include lower segment caesareans, blood transfusions, antibiotic, control of pre-eclampsia and oxytocin.<sup>36</sup> An analysis of 66 countries with the highest rates of maternal and child deaths found that interventions that could be scheduled for example, antenatal care visits or vaccinations, achieved and sustained higher rates of coverage than those that require on-demand availability, such as skilled birth attendance.<sup>37</sup> The study

identified that among these countries (including Cambodia), improving the functions of the continuum of care that cares for women before, during, and after pregnancy was crucial towards progress towards the MDG for maternal health.<sup>37</sup>

Since the global Safe Motherhood Initiative (1987), much has been learned about the most effective clinical interventions to prevent maternal mortality (Figure 6). The challenge for most countries is making proven interventions available to the poor. Experts from around the world acknowledge that almost all maternal deaths can be prevented with proper care. The most critical component of saving mothers lives is that women receive care by a professional health worker (midwife, nurse, or doctor).<sup>38</sup> Delivery in a facility is preferable to home delivery, but the quality of care and hygiene of the facility are crucial to making this difference justified.



**Figure 6: Proven Strategies to Impact the Causes of Maternal Death in Southeast Asia**

Source: Cambodia Global Health Initiative Strategy, USAID/CDC, 2010

At the time of delivery skilled birth attendants must be prepared and trained for the management of delivery complications, most importantly performing active management of the third stage of labor (AMTSL) that is known to reduce PPH by around 60% (Table 2).<sup>31</sup> Further, the availability of uterotonic drugs such as oxytocin or misoprostol must be available for all deliveries for the prevention and management of PPH.

**Table 2: Basic Steps of Delivery with AMTSL**

1. Check to make sure there is not a second child, provide the injection of oxytocin or other uterotonic within 1 minute of delivery
2. Deliver placenta
3. Massage the uterus to stimulate contractions (preventing hemorrhage)
4. Follow-up after 2 hours, every 15 minutes in the 1 <sup>st</sup> hour, and every 30 minutes in the 2 <sup>nd</sup> hour to ensure uterine contraction and examine the quantity of blood loss

Source: Information retrieved from the Prevention of Post-partum Hemorrhage Initiative (POPPHI)

According to the Partnership for Safe Motherhood and Newborn Health skilled attendants must be supported by a referral system to perform the following services:

- Ensure all deliveries are performed hygienically and according to acceptable medical practice, preventing complications resulting from poor care
- Identify complications promptly, managing them appropriately by treatment or referral
- Provide high quality, culturally appropriate, and considerate care, ensuring necessary follow-up and linkages with other services, including antenatal and

postnatal care, as well as family planning, post abortion care, and treatment of STIs

Further a woman's appropriate use of antenatal care (WHO recommends 4 visits before delivery) is crucial to preventing maternal death.<sup>25</sup> During the critical 9 months prior to delivery, risk factors may be identified, counseling on birth preparedness and nutrition can be provided, and iron folate can be given for the treatment of anemia. Although it has been shown that antenatal care alone will not prevent a maternal death, appropriate ANC manages complications such as diabetes, hypertension, and anemia that may lead to complications at birth.<sup>24</sup>

Most agree that there is no silver bullet to achieving lowered MMR, but that reductions can be made with a complete package of interventions to address obstetrical emergencies, especially active management of the third stage of labor (AMTSL) to prevent PPH. Skilled birth attendants should administer magnesium sulfate for the treatment of eclampsia, and a partograph should be used to recognize if labor becomes obstructed and ensure that Caesarean section can be performed quickly if required. Finally, close monitoring by midwife or health center staff is imperative to identify when problems may arise and be able to promptly refer the woman for hemorrhage management and/or blood transfusion.

## V. CAMBODIAN PUBLIC HEALTH SYSTEM AND POLICIES TO ADDRESS MATERNAL MORTALITY

Civil war and political conflict between 1970 and 1993 resulted in Cambodia's status as one of the poorest countries in Southeast Asia. As a result of recent historic political instability, public health services and infrastructure lag behind neighboring countries Thailand and Vietnam.<sup>18</sup> In 1995 with the assistance of the WHO, the Royal Cambodian Government instituted a new public health structure. Cambodia's map was redrawn and 67 new operational districts (OD) were established based on population size. Today the administration of health services is based on a two-tiered service structure with a referral hospital (RH) in each OD, and a network of health centers (HC) (Figure 7).<sup>39</sup> Where population density is low or where geographic barriers exist, ODs establish health posts to serve remote populations.

The Ministry of Health (MOH) is responsible for administering health services to all 24 provinces, 77 ODs, 73 RHs, and 1,000 HCs. The MOH operates under the mission to “ensure sector-wide equitable and quality healthcare for all people of Cambodia through targeting resources, especially to the poor and areas of greatest need.”<sup>30</sup> A large network of health infrastructure exists, but qualitative findings from a health sector support research project, “Obstacles to Deliveries by Trained Health Providers to Cambodian Rural Women” indicate that routine quality medical care is not achieved at a majority of health service locations. Results from this report indicate a widespread perception of reproductive-age women that health centers lack experienced and trained specialists, medicines, 24-hour care, clean facilities, and referrals between HCs and RHs.<sup>40</sup> The health system struggles to meet the health care needs of the population with

services and personnel not up to expectations. A minimum package of activities (MPA) is outlined for HCs, however centers are frequently under stocked with medicines and supplies or unattended due to low staff salaries. Further, it is widely reported that midwives are only present at HCs for 2-3 hours a day. The government claims to provide universal access to services, however insufficient recruitment and training, deterioration of skills, and difficulty attracting and retaining staff are major problems.<sup>30</sup> One particular shortage that directly impacts the country's ability to address maternal mortality is the shortage and poor distribution of midwives in rural areas.<sup>20</sup>



**Figure 7: Photograph of a Health Center in Prey Veng Province: Somrong Thom Health Center**

Source: Author's collection, taken July 2011

Most ODs have a single RH, with a network of HCs. Each HC is responsible for health services for 10,000 people, and each RH is responsible for 100,000-200,000 people. Considering the map below (Figure 8), the reach of health service facilities in Cambodia is striking. There are, however, limitations to the coverage of health services, not portrayed on the map. Health centers and referral hospitals are distributed along roads, in association with population density. HCs are frequently many miles away from small villages, especially those in the rural provinces of Mondolkiri, Rattanakiri, Steung Treung, and those known as the “lake people” who live on floating homes on the Tonle Sap. With no public transportation, difficult roads during flooding, and long distances to health facilities, access to regular health services is limited for many Cambodians. Figure 8 shows a concentration of maternal deaths outside of the prominent areas of health facilities in Figure 9.





**Figure 9: Distribution of Maternal Deaths (within 1 month of delivery) per 100,000 Deliveries by District, 2009**

Source: Achieving Cambodia’s Millennium Development Goals, Ministry of Planning, 2011

Fortunately, in light of the many shortcomings of the health system to serve women of reproductive age, maternal health is the primary health concern for the Ministry of Health. The stagnation of MMR over the last decade has caused the MOH to express increasing concern of the issue, especially in light of major policy steps to reduce the problem (Table 3). Overall the Cambodian government demonstrates strong will to focus on improvements in maternal health, in fact Minister of Health, Dr. Mam Bum Hengwishes to be remembered as the “Minister of Midwifery.” Further the wife of Prime Minister Hun Sen, First Lady Lok Chumteav Bun Rany Hun Sen, a midwife herself, serves as National Champion for the UN Secretary General’s Action Plan for Women’s and Children’s Health. Further the reduction of maternal deaths and improvement of maternal health are clearly addressed in Cambodia’s MDGs, National Strategic Development Plan, Health Sector Strategic Plan (HSSP2), Strategic Plan for HIV/AIDS and STI Prevention and Care in the Health Sector in Cambodia.

**Table 3: National Policies Created to Improve the Health of Mothers**

Birth Spacing Policy of 1995
Safe Motherhood National Policy and Strategies 1997
Abortion Law 1997
National Safe Motherhood 5 Year Action Plan 2001-2005
National Protocol on Maternal Death Audit 2004
National Strategy for Reproductive and Sexual Health 2006-2010
Costing of the National Strategy for Reproductive and Sexual Health 2006-2010

National Immunization Strategy, including Maternal and Neonatal Tetanus Elimination (MNTE)
Child Survival Strategy 2007-2015
Fast Track Initiative Fast Track Initiative Road Map For Reducing Maternal & Newborn Mortality 2010

Source: Information gathered from the Fast Track Initiative: Road Map for Reducing Maternal and Newborn Mortality, MOH, 2010

The MOH developed the HSSP2 2008-2015 as a guiding framework for all programs and interventions in the health sector. The plan defines areas and approaches to improving health services, access to health, particularly for Cambodia’s poor.<sup>41</sup> The HSSP2 serves as the MOH’s vision of Cambodia’s health sector focusing on capacity development and resource allocation. The priority health goals of the HSSP2 are the improvement of health of women and children and combating infectious disease.

To supplement the overall framework of health care in the country, the Minister of Health developed a plan to impact the issue of maternal mortality and to work towards a decreasing MMR.<sup>30</sup> In 2010 the “Fast Track Initiative Road Map for Reducing Maternal and Newborn Mortality” outlined effective initiatives to save the lives of women and children. The initiative concurs with globally recognized strategies for reducing MMR. Despite strong will and support, the HSSP2 and Fast Track Initiative are constrained by limited capital to finance all mechanisms of the plans and no movement to increase the salaries of midwives in the public sector, a much-needed step towards improvements in obstetric care.<sup>42</sup>

It is important to note that the activities of the health service infrastructure in Cambodia is largely funded by donor partners, as only 6% of Cambodia’s health expenditure comes from the national government. The MOH works with a large number

of international development agencies, including USAID, JICA, EU, DFID, the Australian Agency for International Development (AusAID), UNICEF, United Nation Population Fund (UNFPA) and French Development Cooperation (AFD), and the World Bank. The workforce of reproductive health is heavily implemented and funded by external parties, and great difficulty arises when trying to achieve collaboration among the NGO, development, and donor communities and the MOH. Without collaboration and an effort to work together, the process of implementing national strategies outlined by the MOH to reduce maternal mortality will be difficult on the ground level.

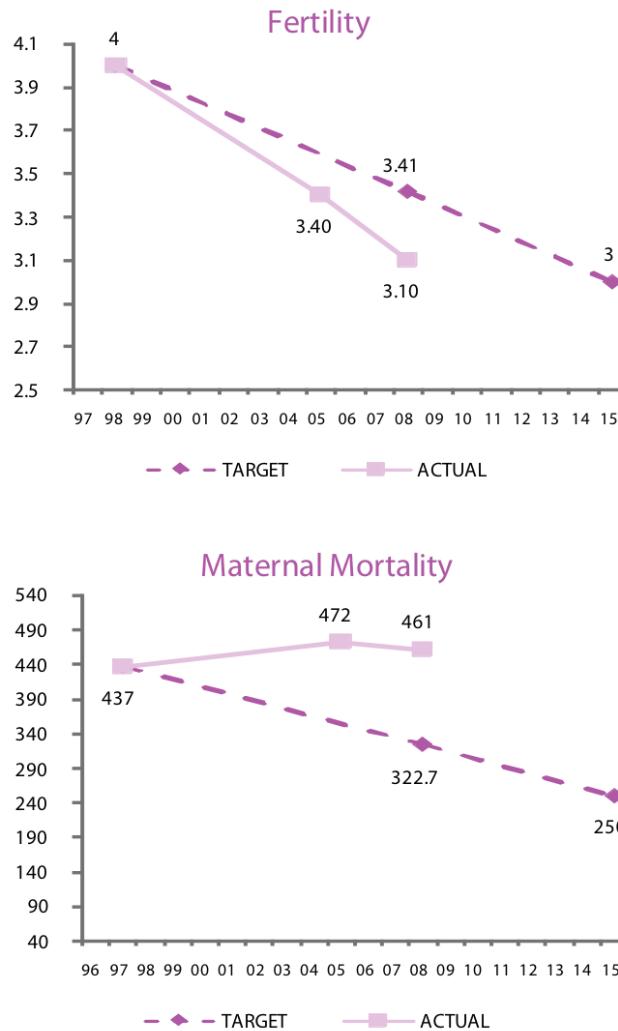
Incentives to increase staff retention and quality of work are an ongoing concern of the MOH. Beginning in 1996, user fees were instituted in HCs. This was done to increase salaries for HC staff and to increase incentives to work. In 2000, a response to subsequent financial barriers to care following the institution of fees was to begin a health equity fund (HEF) for the poor. In doing so, the Ministry of Planning (MOP) identifies communities of a certain level of poverty and issues contracts to health centers that cover those families who qualify. HEFs such as this have been demonstrated in a number of countries including the Chiranjeevi Yojana of the Gujarat State of India where upon a woman's presentation of an identity card that indicates her economic level, the fund covers service fees, transport, and food for poor people accessing health services.<sup>43</sup> In 2008, to further incentivize births in facilities, in an output-based cash initiative was created to stimulate births in facilities. Money is paid directly to HCs (\$15 per live birth), and RH (\$10 per live birth).<sup>44</sup>

## VI. MDG TARGET ASSESSMENT

### Maternal Mortality Ratio (MMR)

Quantifying and the recording the loss of life caused by obstetrical complication in a population is widely accepted as crucial to reducing MMR. The MDG of improving maternal health maintains a target of reducing the MMR by three quarters by 2015. Measurement of MMR is obfuscated by the difficulty in gathering accurate recordings of births, deaths, and circumstances surrounding deaths in developing countries. Maternal deaths are frequently misclassified as deaths due to causes such as intravascular coagulation, peritonitis, septicemia, pulmonary embolism, acute and chronic renal failure, hypovolaemic shock. Other maternal deaths may be classified as unspecified causes of death such as unattended death and respiratory arrest.<sup>3</sup>

Maternal mortality ratio is expressed as a number of maternal deaths per 100,000 live births. Lifetime risk of maternal death is derived from the total fertility rate of a country and MMR. Because MMR is calculated out of a total deaths estimate, if the number of women dying per year declines due to a decrease in fertility, the MMR will remain the same, if the risk of maternal death is unchanged.<sup>25</sup> Cambodia's total fertility rate (TFR) declined from 4.0 births per woman in 2000 to 3.0 in 2010, achieving the CMDG goal for that indicator. Fertility rates are higher among rural, poor, and less educated women, however on average a woman will have 3 children in her lifetime. The figure below demonstrates Cambodia's conflicting trend of decreasing total fertility rate and a recent high level of maternal mortality.



**Figure 10: Trends in Cambodia’s Fertility and Maternal Mortality Rates**

Source: Achieving Cambodia’s Millennium Development Goals, Ministry of Planning, 2011

Maternal mortality data globally is collected by a variety of methods, depending on the country (Table X). Cambodia uses population-based survey, national census, and national surveillance system, and a voluntary reporting system to generate estimate of maternal death. Estimates of Cambodia’s maternal mortality ratio have been expressed in different ways, a 2008 UN estimate puts the MMR at 290, however the 2000 and 2005 Cambodian Demographic and Health Survey estimates were 437 and 472 respectively. The 2008 National Cambodian Census also echoes these higher estimates. Just as this

paper was to be submitted the 2010 MMR became available from the CDHS, considered the gold standard in maternal health estimates in Cambodia, and revealed a staggeringly decreased MMR of 206.

**Table 4: Global Methods of Maternal Death Data Collection**

Civil registration systems	<i>Ideally maternal mortality data should be obtained this way.</i> -Involves the routine registration of births and deaths
Household surveys	<i>Are considered an alternative to civil registration (i.e. DHS)</i> -Identifies pregnancy-related deaths <sup>2</sup> not maternal deaths -Surveys require large sample sizes to provide statistically reliable estimates (expensive) -Estimates subject to wide confidence intervals, making it difficult to monitor change over time
Sisterhoods methods <sup>3</sup>	<i>Interviews of a representative sample about the survival of all adult sisters</i> (determines # of ever-married, living, deceased, deceased during pregnancy, delivery) -Identifies pregnancy-related deaths not maternal deaths -Provides retrospective estimate, referring to a period 5 years prior to survey -Wide confidence intervals
Reproductive-age mortality studies (RAMOS)	Identifies and investigates the deaths of all women of reproductive age in a defined area or population. Uses multiple sources of data: interviews of family members, vital registration, health facility records, burial records, and traditional birth attendants. -Inadequate identification of deaths could result in underreporting -Provides relatively complete estimates of MMR -Complicated, time consuming, and expensive
Verbal autopsy	Cause of death is assigned by interview of family members, where medical certification is not available. -Misclassification of deaths among family members in

<sup>2</sup> A pregnancy-related death is defined by the WHO as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the cause of death.

<sup>3</sup> DHS utilizes the sisterhood method, but requires a large sample size

	common -May not identify maternal deaths occurring in early pregnancy -Accuracy of estimate depends on family members' knowledge, skill of interviewer, and diagnosis
Census	A national census that adds a number of questions regarding maternal deaths can produce MM estimates -eliminates sampling errors -recent estimates, but at 10 year intervals -results can be adjusted for distortions of age structures, and completeness of births and deaths declared in census

Adapted from WHO Trends in Maternal Mortality 1998 to 2008

In 2011 Cambodia instituted a civil registration system to track births and deaths; it is possible that the creation of this system will in fact make the MMR increase as the mechanisms of reporting maternal deaths are improved. Further complicating accurate data collection of maternal deaths is the division of the surveillance systems collecting maternal mortality data. There are two parties collecting MMR data, and according to key informants, they do not work together to verify reports. The National Maternal and Child Health Center (NMCHC) is primarily concerned with the investigations causes of maternal deaths. They work to identify methods of improvements, and broader implications of maternal death on the health system.

Separately, the Department of Planning and Health Information (DPHI) receives data from HCs and RHs, and is concerned with counting and general surveillance of disease, including maternal death.<sup>45</sup> This data is compiled into a Health Information System (HIS). Further, the Ministry of Interior (MOI) has a system of maternal death collection that is obtained from the commune level, and voluntary reports from the family. Commune councils are required to report on health and education indicators

including the number of pregnant women, ANC service, delivery, health personnel, TBA, facility and maternal deaths. These maternal death reports supplement the reports coming from HCs where deaths are only reported if occurring in the facility, however according to informants the collaboration of the Ministry of the Interior and Ministry of Planning and Health Information is not forthcoming. Some reports claim that data is gathered from weekly reports and cross-checked with the HIS data received from HCs and RHs, however in order to move towards a true national surveillance of maternal deaths, these institutions must come together and agree on the best methods of data gathering. According to Dr. Jerker Liljestrand, recent attempts to bring these two parties together were unsuccessful.

On top of systematic struggles to collect, share, and aggregate data, frequently maternal deaths are simply not reported. According to informants, in Cambodia many maternal deaths are “swept under the carpet,” due to long distances women must travel to HCs and RHs, often times a woman may be dead upon arrival, in which case the facility is not likely to report the death. Deaths that occur after a referral from one facility to another, or a death occurring in a facility after labor in another location (i.e. home) are oftentimes not reported.

In 2004 a National Committee for Maternal Death Audit was created in Cambodia, with officials from the National Reproductive Health Program (NRHP), NMCHC, and DPHI. This action charged the Provincial Health Departments (PHD) with conducting formal maternal death audits and looking into the implications of each case. In 2005 Maternal Audit Committees worked in 18 (of 24) provinces. Currently the country is considering how best to analyze, interpret, and use this information. A report

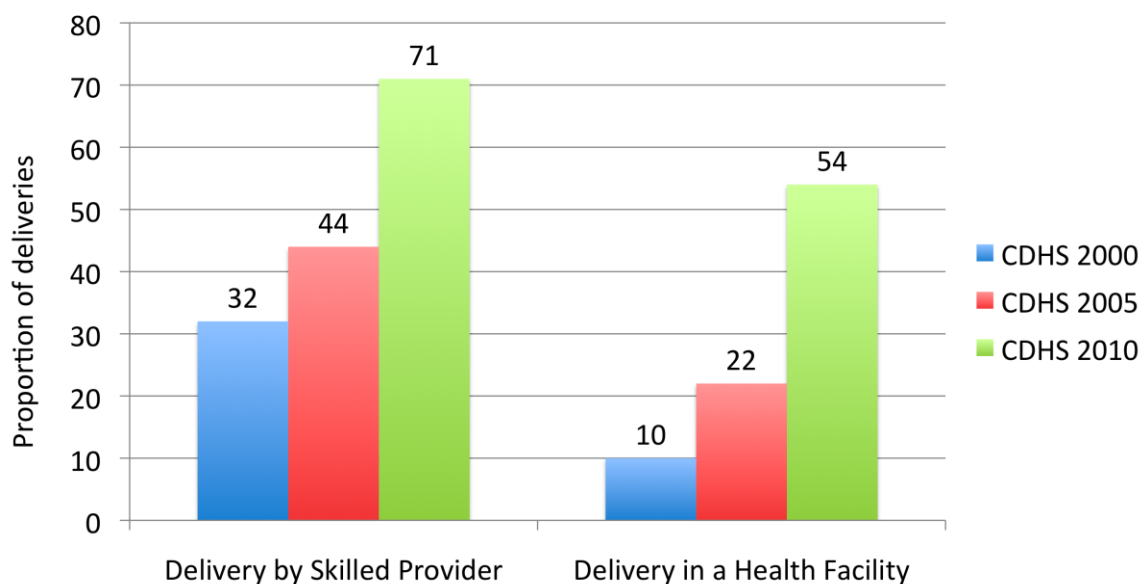


of maternal audits in one major NGO catchment area (RACHA) suggests that 50% of maternal deaths reach the maternal death audit committees, and as low as 10% in some regions.<sup>46</sup> In the recommendations section of this report, a case of community maternal death reporting that actually caused a decrease in maternal deaths is discussed.

## Proportion of Births Attended by Skilled Health Personnel

Delivery attended by skilled health personnel or skilled birth attendant (SBA) is critical to the management of pregnancy-related complications, and is accepted widely as an effective approach to preventing maternal mortality.<sup>47</sup> There is global agreement that the proportion of deliveries with an SBA is a proxy indicator towards progress of achieving MDG5.<sup>48</sup> The Cambodian MOH defines birth attendants as primary or secondary midwives, primary or secondary nurses trained for 4 months in birth attendance, and doctors/physicians with obstetrics training. In the last decade the proportion of Cambodian women that deliver with skilled health personnel, or skilled birth attendants (SBA) has increased dramatically from 44% in 2005 to 71% in 2010, likely because of schemes initiated by the MOH to incentivize midwives to deliver in HCs, as well as the health equity funds that remove the financial barrier to care.<sup>10</sup> Because Cambodia achieved its MDG goal for delivery with SBA, the target was increased from 70% in 2010 to 80% by 2015. There is reason to believe that Cambodia will indeed meet its new target. This incredible increase in the use of skilled birth attendants in a short time is occurring alongside the increase of delivery in health facility increases (Figure 11). Cambodia has also seen an unprecedented increase in the uptake of delivery in health facilities. The 2010 CDHS showed that in just 10 years, deliveries in

facilities have increased from 10% to 54%. In 2010, on average woman in Cambodia can access an HC or RH in about 6 hours.<sup>45</sup> The linkages between ANC, delivery by skilled health personnel, and delivery in a facility are clear. A 2006 population-based survey study (n=980) found that Cambodian women who had previous contact with a skilled attendant through antenatal care were more likely to deliver in a facility.<sup>49</sup>



**Figure 11: Trends in Maternal Health for Delivery by Provider and in Health Facility**

Source: Data from the CDHS 2000, 2005, 2010

Despite overall improvements, there is the same urban/rural divide for skilled attendance and facility births seen in the maternal mortality rates of urban versus rural areas. In urban areas 95% of women give birth with an SBA, and in rural areas only 67% of women give birth with a SBA, with some areas such as Preah Vihear and Steung Treng as low as 28%.<sup>10</sup> Barriers to SBA include a shortage of midwives, limited working

hours of health centers, cost of care and transport, distance, and desire to practice traditional beliefs at home with traditional birth attendants (TBA).<sup>13</sup>

A recent study by Cambodia's National Reproductive Health Program found that despite high demand of skilled birth attendance, access continues to be constrained by cost and distance to facility. A continuing trend is observed among young women with higher incomes using SBAs more frequently and older and poorer women using traditional birth attendants because they are more familiar and closer to home.<sup>20</sup> Other reports show that younger women are increasingly turning from traditional birth attendants (TBA) as they are seen as "unsafe," however an initiative by the Midwife-TBA Alliance has identified TBAs as a critical players in the community's role in saving mother's lives. Though there is sufficient evidence to suggest that it is not effective to solely train TBAs in interventions aimed at saving mothers lives, they can be encouraged to refer pregnant women to health centers, especially women with complications; assist midwives in deliveries; and educate women in the community.<sup>25,20</sup>

According to the WHO there are only 7.9 nurses/midwives per 10,000 in Cambodia, compared to the Southeast Asia regional average of 20.3.<sup>36</sup> In 2005 the shortage was estimated to be around 1,287 midwives. For 2011, The MOH estimates that there will 851 midwives graduating from MOH institutions, which suggests that the country is closing its gap on the shortage of 1,287. However despite the existence of the Cambodian Midwives Association and the Cambodian Midwives Council, there is no compulsory registration of midwives making an assessment of attrition rates difficult.<sup>50</sup> Further, it is not law that the country's large number of private sector clinics report their numbers of midwives or staff, making it difficult to estimate the number of midwives

going to work in this better-paid setting.<sup>31</sup> In spite of this the MOH Personnel Department reports that in 2010 all health centers were staffed with a primary midwife and about 53% with a secondary midwife, and promises a large number of graduates in 2011.<sup>42</sup> In 2006 there were nearly 4,000 midwives, with only 2,626 working in the public sector.

Midwives in the public sector struggle to maintain their position in HCs because of low wages, some as low as \$40 per month in a country where the average wage is around \$150 per month. It is widely reported that midwives spend only 3 to 4 hours a day in the health center, using the other half of the day to perform private house-calls, sell drugs from home, or work other jobs.<sup>44</sup> In a survey by RHAC, women reported going to HCs to deliver children but found empty HCs, most notably in the afternoon and nighttime hours. The widespread cellular service in the country has made it possible for women to call midwives when they are at an unattended HC, or in need at home.

To effectively address the problem of unattended health centers, it cannot be expected that recently trained graduates will desire to take jobs with so little pay and often times in remote areas. The MOH has made great steps forward toward building a cadre of trained midwives, however the sustainability of the profession is in question as long as wages for jobs in public sector clinics are not raised. Currently the MOH has not made steps to increasing base salaries for midwives who invest time and money into entering the profession. The MOH has, however implemented an output based incentive scheme, where midwives receive \$15 for each delivery in an HC, and \$10 for each delivery in an RH. Money is divided among staff attending births. The scheme has incentivized midwives to encourage women in their villages to deliver by skilled health personnel and in health centers.<sup>44</sup>

A new 3-year direct entry Associate Degree of Midwifery has begun, and preparation for the implementation of a Bachelor's degree is underway. Midwifery is highly respected in communities, but the further professionalization of the skills of midwifery is vital to help achieve economic gain for practitioners. The MOH has recognized this and implemented several in-service trainings for current midwives. AMTSL is the most critical component to skilled birth care, and is included in pre-service and in-service training, however a midwifery review of 2006 performed by the MOH found that large proportions of midwives were not confident in their skills in AMTSL (50%) or eclampsia (80%).<sup>51</sup> One study in the biggest public delivery units in Cambodia found that only AMTSL was correctly practiced only 17.1% of the time, magnesium sulfate was used sometimes to control eclampsia but not in doses recommended by WHO, and that other practices during the intrapartum period were not performed correctly, or were not evidence-based.<sup>31</sup>

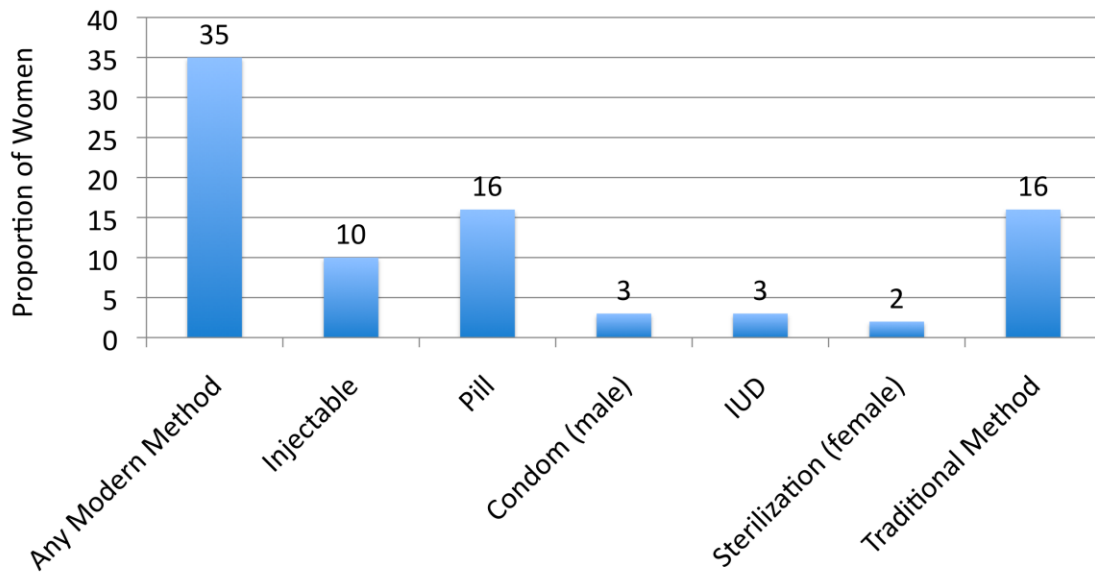
Overall the government is focused on increasing the number of midwives as a strategy to reduce maternal deaths, however with an increase in trained midwives, the sustainability of the workforce by improving wages, and ensuring quality training must also be a priority. While positive steps have been made in a woman's choice to deliver with a skilled birth attendant, Cambodia must now focus on improving the quality of training, supervision, and salary for midwives to encourage them to work in the public sector.

### Proportion of Women Using Birth Spacing Methods

Family planning products and services first became available in Cambodia in 1991 beginning with the condom and pill, reversible methods, generally the first to be

adopted in countries beginning a family planning program. In 1994 the Cambodian government advocated for lengthening the space between births and with the help of the United Nations Population Fund (UNFPA) began a program that provided family planning services at health centers, family planning education, and training of public health staff. After 1996 long-term methods of family planning such as tubal ligation, vasectomy, and IUDs also became available.<sup>52</sup> In 1999 the country initiated a Community Based Distribution of Contraceptives Program (CBD) that works with existing NGO initiatives, particularly Marie Stopes International and Population Services International, to distribute contraceptives throughout the country.<sup>20</sup> In 2006 the National Reproductive Health Program planned to introduce the Norplant 1-rod, the female condom, and emergency contraception. Today the most popular form of family planning is the pill, followed by traditional methods, and injectables (Figure 12).

Today the MOH has expanded services offered in the public sector and the variety of family planning methods available. In 2010 the proportion of women using any family planning method is 35%, up from 27% in 2005 and 19% in 2000. It appears unlikely that Cambodia will reach the 2015 CMDG goal of 60% of women using birth spacing methods. One significant improvement, however, is that efforts to increase family planning use in rural areas nearly doubled the proportion of rural women using modern methods of family planning from 27% in 2005 to 36% in 2010.



**Figure 12: Use of Family Planning Methods in 2010**

Source: CDHS 2010

\*Percentages of currently married women age 15-49

Though a decrease in fertility from an average of 6 children during Pol Pot times to 3 per woman in 2010 has occurred in Cambodia, the use and availability of family planning continues to lag below what it should be to be on track for the 2015 MDG. It is unclear how this trend has occurred, and suggested that women may be using traditional methods or withdrawal to avoid pregnancies. Despite the achievement of CMDG for fertility, still 50% of maternal deaths in Cambodia occur in women over 35 who have a number of previous births, signifying a high rate of unmet family planning needs.

It is well recognized that investment in family planning is a highly cost effective approach for the reduction of maternal deaths.<sup>37</sup> Cambodia, despite its dramatic improvement in attended facility births, has much work to do to decrease the unmet need for family planning. A MOP report on Cambodia’s MDGs purports that family planning has the potential to reduce maternal mortality by up to 30% by reducing the need for

unintended pregnancies and unsafe abortions.<sup>9</sup> Despite this finding from a government department, Dr. Chivorn Var, Associate Director of the Reproductive Health Association of Cambodia (RHAC) found that key officials in the Cambodian Royal Government do not recognize the direct relationship between family planning and maternal health. Dr. Var interviewed 10 parliament members and 6 public health department decision-makers regarding maternal health needs in their country. Only 1 out of the 16 interviewed linked family planning and safe motherhood together. Instead policy makers focused heavily on intrapartum interventions.<sup>44</sup>

Although plans for expanding family planning coverage and the variety of methods available are underway, an evaluation of Cambodian family planning programs by USAID found that low usage rates abound even in areas where methods are available. This finding suggests that there must be reasons beyond the availability or access preventing uptake of this maternal health service. One study suggests that Cambodian women's choice to use family planning is heavily influenced by parity and social network acceptance of the methods. The study found that women who believed their husbands had a positive attitude toward contraception or who knew peers who used contraception were more likely to choose to use a method. Women who were told by elders not to use it, were nervous to talk with their husbands or had husbands who made final decisions about contraception were less likely to use it.<sup>53</sup> A qualitative in Kampong Thom province supports these findings, reporting that women cited friends and neighbors as an important influence on seeking family planning services and which method was chosen.<sup>52</sup> The study also suggests that side effects leading to discontinuation, and fear among older women of reproductive age felt that that contraception would cause health problems for them.<sup>52</sup>



Findings from this study suggests that there is a need to educate husbands, wives, and community members on the importance of family planning, as well as adopt an approach appropriate for older women who have fear-based biases towards using contraception.

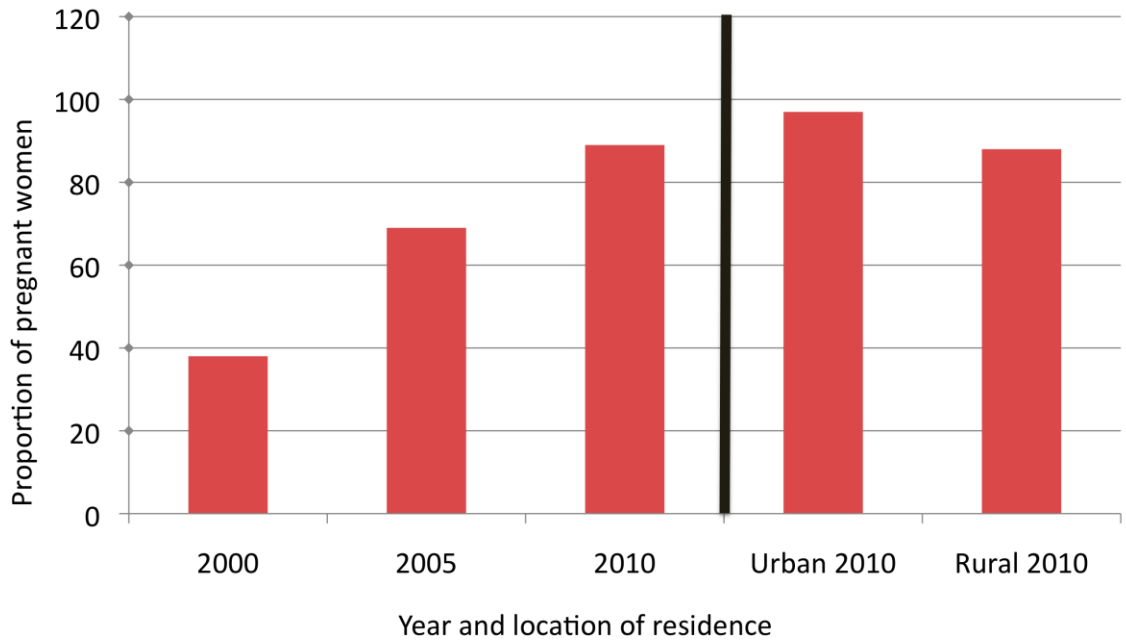
Since a majority of maternal deaths occur in women of older reproductive age, there must be a move toward promoting strategies to increase their usage of family planning. Dr. Liljestrand of University Research Group (URC) recently proposed to the National Maternal and Child Health Center (NMCHC) an adoption of post-partum sterilization, or tubal ligation, which has been shown to be an effective means of preventing unwanted pregnancy in older women.<sup>54</sup> It is unclear whether the MOH will adopt this approach to curbing unwanted pregnancies in older women. Current strategies in Cambodia focus on the younger demographic of reproductive age women given their large demographic share, however new approaches should especially address the beliefs of older women that contraceptives cause a loss of “strength” and how to deal with other side effects resulting from contraceptive use.

### Proportion of Women Receiving 2 or More ANC Visits with SBA

As one of the main indicators included in the Millennium Development goals, routine antenatal care is widely accepted as a key component of child and maternal health. Antenatal care is defined by the WHO as “screening for health and socioeconomic conditions likely to increase the possibility of specific adverse pregnancy outcomes, providing therapeutic interventions known to be effective; and educating pregnant women about planning for safe birth, emergencies during pregnancy and how to deal with them.” The WHO recommends that a minimum of 4 antenatal care visits prior to delivery

is instrumental in preventing the direct causes of maternal death such as: hemorrhage, infection, obstructed labor, eclampsia, preterm birth, anemia, and unsafe abortion. Further, approximately 20% of <5 childhood diseases are directly related to poor maternal health, most notably related to a lack of access to skilled birth attendants and ANC.<sup>55</sup>

The 2010 Cambodian Demographic Health Survey, found a drastic increase in women's ANC visits (2 or more) during their pregnancies than ever before, up from 38% in 2000, 69% in 2005, to 89% in 2010, though this statistic does not measure whether women receive 4 visits. The CMDG for 2015 is 90%, requiring only an increase in 1% in the next 5 years to reach the goal. Most likely the difference will need to be made in rural Cambodia, where the percentage is lowest. Still, however 88% of rural women are receiving ANC (Figure 13). 98% of women with secondary education and 77% of women with no education receive ANC. Because of Cambodia's high prevalence of anemia in women, the high rate of ANC visits in the country where anemia may be monitored and reduced should be recognized as a great achievement.



**Figure 13: Proportion of Women Receiving 2 or More ANC Visits by Year and Residence**

Source: Data from CDHS 2010

Despite increasing numbers of women reporting access to ANC, the MMR has changed very little over the last 10 years concurring with other research that shows accessing ANC alone is not enough to reduce maternal mortality on its own, and that ANC generally works more to protect the health of the baby than the pregnant mother. It is generally recognized that ANC alone cannot prevent maternal deaths, and that a focus should increasingly be directed toward detecting complications as well as care for the baby.<sup>25</sup>

## VII. WHAT CAN BE LEARNED FROM OTHER COUNTRIES

In the late 19<sup>th</sup> and early 20<sup>th</sup> century most industrializing countries had MMRs higher than many developing countries today, most above 600 per 100,000. In Sweden, England, Wales, and the US data is available to see a reduction over time as governments created initiatives to address maternal death.<sup>36</sup> Looking back, medical historians deduce that maternal mortality reduction in the industrializing world was hindered by the willingness of decision-makers to take up their responsibility, by making modern obstetrical care available to the population, and the extent to which professionals in maternal health were held accountable for addressing maternal health effectively.<sup>36</sup> A study analyzing conditions under which the industrialized world has reduced maternal mortality identified several important preconditions: early awareness of the magnitude of the problem, recognition that most maternal deaths are avoidable, and the mobilization of professionals and the community.<sup>36</sup>

In Sweden, success in reducing maternal deaths was initially attributed to the government's recognition that maternal mortality was a national problem and was attributed to a shortage of midwives. To address the problem public health authorities developed a policy of training enough midwives to ensure universal skilled birth attendance. As a result the number of attended births increased from 40% in 1861 to 78% in 1900. In support, local public health department doctors, who were accountable for official reports, supervised midwives. It was a long and slow process, however results reflected the strong political will of the country and by the 20<sup>th</sup> century Sweden achieved the lowest MMR in Europe, at 228 per 100,000 live births.

Similar safe motherhood policies were adopted by Norway, the Netherlands and, Denmark who were able to reduce their MMRs to less than 300. In England and Wales maternal mortality remained high longer than in Scandinavian countries, however when England created the Midwives Act of 1902, high prevalence of delivery by untrained birth attendants was soon replaced by delivery by trained and certified midwives. As has been shown critical in many country cases, the profession of midwifery became regulated, and training for midwives mandatory.<sup>36</sup>

The reductions in MMR in these now developed countries, before and during their periods of industrialization, demonstrate that MMR reduction can be achieved without first achieving high levels of economic development. It should be noted though, that such dramatic falls in MMR are likely influenced by a decrease in the prevalence of pathogens linked with puerperal sepsis or “childbed fever,” caused by doctors themselves. Interestingly in England at the end of the 19<sup>th</sup> century, researchers believe that women of lower social class were not disadvantaged in experiencing poorer birth outcomes, that in fact maternal mortality rates tended to be higher among upper classes than lower social classes, due to their likelihood of delivering with physicians who commonly did not wash their hands, spreading the bacterial infection.<sup>56</sup> Regardless of this observed association, there is substantial evidence from contemporary developing countries that the economic vitality of a country does not predetermine its ability to improve maternal health outcomes and save women’s lives.

Evaluations from countries such as Tunisia, Sri Lanka, Kerala State in India, Cuba, and the former Soviet Union showed that maternal mortality can be reduced by implementing a combination of interventions including education for all, universal access

to basic health services and nutrition before during and after childbirth, attendance at birth skilled birth attendants, and access to emergency obstetric care.<sup>4</sup> In Sri Lanka, for instance the MMR dropped from 555/100,000 in the 1960s to 30/100,000 in the 1990s. It has been shown in many cases that both gross national product or average annual per capita income do not predict the ability of a country to reduce its MMR.<sup>57</sup> For example Sri Lanka and Ivory Coast have similar GNPs, but in the 1990s Ivory Coast's MMR was 830 while Sri Lanka had succeeded in reducing its MMR to 30.

Sri Lanka's sharp reduction in MMR is attributed to a combination of factors including investments in midwifery training including control and supervision of the profession. To increase access to care the country invested sharply in referral hospitals and providing maternal care free of charge for poor women.<sup>26</sup> A similar case study, Malaysia's MMR was cut in half in a 7-year period between 1950-1957. Reasons for this quick reduction include professionalizing the field of midwifery, establishing a birth and death registration, developing maternal health services for urban areas and then focusing those efforts on the rural poor who experienced the worst birth outcomes. An extensive rural health service network was established, with a focus on improved quality of care with referrals, strengthening community involvement.<sup>57</sup> With similar government focus as Sri Lanka and Malaysia, Thailand too substantially decreased its MMR from over 400 per 100,000 live births in 1960 to an MMR of 50 in 1984.<sup>26</sup>

## VIII. RECOMMENDATIONS

### Increase Community Engagement

Cambodia is in need of increased community recognition of and engagement in maternal health issues. The achievement of improved health outcomes for women depends on the participation of individuals, families, and communities.<sup>4</sup> The Alma-Ata conference of 1978 first made the recommendation that successful health programs must strive for “participation and ultimately self-reliance, with individuals, families, and communities assuming more responsibility for their own health.”<sup>58</sup> Communities must be empowered to recognize their right to quality maternal care, and in fact demand it. Such demand from the community level will help to ensure long-term accountability of the care provided by HCs and RHs, as well as recognition of the importance of health staff roles. Specifically groups most commonly excluded from the decision-making processes, women and the rural poor, must be involved. Long-term success can be achieved through health alliances, bringing the focus away from the individual and encouraging community responsibility for action.<sup>59</sup>

Some model strategies from Bolivia, Nepal, and India used women’s groups to bring awareness to communities of key maternal health problems as well as develop local strategies to address them. The Warmi Project in Bolivia of the early 1990’s was one of the first to use a woman’s group intervention model and has been replicated in a number of countries. The intervention involved the initiation of women’s groups, developing women’s skills and ability to recognize pregnancy danger signs, developing solutions to problems identified, and training community members in safe birthing techniques. Results from the study in Bolivia yielded a decrease in perinatal mortality from 117 to 44

comparing study groups to controls over a four-year period.<sup>58</sup>

A MIRA study (Mother and Infant Research Activities) in the Makwanpur district of Nepal used a similar participatory approach drawing from the Warmi model. Ten women's group meetings were conducted over a 1-year period in study clusters. The 10 meetings had planned topics and facilitators trained to guide the meeting. The topics covered reasons why mothers and newborns die in child birth, how women perceived maternal health problems and their frequencies in the community, prioritization of problems effecting women, strategies to address problems, ways to involve other community members, preparations for community meetings with other members, and ultimately holding a meeting with community members to discuss the problems. In this study the MMR was assessed after a two-year period and found that the MMR in the intervention clusters was 69 compared to 341 in control clusters.<sup>60</sup> Further, women in the study groups were receiving more ANC, higher frequency of births in facilities, skilled birth attendants at their side, and hygienic care.

Though at this time studies of scaling up of these programs have not been assessed, many countries have a community health work network established to facilitate the adoption of these programs at a national level. Cambodia has a network of village health volunteers in place called the Village Health Support Group (VHSG). Established by HSSP2, each HC is required to have a VHSG, 2 per village, with 20 households served per volunteer. VHSGs are responsible for the feedback of health problems to HCs, and participate in community meetings at HCs every two months. Thus structure is in place for community health workers, but there is little support to expand their role and competencies related to maternal care. NGO's such as RHAC have increased the role of



VHSGs, by equipping them to provide training to villagers in birth preparedness education, and capitalizing on their reach in the community by having them deliver educational messages to pregnant women in communities, including delivering free ANC, (prevention of mother to child transmission) PMTCT, delivery, and (post-natal care) PNC vouchers. The RGC as well as NGOs working in Cambodia's maternal health sector should consider low-cost participatory meetings to provide community members opportunities to discuss pregnancy, as well as family planning issues, and identify solutions to problems. Further, an understanding of services offered by HCs for maternal health care should be emphasized in community meetings, empowering members to access and demand maternal care.

With greater collaboration between HCs and commune councils, potential funds may be available to support the increased role of VHSGs on a larger scale. Beginning in August 2010 the Ministry of the Interior has allocated \$1,000 each year to commune councils. Commune councils must create a budget plan which addresses the guidelines established for the use of funds. One of the five activity areas that funds may be used for are maternal and newborn health. A recommendation is that this money be used in large proportion to support the VHSGs in trainings and potential commission for maternal and neonatal health services; examples including birth preparedness training, referral, family planning, facilitating women's groups or community meetings, and perhaps most importantly be responsible for maternal death audits for reporting to HCs. Right now VHSGs are under HC supervision, but in order to increase their role there should be a push to move them under commune councils where they can receive funding.

## Improve the Interaction of Health Centers, Referral Hospitals, and Provincial Health Departments

Similar to the need for increased collaboration between commune councils and HCs, the MOH would benefit its existing public health activities by encouraging HCs, RHs, and PHDs to work more closely together. There is a need for the MOH to organize a supervisory system whereby HCs are an extension of RHs, providing referrals and sharing information on patients from their areas. HCs currently are entities much detached from the RH and provincial health departments network, and are very much left to fend for themselves. To improve the quality of care for women and increase the supervision of HC staff, staff from RH should take an active role in training and monitoring of HC staff.

An increase in collaboration between HCs, RHs, and PHDs could effectively improve the data collection effort around maternal health issues, and vital health statistics. An example from the Tamil Nadu case illustrates that mandating the communication between all private and public health centers with a central authority in that State, effectively improved the accuracy and reach of maternal death data collection. It was mandated that all maternal deaths, regardless of their location, were reported within 24 hours of occurrence to the state's Commissioner of Maternal and Child Health (MCH). Further, there was a call for the incorporation of community-based maternal reviews, or maternal autopsies for each and every death reported. The system was responsible for an initial nearly 3x increase in reported maternal deaths, from 640 in 1994 to 1600 in 2000, and leveling off to 1100 in 2005.

## Need for Improvement of Normal Birthing Care

It is common in Cambodia for HCs and RHs to be unattended most of the day and most certainly at nighttime. Women frequently telephone midwives to alert them that they are in need, a system that may not work for women with no prior encounter with the midwife to learn of this arrangement. The Demographic Health Survey (2005) reports that the major reasons cited for not delivering in a health facility, is belief that there will be no staff there.<sup>21</sup>

Tamil Nadu, the seventh most populous state of India, has implemented a set of strategies to solve this problem which Cambodia can draw from. Tamil Nadu recognized a similar dilemma of many health facilities left unattended, particularly at night. They piloted a scheme of appointing and contracting 3 nurses to provide 24-hour delivery services in each of 90 primary health centers in remote regions of the state. Similar to the scheme currently in place in Cambodia where HCs receive \$15 and RH receive \$10 for every delivery, in Tamil Nadu nurses were paid per delivery on top of an elevated monthly wage. The performance of the scheme was assessed and found that on average nurses conducted 15.5 deliveries per month compared to 4.2 deliveries per month in areas without the scheme. Likewise the scheme increased facility births, and a shift was observed in deliveries in the private sector to the public sector.<sup>61</sup>

Cambodia would benefit by borrowing from this strategy, and assuring a minimum number of midwives are appointed at HCs on a 24-hour schedule. Midwives given this appointment can be incentivized by increased base salaries and given increased supervision by ODs and PHDs. Recognizing Cambodia's strong efforts to grow its midwifery workforce, the availability of trained midwives may not be the problem, rather

the entry of midwives to the public sector and fidelity of midwives to their stations. The Royal Government of Cambodia must empower the role of midwives by making fiscal decisions that appropriate funds to ensure their presence at HCs for intervals that represent 24-hour days.

Cambodia's availability of emergency obstetrical care (EmONC) is lacking. The UN indicators of an appropriate ratio of EmONC facility to population is 5 basic EmONC facilities including 1 Comprehensive EmONC facility for every 500,000 people.<sup>62</sup> For Cambodia's population of 13.4 million, at least 29 Comprehensive EmONC and 101 Basic EmONC facilities should be distributed throughout the country. In 2008, early results from a national assessment of EmONC facilities in the country found that of 307 HCs and RHs assessed, only 8% offered all functions of a Comprehensive EmONC facility, and only 6% offered signal functions of a Basic EmONC facility. Not only are the number of EmONCs short of the appropriate number to serve the population, EmONC facilities that do exist are poorly distributed and not serving enough women expected to have complications. Very few HCs (0%) and lower level RHs (29%) were found to provide signal functions of an EmONC facility.

Only 11.6% of women in Cambodia give birth in facilities that do offer EmONC, whereas the accepted international level is 15%. Only 13% of the estimated women to have complications are being treated in the 44 identified EmONC facilities. A national initiative to scale-up the EmONC services in the country was created for implementation in 2010-2014 with plans to upgrade 139 facilities and staffing to provide EmONC health workers and a focus on providing 24-hour emergency services. Current plans are likely to

yield positive results in improving the quality of services for women experiencing pregnancy complications.

On another note, most pregnancies will not advance to a stage of complication, which begs the question, how is the quality of normal birthing practices in Cambodia? With the incredible increase in facility births over the past decade, the Royal Government of Cambodia must also focus on strengthening the quality of normal birth care. The Government must ensure that as HCs become more and more crowded with expecting mothers, the HCs medical equipment, space, and number of staff increase to match demand. Women who do arrive at an HC to deliver must not be compromised by unhygienic practices, or lack of trained staff, space and equipment. An expansion of current HCs would be appropriate as well as the building and staffing of new HCs. A recent study by RHAC and Reproductive and Child Health Alliance (RACHA) report that women are reluctant to come to HCs for delivery, stay in HCs after delivery for the recommended amount of time, because of crowding, a lack of beds, rooms, and accommodations for family. Women frequently report to the above NGOs who are very active in community settings, that HCs frequently do not have running water, that electricity is not a given, and that bathrooms are nonfunctional. In order to avoid iatrogenic causes of maternal morbidity and mortality, quality assurance of average HCs especially in rural areas must be assessed and a national strategy must be put in place to ensure the safety of normal deliveries.

**Need for an Increased Focus on Family Planning and Availability of Safe Abortion**

As mentioned previously, Cambodia has a high unmet need for family planning, defined as the percentage of married women who want to space births or do not want more children but who are not using contraception. The CDHS 2010 reveals that 17% of Cambodia women have an unmet need for family planning, highest rural areas and among poor and less educated women. To seriously derail the current rate of MMR, Cambodia has an immediate need for increased government support for family planning methods. The Guttmacher Institute, based on recent 2008 maternal mortality data from the Institute for Health Metrics and Evaluation, suggests that a global doubling of investment in family planning expenditures in South Central and Southeast Asia could result in a decrease from 1.63 million to 780,000 unintended pregnancies and a 75% decrease in maternal deaths.<sup>63</sup> This doubled investment is considered to be what is required to fully meet the developing world's need for family planning.

The Royal Government of Cambodia must work to encourage the use of family planning methods by making national statements and actions to further endorse birth spacing methods. Though family planning is currently part of many of the MOH Maternal and Child Health policies, stronger support is required to reduce the number of women of older reproductive age dying during childbirth. Further, increased research must be performed to identify specific reasons women of older reproductive age are not using birth spacing methods, and tailor strategies to address these barriers.

Unsafe abortion is a leading cause of maternal death worldwide with some 68,000 women dying annually and attributing 16% of global maternal deaths.<sup>64</sup> Global estimates report that as many as 50% of pregnancies are unplanned, and that around 25% of pregnancies were undesired.<sup>4</sup> It is estimated that 6% of maternal deaths in Cambodia are

caused by unsafe abortions. The current prevalence of unsafe abortion is unknown due to underreporting of abortion and lack of data. The issue will be addressed by the CDHS 2010, but for now the CDHS 2005 reported that approximately 8% of women age 15-49 reported having had one or more abortions in their lifetime. Women were more likely to abort as they got older and had more children. 45% of abortions took place at home, about the same proportion of abortions in health facilities (48%). Of the reported abortions, 7% of women received help from a (TBA) or Kru Khmer, and 8% did not receive help from anyone.<sup>21</sup>

Cambodia's abortion law ensures the right of the woman to abortion by trained medical practitioner in a health facility up until 12 weeks of pregnancy.<sup>21</sup> While Cambodia does indeed have one of the most progressive abortion policies in the region, leaders have adopted a so-called pro-natalist position similar to that of the United States, which is likely due to funding restrictions on any program that includes an abortion component.<sup>45</sup> Though Cambodia has the two ingredients required to prevent unsafe abortion: availability of modern family planning methods and open abortion laws, leaders do not fully endorse a woman's right to access safe abortion. Dr. Liljestrand describes an unspoken disapproval of abortion services from the Cambodian government. The Minister's wife, herself a nurse who has taken up the fight against maternal mortality, refuses to discuss abortion publically.

This stance against abortion is reflected in findings from an Abortion Service Needs Assessment in 2007 that found only 47% of hospitals and 15% of health centers provide abortions, with 40% of service providers in hospitals believing that abortion is illegal.<sup>52</sup> Others report a belief that abortion is widely unavailable in health centers and in

most referral hospitals.<sup>45</sup> One qualitative study reported that safe abortions were provided in private clinics and at a high cost, making them unavailable for poor women. The same study found that women who did go to HCs for abortion frequently found providers who refused to perform the service.<sup>52</sup> Thus while the right to safe abortion is encoded in law, safe services for abortion are not available or accepted by society, jeopardizing women who result to seeking unsafe methods to terminate pregnancies.



## IX. CONCLUSIONS

A countdown to 2015 report published in the Lancet found from a review of 66 maternal death priority countries, that globally the necessary ingredients are in place to accelerate progress towards achievement of MDG5 for maternal health. Namely, there is an international consensus on the priority interventions; there are effective programs in place; there is an increased availability of data for decision-making; and there is strong donor and country commitment.<sup>37</sup> Further, new technologies are constantly being developed for reducing maternal deaths in developing countries, for instance the prevention of death to PPH, such as the new non-pneumatic anti-shock garment that is currently being tested for its capacity to reduce shock and death.<sup>45</sup>

Today health experts agree on the most effective clinical steps to safely deliver a child, however the biggest challenge is finding a way to deliver the services to poor and rural women. Countries seeking to reduce maternal mortality should first establish that women have access to family planning and safe abortion.<sup>36</sup> Preventing maternal death can be avoided by reducing unwanted pregnancies that result in unsafe abortions. More broadly governments should focus on disseminating emergency obstetric care services through the country, and finally increase the coverage and professionalization of skilled birth attendants.<sup>29</sup>

Cambodia has made great strides towards improving the lives of mothers, and has done much to ensure a national agenda to protect maternal health. Most significantly, the maternal mortality ratio has reduced from 472 in 2005 to 206 in 2010. Considering the level of achievement among other maternal health indicators and the MMR, the CMDG target of an MMR of 140 is well within reach (Table 5). Cambodia has already met its

target for a TFR of 3; the proportion of births with SBAs has increased from 44% to 71% and needs only to increase by 9 percentage points in the next 5 years to meet its target; the proportion of women receiving 2 ANC visits with an SBA is 89% and needs only 1 percentage point to meet its 2015 target. The only indicator assessed by this report not likely to succeed in meeting its target by 2015 is the proportion of women using modern birth spacing methods. Currently 35% of women use modern birth spacing methods while the target lies at 60% requiring a doubling in 5 years that is unlikely based on previous trends between CDHS periods. That is not to say that Cambodia cannot do it, but that an increased focus on family planning is required to help the country meet its goal.

**Table 5: Maternal Mortality Indicators and Status to Reaching 2015 CMDG Targets**

	Benchmark		Most recently available		2015 Target	Distance to target		
	Value	Year	Value	Year		Total Distance To Go (2000-2015)	Current Distance to 2015 Target	Progress Made from 2000-2010
<b>Maternal mortality ratio (per 100,000 live births)</b>	437	1997	206	2010	140	297	66	78%
<b>Total fertility rate</b>	4	1998	3	2010	3	1	0	100%
<b>Proportion of birth attended by skilled health personnel</b>	0.32	2000	0.71	2010	0.80	0.48	0.09	81%
<b>Proportion of married women using modern birth spacing methods</b>	0.19	2000.00	0.35	2010.00	0.60	0.42	0.25	40%
<b>Proportion of pregnant women with 2 or more ANC with skilled health personnel</b>	0.31	2000	0.89	2010	0.90	0.60	0.01	98%
<b>Proportion of women 15-49 years with iron deficiency anemia</b>	0.58	2000	0.44	2010	0.19	0.39	0.25	36%
<b>Proportion of pregnant women delivered by C-Section (proxy for EmONC)</b>	0.01	2000	0.02	2008	0.04	0.03	0.02	35%

Due to the rapid increase in deliveries in facilities and with skilled birth attendants, Cambodia's MOH priorities for maternal health should focus on improving upon skills and competencies of currently working midwives as well as the provision of

increased incentives (salaries) for midwives to be present at health centers, and to perform their duties well. An increase in the cooperation between HCs, RHs, and PHDs is necessary to adopt a supervisory structure to midwives and health care staff, and to ensure appropriate referrals, and that accurate data on maternal health indicators are collected. Further, with the increasing professionalization of midwifery, the MOH must create incentive schemes or pay raises to attract new graduates to public health posts for work. Finally as the rate of deliveries in public health facilities increases, the quality of education and training in normal birthing care must be a priority, as should be the availability of necessary medicines, materials, electricity, and clean water in health centers.

In the last decade Cambodia's leaders have clearly adopted the goal of reducing maternal mortality as a national priority. Numerous programs under the Ministry of Health, local NGOs such as RHAC and RACHA, and many international NGOs and development agencies have achieved success in most of the major indicators under MDG5. Certainly, by sustaining and improving upon national initiatives to protect mothers the country will reduce the MMR to its target of 140 by the MDG deadline of 2015. Regardless of the goal, Cambodian citizens and those working in public health have reason for optimism. As already discussed, for the first time overall progress for the reduction of maternal mortality has been documented in the developing world. This report suggests that after a decade of languishing maternal mortality, Cambodia has reached a fulcrum point for a decline in maternal mortality.

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