

# Safer health care facilities in Cambodia



Health care facility assessment report

June 2015

## Acknowledgements

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## Abbreviations

<b>CDHS</b>	Cambodia Demographic and Health Survey
<b>HAI</b>	Health care associated infection
<b>HCF</b>	Health care facility
<b>HMIS</b>	Health management information system
<b>JMP</b>	WHO/UNICEF Joint Monitoring Programme
<b>MNH</b>	Maternal and newborn health
<b>MoH</b>	Ministry of Health
<b>NGO</b>	Non-government organisation
<b>PMNCH</b>	Partnership for Maternal, Newborn and Child Health
<b>RWC</b>	RainWater Cambodia
<b>UHC</b>	Universal health coverage
<b>UNICEF</b>	United Nations Children's Fund
<b>USAID</b>	United States agency for foreign assistance
<b>WASH</b>	Water, sanitation and hygiene
<b>WHO</b>	World Health Organization

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# Executive summary

Since the Millennium Development Goals were set out in 2000, there has been significant progress in improving maternal and newborn health. In South-East Asia, the maternal mortality ratio has dropped by 56% and four out of five babies are now delivered by skilled health personnel (United Nations, 2014). However, in many communities, maternal and newborn survival remains a major public health challenge.

In Cambodia there are now more babies being delivered by health professionals and more women choosing to deliver at a health facility than ever before (Royal Government of Cambodia, 2013). A significant decline in the maternal mortality ratio has been reported, from 472 deaths per 100,000 live births in 2005, to 170 deaths per 100,000 live births in 2014 (MoH, MoP and ICF International, 2015). However, demographic and health data show a much slower decrease in the rate of neonatal mortality, which now accounts for half of all deaths in children under the age of five (Countdown to 2015, 2014).

The links between water, sanitation and hygiene interventions and improved maternal and newborn health outcomes are well established (Velleman, 2014). They are multiple and occur not only during the continuum of care from pregnancy to delivery, and the postpartum period, but also throughout the life of the mother and her child. Within health care facilities, access to safe WASH is particularly important in the prevention and control of infections that can lead to maternal and newborn deaths.

The World Health Organization has estimated that health care associated infections cause up to 56% of all neonatal deaths among facility-born babies in developing countries and that 10.7% of maternal deaths are due to infections that can be linked to unhygienic conditions (Say, 2014).

The aim of this research was to pilot a health care facility assessment tool that is able to give a detailed overview of access to water, sanitation and hygiene in health care facilities in Cambodia through the following objectives:

- Develop and pilot a health facility assessment tool that captures comprehensive data on access to WASH in a subset of health care facilities that provide maternal and newborn services.

- Analyse the ability of the tool to capture the information required to form a comprehensive overview of WASH in a health care facility.
- Provide recommendations for further research and use of the health facility assessment tool to influence decision makers in both the WASH and health sectors in order to prioritise access to WASH in health care facilities.

## Methodology

A health care facility assessment tool was developed and piloted in 12 health care facilities in two provinces of Cambodia: Kampong Speu and Prey Veng. The tool was designed to capture data on a comprehensive range of WASH components, including staffing and facility infrastructure; water supply; sanitation facilities; waste disposal and management; maintenance; hygiene facilities and facility accessibility (Annex 1).

## Results

### **1. Almost all facilities had access to an improved water source and improved sanitation**

In almost all facilities there was access to both an improved water supply and sanitation facility, according to WHO/UNICEF Joint Monitoring Programme definitions for WASH access. All health care facilities surveyed had a squat flush toilet and all had a secondary source of water available.

### **2. Almost none of the facilities provided any form of drinking water**

Due to the lack of availability of drinking water, staff reported that most clients and staff purchase their own bottled water and bring it to the health care facility. Only two of the facilities surveyed provided either bottled or filtered tap water for clients to drink.

### **3. Most sanitation facilities were not accessible to patients or staff with physical disabilities**

Functionality of the toilets was measured through the availability of water for the flush, with all referral hospitals and 75% of health centres having functional, improved sanitation. The only toilet facilities found to be designed with disabled access in mind were at two referral hospitals.

#### **4. Menstrual hygiene management was non-existent at all facilities**

There were no designated receptacles for the disposal of menstrual hygiene materials seen in any of the facilities.

#### **5. Waste disposal methods were consistent with Cambodian Ministry of Health Infection Prevention and Control Guidelines**

Waste disposal methods did not vary greatly with facility type. The majority of waste was burned in a brick incinerator on site and sharps waste was most likely to be placed in a designated cardboard box that was removed offsite.

#### **6. Hygiene and handwashing facilities were better in delivery units than maternity wards**

Delivery units had beds and handwashing facilities that were visibly cleaner and in better condition than the maternity wards. The delivery units were more likely to have a functioning tap available at a sink, with soap or a suitable alternative present. Almost all delivery units had the basic equipment needed for a safe delivery, including scissors for cord cutting, disposable cord clamps and sterile gloves.

### **Discussion and recommendations**

Overall, this assessment was able to present data on a range of important indicators of access to safe WASH in health care facilities; however the research also highlighted gaps in some aspects of the tool design and provided a base for revisions and recommendations for further investigation.

Specific areas highlighted in this research that require addressing include:

- Revisions to this assessment tool will be required before it is used in a larger-scale assessment. This will include incorporating the following recommendations and adapting the tool to the scale and context of subsequent assessments.
- Implementation of this tool in a wider setting will improve the understanding of the status of WASH in health care facilities, which is lacking nationally, regionally and globally and is a barrier to driving policy change and addressing the issue of WASH in health care facilities.

- The addition of a complementary qualitative component of this assessment may lead to an increased understanding of hygiene practice and adherence to infection, prevention and control behaviours, particularly around the time of delivery.
- Developing this tool to be used at a larger scale could inform the formulation of key indicators to be inserted into existing national monitoring mechanisms such as the Ministry of Health's Health Management Information System (HMIS) to enable ongoing monitoring of the availability of WASH elements in health care facilities.
- This assessment tool could be adapted for distinct purposes. A traffic light system may be a useful way of assessing broad coverage and identifying regions or areas that require attention. A more detailed risk assessment for individual facilities, similar to the WHO's Water Safety Plan (WSP) but specific to health care facilities, could identify key risks and prioritise investment in improvements and upgrades. As it stands, this tool cannot do both but has the potential to be adapted to fit a specific purpose.

### **Conclusion**

This research successfully tested a health care facility assessment tool that collected comprehensive data on access to water, sanitation and hygiene in health care facilities in Cambodia. While access to basic water supply and sanitation facilities in almost all health centres surveyed met WHO's minimum standards, the tool did highlight the disparity in access to key elements of infection prevention and control between health centres and referral hospitals, as well as between maternity wards and delivery units. In addition, this study provides recommendations for how this assessment tool can be used to effectively assess the coverage of WASH in health care facilities and be adapted to support decision makers to prioritise investments and take action to improve WASH infrastructure and practices in health care facilities. Without these basic services, aspirations to provide high-quality universal health coverage and reduce neonatal and maternal mortality will not be met.

# 1. Introduction

In October 2014, WaterAid Australia and WaterAid Cambodia undertook research in two provinces of Cambodia to understand the status of water, sanitation and hygiene (WASH) in health care facilities providing maternal and newborn health services.

This research was conducted in partnership with RainWater Cambodia and the World Health Organization (WHO). RainWater Cambodia is a local Cambodian non-governmental organisation (NGO) working to provide rural communities with access to safe water and sanitation, and has previous experience conducting WASH assessments in health care facilities, as well as providing WASH infrastructure upgrades. WHO Cambodia's Noncommunicable Disease and Environmental Health Unit was involved in the planning and design process of the assessment.

Access to safe water, sanitation and hygiene is fundamental to infection prevention and control, and good health outcomes in health care facilities. Patients who seek care at facilities are more vulnerable and susceptible to infection, relying on a clean environment for effective treatment. This is particularly important for mothers and newborns around the time of delivery, where there are established links between poor WASH and maternal and neonatal morbidity and mortality outcomes.

While there is a growing body of evidence to support the links between maternal and neonatal health and WASH, globally there is a lack of available data on the status of WASH in health care facilities and the resulting impact that it has on health outcomes. This research piloted a comprehensive health care facility assessment tool to capture data on the current status of WASH in health care facilities in rural Cambodia and is part of a larger research project that has reviewed existing national data available on WASH in health care facilities. The combination of these two pieces of research paves the way for a national-level assessment of WASH coverage in health care facilities and the development of strategies to improve quality of care in health care facilities in Cambodia.

## 2. Background and rationale

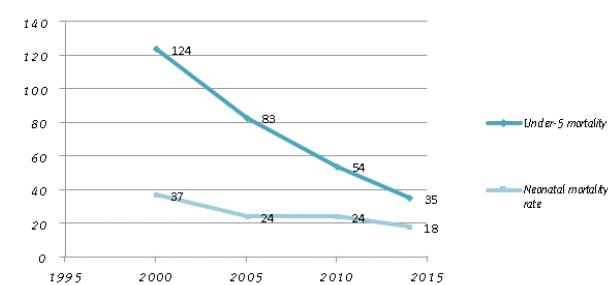
Despite the progress that has been made towards achieving the Millennium Development Goals for maternal and child health in the lead up to 2015, maternal and newborn survival remains a major global challenge. Newborn mortality accounts for a median share of 44% of under-five mortality in high-burden countries (Black, 2010) and in 2012, 2.9 million babies died during the first 28 days of life (Save the Children, 2014). Similarly, maternal mortality has remained high in many settings and the declining global maternal mortality ratio hides vast disparities in the number of maternal deaths seen in different parts of the world (WHO, UNICEF, UNFPA, World Bank, UNPD, 2014).

The links between water, sanitation and hygiene interventions and improved maternal and newborn health outcomes are well established (Velleman et al., 2014; Campbell et al., 2014; Benova, Cumming, & Campbell, 2014). They are multiple and occur not only during the continuum of care from pregnancy to delivery, and the postpartum period, but also throughout the life of the mother and her child. Within health care facilities, access to safe WASH is particularly important in the prevention and control of infections that can lead to maternal and newborn deaths. The World Health Organization has estimated that health-care associated infections cause up to 56% of all neonatal deaths among facility-born babies in developing countries and that 10.7% of maternal deaths are due to infections that can be linked to unhygienic conditions (Say, 2014).

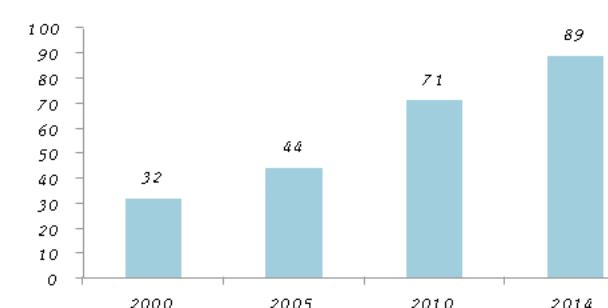
In Cambodia there are now more babies being delivered by health professionals and more women choosing to deliver at a health facility than ever before (Royal Government of Cambodia, 2013). Delivery at a health care facility with a skilled birth attendant prevents or manages the majority of obstetric complications that can lead to maternal or neonatal deaths (WHO, ICM & FIGO, 2004). The most recent Cambodian Demographic and Health Survey (CDHS) data estimates that in 2014, 89% of births were attended by skilled health personnel in Cambodia. This rate has increased substantially since 2000, where just 32% of births were attended by skilled health personnel (MoH, MoP and ICF International, 2015). While these figures are encouraging, the same survey estimates that there

are 170 maternal deaths per 100,000 live births, and 18 neonatal deaths per 1,000 live births in Cambodia. Ensuring that health care facilities are safe environments for women to deliver their babies is a core part of ensuring better health outcomes for women and newborns in Cambodia.

**Figure 1. Under-5 and neonatal mortality trends in Cambodia (deaths per 1,000 live births) (Cambodia Demographic and Health Surveys)**



**Figure 2. Skilled attendance at birth in Cambodia (%) (Cambodia Demographic and Health Surveys)**



### Public health service delivery in Cambodia

Cambodia's service delivery model for public health is organised through two levels of services provided in all operational districts (WHO, Cambodian Ministry of Health, 2012):

1. the Minimum Package of Activity provided at health centres
2. the Complementary Package of Activity (CPA) provided at referral hospitals

Health centres and health posts are minimum primary health care services mainly for rural populations. There are 1,103 facilities that cover around 10,000-20,000 people each, offering services such as initial consultations and primary diagnosis, emergency first aid, chronic disease care, maternal and child care (including normal delivery), birth spacing advice, immunisation, health education and referral.

There are three levels of referral hospitals in Cambodia: national, provincial and district referral hospitals. These designations are based on the number of staff, beds, medicines, equipment and clinical activities. In 2014, there were 97 referral hospitals that offered the Complementary Package of Activities (WHO, Cambodian Ministry of Health, 2012), all of which are expected to support primary care and have resources and expertise available for district health services.

Referral hospitals are designated according to the Complimentary Package of Activities that they deliver (WHO, Cambodian Ministry of Health, 2012):

- CPA-1:** basic obstetric services, no blood bank or large-scale surgery (with general anaesthesia).
- CPA-2:** CPA-1 plus emergency care, large-scale surgery including intensive care and other specialised services such as blood transfusion, ear, nose, throat (ENT), ophthalmology and orthodontics services.
- CPA-3:** large-scale surgery and more activities (in terms of both numbers of patients and activities) than a CPA-2, and also have various specialised services.

## What we know about WASH in health care facilities

There is a lack of quality data on the current status of WASH in health care facilities, not only in Cambodia but globally. There are few monitoring mechanisms that capture any information on different WASH components, and those that do focus narrowly on water supply and availability of toilet facilities. A recent landscaping report published by WHO and UNICEF reviews access to WASH in health care facilities in low-resource settings through existing data. Only 54, 36 and 35 low- and middle-income countries had any data available for access to water, sanitation and hygiene, respectively (WHO, UNICEF, 2015). Of these countries, Asia was the region least represented, with a heavy focus on Africa. Just one survey collected data on access to water in Cambodian health care facilities: the Health Impact Evaluation Consortium Survey in 2008, a sub-national survey that assessed 447 facilities and found that 67% had access to an improved water source. Indicators used by the assessments included in this report used the indicators set by the WHO/UNICEF Joint Monitoring Programme; defining ‘access to water’ as the presence of a water source within 500 metres of the facility, and ‘access to sanitation and hygiene’ as the presence of facilities within the health care facility. These definitions fall short of WHO minimum standards and do not consider quality, quantity or functionality, which have a direct impact on the quality of service delivery in health care facilities.

The aim of this research project is to develop and test a comprehensive health care facility assessment tool that looks beyond basic WASH indicators and captures data on water supply, excreta disposal, drainage, health care waste management and environmental sanitation, with a focus on the maternity and delivery wards of the facility. Each of these elements plays a key role in the prevention and control of infection in the health care setting. The second component of this research project, a review of existing datasets, policies and standards that capture information on WASH in health care facilities, will complement the health care facility assessment and provide an overview of the current understanding of WASH in health care facilities in Cambodia.

# 3. Research aim, objectives and methodology

There are clear and established links between access to safe WASH and improved maternal and neonatal health. Similarly, improved WASH in health care facilities has been identified as essential to the prevention of health care associated infections, including the incidence of maternal and neonatal sepsis. This research aimed to gather country-specific information on access to WASH in health care facilities in Cambodia.

## 3.1 Aims and objectives

### Aim

To pilot a health care facility assessment tool able to give a detailed overview of access to water, sanitation and hygiene in health care facilities in Cambodia.

### Objectives

1. Develop and pilot a health care facility assessment tool that captures comprehensive data on access to WASH in health care facilities that provide maternal and newborn services.
2. Analyse the ability of the tool to capture the information required to form a comprehensive overview of WASH in a health care facility.
3. Provide recommendations for further research and use of the health care facility assessment tool to influence decision makers in both the WASH and health sectors to prioritise access to WASH in health care facilities.

## 3.2 Methodology

### 3.2.1 Health care facility assessment tool development

The first step in the development of the health care facilities assessment tool was to compile existing tools and monitoring mechanisms for analysis of WASH components. This included large-scale global monitoring tools such as the WHO Service Availability and Readiness Assessment, as well as assessments carried out by WaterAid partners in WaterAid country programmes. They were examined for the key areas of information captured, tools used, uses, limitations

and relevant programme context. These are presented in Annex 1. Tools examined include:

- Service Availability and Readiness Assessment (SARA) – WHO and USAID
- Service Provision Assessment (SPA) – Measure DHS and USAID
- Rapid Health Facility Assessment (R-HFA) – USAID and MEASURE Evaluation
- The Soapbox Collaborative Needs Assessment – The Soapbox Collaborative
- Service Delivery Assessment (SDI) – The World Bank
- Essential Environmental Standards in Health Care – WHO

Using this analysis, an assessment tool was developed to capture the most comprehensive data on multiple aspects of WASH in health care facilities.

The tool was designed to capture data on the following key areas:

- Staffing and facility infrastructure
- Water supply
- Sanitation facilities
- Waste disposal and management
- Maintenance
- Hygiene facilities
- Facility accessibility

The assessment tool was structured into two modules. Module 1 was a health facility checklist that was administered as a survey to the chief of the facility, or an available senior staff member. Module 2 was a walkthrough checklist, administered by the data collection team, who observed and assessed the different components. This module was conducted in the maternity wards and delivery units of health care facilities.

### 3.2.2 Health care facility assessment pilot

#### Identification of staff and study sites for data collection

In total, three staff were involved in data collection: one investigator from WaterAid and two Cambodian research assistants from RainWater Cambodia and Angkor Research.<sup>1</sup>

The health care facility assessment tool pilot was conducted in a total of 12 facilities in two provinces in Cambodia: six in Kampong Speu Province and six in Prey Veng Province. In each province the pilot was run in four health centres and two referral hospitals. Of the referral hospitals, both in Prey Veng were CPA-1 level, while in Kampong Speu one was CPA-2 and one was CPA-3.

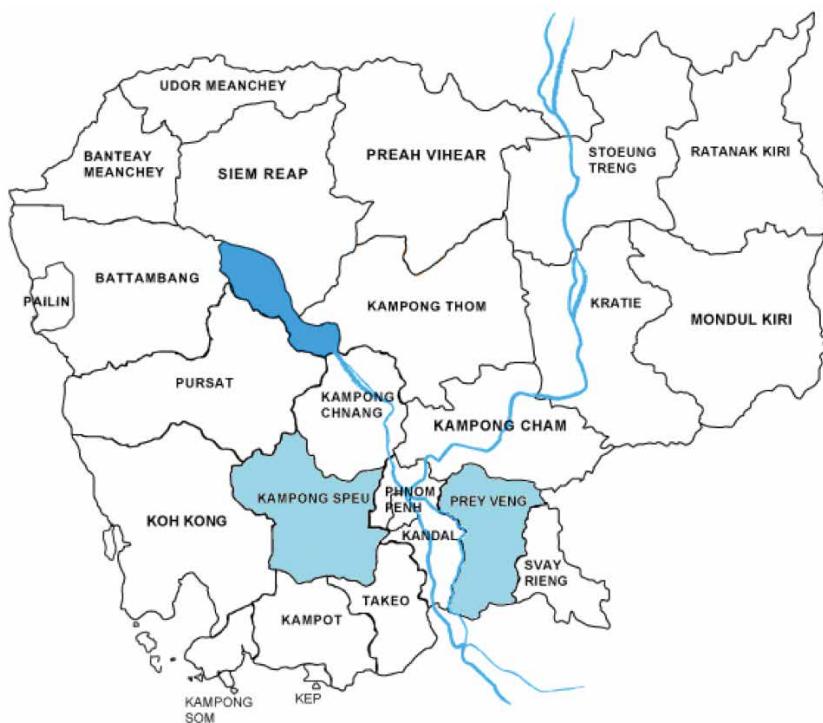
Study sites were selected by RainWater Cambodia based on locations where the organisation had previously worked and had relationships with local government and Ministry of Health representatives.

#### Data collection and analysis

The assessment tool was designed to quantitatively assess access to WASH in health care facilities and did not require patient interviews or seek to investigate culturally sensitive issues or concepts. The assessment was administered to the chief of the hospital, or an available senior member of staff. Written consent was sought from all participants prior to undertaking the survey.

Data was collected through a paper-based survey administered at all health care facilities. As it was a small sample size, a descriptive analysis was performed. The following results section describes the availability of services at the health care facility, and the availability and condition of resources in the health care facility and maternity and delivery wards.

**Figure 3. Map of study locations in Cambodia<sup>2</sup>**



<sup>1</sup> Angkor Research is a Cambodian research, monitoring and evaluation consulting firm.

<sup>2</sup> Image adapted from Tabitha Foundation Cambodia

# 4. Results: Module 1

## – Health care facility checklist



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The following section presents the key findings of the health care facility assessment under each of the survey headings. The results from Module 2, which focused on the maternity and delivery wards, are presented in a separate section.

### 4.1 Staffing and beds

Table 1 describes the mean number of staff and beds at the health care facilities visited. Unsurprisingly, the referral hospitals had a much higher number of staff available. This number was notably higher in Kampong Speu due to one of the referral hospitals visited being a district-level facility, with a range of specialist medical services available. In general, at the health centres there were more midwives on staff than nurses. As one of the primary functions of a health centre is delivery services, this was not a surprising result.

All but one of the health centres had at least one dedicated maternity bed available (in addition to the delivery bed) – consistent with one of the primary functions of the health centres being the provision of obstetric services.

**Table 1. Mean number of selected staff and patient beds in health centres and referral hospitals by province**

	Prey Veng	Kampong Speu*
<b>Doctors</b>		
Health centre	1	1
Referral hospital	2	20
<b>Nurses</b>		
Health centre	2	4
Referral hospital	12	43
<b>Midwives</b>		
Health centre	3	5
Referral hospital	3	14
<b>Inpatient beds</b>		
Health centre	4	6
Referral hospital	28	94
<b>Dedicated maternity beds</b>		
Health centre	2	3
Referral hospital	7	15

\* In Kampong Speu, it must be noted that one of the two referral hospitals assessed was a district-level facility, with a much higher number of staff and beds than any other facility visited. This has increased the mean presented here.

**Table 2. Mean and range of deliveries in health centres and referral hospitals**

Facility type	Total number	Mean (this year)	Range	Mean (per quarter)	Range
Referral hospital	2135	534	(195-1496)	178	(53-809)
Health centre	930	116	(23-236)	39	(3-86)

## 4.2 Obstetric and newborn services

All of the health care facilities reported being open 24-hours, with most stating that a staff member is on-call for women delivering at night. However, this assessment tool was unable to verify this. The number of deliveries performed each month varied between health centres and referral hospitals, with referral hospitals performing a higher mean number of deliveries per quarter than health care facilities (Table 2). All facilities offered delivery services, although only the district level hospital provided caesarean sections; from January to October 2015 this hospital performed 62 caesareans (4% of total births), 1,496 normal deliveries and 108 assisted deliveries.

The average number of births in health centres per quarter was 39 – an average of three deliveries per week.

## 4.3 Water, sanitation and power supply

### Water supply

Table 3 describes the water supply for health centres and referral hospitals in the two provinces. All health centres had a secondary source of water supply available, as did three out of four of the referral hospitals. The one that didn't had a very reliable piped source and reported no need for a secondary source.

At the health centres, there were only two types of secondary water sources used: rainwater harvesting tanks (63%) and boreholes with hand pumps (38%). At the referral hospitals, each of the three used a different source; one borehole with a mechanised pump, one borehole with a hand pump, and one rainwater harvesting tank. Each of these secondary sources is an improved source of water.

**Table 3. Water supply to health centres and referral hospitals by type (%)**

	Health centre	Referral hospital
	n=8	n=4
<b>Main source of water (%)</b>		
Piped into facility	12.5	50
Borehole with hand pump	0	0
Borehole with mechanised pump	37.5	50
Surface water	25	0
Rainwater harvesting tank	25	0
Delivered	0	0
<b>Total</b>	<b>100</b>	<b>100</b>
<b>Main source of water during wet season (%)</b>		
Piped into facility	0	50
Borehole with hand pump	12.5	0
Borehole with mechanised pump	12.5	50
Surface water	12.5	0
Rainwater harvesting tank	62.5	0
Delivered	0	0
<b>Total</b>	<b>100</b>	<b>100</b>
<b>Main source of water during dry season (%)</b>		
Piped into facility	12.5	50
Borehole with hand pump	12.5	0
Borehole with mechanised pump	37.5	50
Surface water	25	0
Rainwater harvesting tank	12.5	0
Delivered	0	0
<b>Total</b>	<b>100</b>	<b>100</b>
<b>Secondary water supply available</b>		75
<b>Average volume of water storage (litres)</b>	10,813	8,750



Table 4 shows that the majority of health care facilities had a good supply of water from their primary source, although 8.3% reported that they never had a sufficient water supply. Almost 60% had sufficient water all year round from the primary source, not needing to use the secondary water supply.

**Table 4. Sufficiency of water supply from primary source for referral hospitals and health centres**

	Health centre n=8	Referral hospital n=4	Total n=12
<b>Yes, all year</b>	50	75	58.3
<b>Seasonally</b>	37.5	25	33.3
<b>Never enough</b>	12.5	0	8.3

## Water storage

Seventy-five percent of the facilities had functioning water storage tanks, and while the remaining 25% had leaks and rust there was no major structural damage seen that impaired their functionality. Cleaning schedules varied, with some facilities reporting that they cleaned their tanks weekly and some not at all. Referral hospitals had smaller tanks and some were disused as the piped water to the facility was reliable and sufficient for all-year-round needs. The required water storage capability was not assessed.

The majority of facilities reported that they didn't have any interruptions to their water supply. Three health centres stated that they had daily interruptions – one had extended periods of no water during the dry season. All the facilities had functioning water sources at the time of the visit.

Only one facility used its water source for drinking purposes. Other uses of water identified by all facilities were:

- bathing
- anal cleansing after defecation
- toilet flush or pour flush
- handwashing
- cleaning

## Drinking water

At health centres, 63% provided a source of drinking water for their staff. In most cases, this was bottled water delivered to the facility. There were a number of bottling plants observed during the survey that were operated by NGOs in proximity to health centres. Only two health centres also provided water for clients. None of the referral hospitals offered drinking water for staff or clients. Quality and safety of drinking water was not assessed in this survey.

## Toilet facilities

All facilities had at least one functioning toilet available for use that satisfied the criteria for an improved sanitation facility<sup>3</sup> and the mean number of toilets per facility is outlined in Table 5. Functionality

<sup>3</sup> “An ‘improved’ sanitation facility is one that hygienically separates human excreta from human contact.” (WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation).

was assessed through the proxy indicator of availability of water in the toilet facility, as all toilets were a pour flush, squat toilet. In health centres, 75% of available toilets were functional, compared to 100% of toilets observed in referral hospitals. Only two referral hospitals in Kampong Speu had toilets designed for clients or staff with disabilities. In health centres, only 25% had separate toilets for men and women on site. Three out of four referral hospitals had separate toilets available for men and women.

Table 6 describes access to toilet facilities. Overall, the majority of facilities had good access to their toilets, with wide, clear paths that could be followed by someone who was visually impaired. In general, referral hospitals had better toilet access. Two of the referral hospitals we visited had received infrastructure upgrades funded by Lien Aid and had large, well-designed toilet blocks with full disabled access.

**Table 5. Mean number of toilet facilities at health centres and referral hospitals**

	Health centre n=8	Referral hospital n=4
<b>Mean number of toilets</b>	2.1	7.5
<b>Range</b>	(2-3)	(4-12)



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**Table 6. Access to toilet facilities in health centres and referral hospitals**

	Health centre (%) n=8	Referral hospital (%) n=4
<b>Wide enough path</b>	100	100
<b>Clear, firm and non-slippery path</b>	62.5	75
<b>Path able to be followed by visually impaired</b>	87.5	100
	Health centre (%) n=7	Referral hospital (%) n=3
<b>If steps are available:</b>		
Manageable height	85.7	100
Ramp	14.3	66.7
Handrail	42.9	100



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**Table 7. Accessibility of toilet facilities in health centres and referral hospitals**

	Health centre (%)		Referral hospital (%)	
	At least one	None	At least one	None
<b>Entrance wide enough for a wheelchair</b>	75	25	100	0
<b>Interior large enough for a wheelchair</b>	62.5	37.5	75	25
<b>Handrail</b>	0	100	50	50
<b>Separate for men and women</b>	25	75	75	25
<b>Locked from the inside</b>	50	50	100	0

Further assessment of access to toilet facilities is outlined in Table 7. All referral hospitals had at least one toilet facility with an entrance that was wide enough for a wheelchair, and 75% had at least one toilet that had a large enough interior space in which a wheelchair or a helper could move comfortably. At health centres there generally were not separate toilets for men and women (25%) and none had handrails inside the toilet.

#### **Menstrual hygiene management**

None of the observed toilet facilities had any receptacle for the disposal of menstrual hygiene products.

#### **Excreta and wastewater management**

All facilities visited had an underground storage tank to collect human solid waste from the toilet facilities. Many didn't have a schedule for the emptying of the tanks, or didn't know if one existed, as often they had never been full. However, each of the respondents was of the opinion that human solid waste was disposed of safely. This was not verified in this survey.

All but one of the facilities had an underground system for wastewater drainage.

#### **Power supply**

All four of the referral hospitals relied on a national or local grid for electricity, and all four had a back-up generator available. Three of eight health centres stated that their main source of power was solar. Two of these facilities used the national or local grid as their back-up power source. All but two of the facilities surveyed had any back-up source of

electricity. The two that did not have a back-up relied on the national or local grid for power and stated that they had no need for a back-up source of power.

#### **4.4 Waste disposal and management**

Waste disposal was assessed based on four separate categories: sharps waste, infectious medical waste; non-infectious, normal waste and placenta. In all facilities, except for one health centre, there was a functioning incinerator available, all of which were accessible and located near the facility. A third of the facilities had waste receptacles that were visibly full or overflowing.

In 75% of the health centres sharps were collected in marked cardboard boxes and removed offsite for disposal. The remaining 25% had a sealed underground container for disposal. Three of the four referral hospitals buried their sharps in underground concrete containers, with just one using the designated cardboard boxes for collection and removal offsite. All but one facility burned their medical waste in a brick incinerator. The remaining one burned their waste in an uncovered pit. In the majority of health centres (75%), normal waste was burned in a brick incinerator, often along with the infectious waste. In the referral hospitals, three out of four burned their normal waste in an open pit at the rear of the health care facility. All but one facility had a functional incinerator at the time of assessment.

In the majority of the facilities (60%) the mother was responsible for taking the placenta home and disposing of it personally. In the remaining facilities, it was buried in a covered concrete pit. None of the pits was observed as being full.

# 5. Results: Module 2

## – Ward walkthrough checklist

### 5.1 Maternity ward and delivery unit: general area and beds

#### General area cleanliness

No environmental swabs were taken during this assessment for further microbiological testing, and the ‘cleanliness’ of the health care facilities refers to the visible cleanliness – i.e. floors free from build-up or residue. Overall, the majority of both the maternity wards and delivery units in all facilities were observed to be clean (Table 8). Major differences were the storage of equipment on the floor of delivery units in health centres, as there was often limited storage space in these rooms; and the floors of delivery units were also visibly cleaner than the maternity wards. Families of the women would often bring food, water and other items into the maternity wards, which could potentially affect the cleanliness of the ward environment.

None of the facilities had any drinking water available for staff or clients in the maternity wards and there were no illustrated hand-hygiene posters observed. The maternity wards at health centres were often just a separate room with very simple beds and not much else, designed for outpatient use.



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#### Beds

Table 9 shows that in the delivery units of both health centres and referral hospitals, the beds were in better condition than in the maternity wards. Visible cleanliness was high across all facilities.

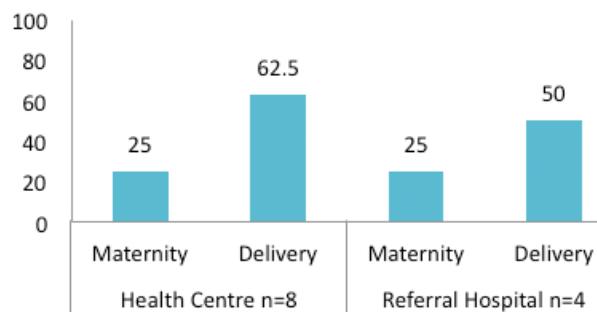
**Table 8. Observed general area cleanliness in maternity wards and delivery units in health centres and referral hospitals**

	Health centre (%) n=8		Referral hospital (%) n=4	
	Maternity	Delivery	Maternity	Delivery
<b>Floor visibly clean</b>	87.5	100	50	75
<b>Floor free from clutter</b>	62.5	62.5	100	100
<b>Room free from foul or stale odours</b>	100	100	100	100
<b>Stock and equipment stored above floor level</b>	62.5	37.5	75	75

**Table 9. Condition of beds in maternity wards and delivery units in health centres and referral hospitals**

	Health centre (%) n=8		Referral hospital (%) n=4	
	Maternity	Delivery	Maternity	Delivery
<b>Visibly clean</b>	100	100	75	100
<b>Free from damage</b>	37.5	75	50	100

**Figure 4. Availability of fixed mattresses in maternity wards and delivery units in health centres and referral hospitals (%)**



The availability of fixed mattresses on beds in both maternity wards and delivery units is shown in Figure 4. A fixed mattress with a waterproof, protective cover that can easily be disinfected after a delivery should be in place. Overall, the availability of an appropriate mattress was higher for the delivery units. Table 10 shows that where a mattress was available, in the delivery unit it was almost always in good condition, visibly clean and free from damage. In all health care facilities, the mattresses were covered in an easily cleaned, waterproof material.

### Birthing surface in the delivery unit

The birthing surface (the surface on which women deliver their babies) should be made of a washable, waterproof material that can be disinfected, and as such acts as a barrier between the mother and the mattress. All referral hospitals had such a surface on the delivery bed during the delivery and all of them were visibly clean. In 75% of facilities these were of re-usable, washable material. Half of the health centres provided a material for the birthing surface; all were washable and visibly clean. Just one health centre used disposable material.

### 5.2 Maternity ward and delivery unit: handwashing facilities

The only handwashing facilities seen in all health care facilities were sinks with a connected tap; no facility had a bucket or standing water. Maternity wards were less likely to have a handwashing sink (60% of health centres and 50% of referral hospitals), while all delivery units surveyed had at least one sink available. Table 11 describes the functionality and conditions of handwashing facilities in maternity wards and delivery units. The handwashing facilities in delivery units had better availability of water, soap and functioning taps, and were cleaner. In the maternity wards, just over half of sinks had water and soap available, whereas water and soap were available in almost all the delivery units. A greater proportion of taps in delivery units were functioning at the time of the assessment, compared to the maternity wards.

**Table 10. Condition of fixed mattresses in maternity wards and delivery units in health centres and referral hospitals**

	Health centre (%)		Referral hospital (%)	
	Maternity n=2	Delivery n=5	Maternity n=1	Delivery n=2
<b>Visibly clean</b>	50	100	100	100
<b>Free from damage</b>	100	80	0	100
<b>Easily cleaned, waterproof material</b>	100	100	100	100

**Table 11. Description of available handwashing facilities in maternity wards and delivery units**

	Maternity ward (%)		Delivery unit (%)	
	Health centre n=5	Referral hospital n=2	Health centre n=8	Referral hospital n=4
<b>Water available</b>	60	50	88	100
<b>Soap available</b>	40	50	100	75
<b>Accessible</b>	100	100	100	100
<b>Near client bed</b>	100	50	100	100
<b>Visibly clean</b>	80	50	75	100
<b>Free from damage</b>	100	50	63	50
<b>Functioning tap</b>	60	50	88	100

None of the health care facilities visited had any disposable material available at their sinks to dry hands on and none had a dedicated sink for the washing of equipment; all were multi-purpose.

### 5.3 Delivery unit: barrier clothing and birth practices

Appropriate barrier clothing refers to the plastic heavy duty aprons and disposable, sterile latex gloves used for infection prevention during delivery. All referral hospitals had both plastic heavy duty aprons and disposable gloves available (Table 12). Almost all facilities had the visibly clean barrier clothing stored away from contamination risk, and close to the point of care. In the health centres, 75% of those with aprons had them stored correctly and all observed were visibly clean. All health centres that had gloves stored them away from contamination risk and had them close to the point of care.

#### Clean cord cutting

All facilities had reusable scissors or blades available for cord cutting, in the delivery area or near it (Table 12). All apart from three health centres had them stored appropriately and all were visibly free from rust. Most were kept decontaminated before use, apart from three health centres where they were either waiting to be sterilised or on the sink. None of the facilities stocked disposable blades for cord cutting. None of the facilities had reusable cord clamps available; all facilities apart from the two referral hospitals in Prey Veng used disposable clamps that were packaged individually in sealed plastic packets. The two referral hospitals in Prey Veng used string.

**Table 12. Availability of barrier clothing and birthing equipment in health centres and referral hospitals**

	Health centre (%) n=8	Referral hospital (%) n=4
<b>Plastic apron</b>	50	100
<b>Sterile gloves</b>	100	100
<b>Scissors for cord cutting</b>	100	100
<b>Disposable cord clamps</b>	100	50

**Table 13. Availability and condition of waste receptacles in the delivery units of health centres and referral hospitals**

	<b>Medical waste</b>		<b>Sharps container</b>		<b>Placenta container</b>		<b>Normal solid waste</b>	
	<b>Health centre (%)</b>	<b>Referral hospital (%)</b>	<b>Health centre (%)</b>	<b>Referral hospital (%)</b>	<b>Health centre (%)</b>	<b>Referral hospital (%)</b>	<b>Health centre (%)</b>	<b>Referral hospital (%)</b>
<b>Available</b>	100	100	100	100	100	100	62.5	50
<b>Visibly clean</b>	75	75	62.5	75	100	75	60	100
<b>Intact, free from damage</b>	87.5	100	100	75	100	100	100	100
<b>Lid available</b>	87.5	100	N/A	N/A	0	0	60	100
<b>Foot pedal to open</b>	75	100	N/A	N/A	N/A	N/A	33	50
<b>&lt;2/3 full</b>	87.5	100	100	75	N/A	N/A	60	50

#### **5.4 Delivery unit: waste storage and disposal**

All of the facilities had segregated waste that was disposed of in appropriate categories. The containers were also generally colour-coded or identifiable for different categories of waste. Table 13 describes the availability and condition of waste receptacles in the delivery unit. All facilities had separate receptacles for sharps, infectious medical waste and placenta. Normal waste bins were less frequently observed, particularly in health centres; however an observation from the assessment was that normal waste was regularly thrown into the bin for medical waste. The placentas were all collected in a large bowl or bin, lined with a heavy duty plastic bag.

# 6. Discussion

Overall, this assessment was able to present data on a range of important components of access to safe WASH in health care facilities; however the research also highlighted gaps in some aspects of the tool design and provided a base for revisions and recommendations for further investigation.

## Pilot assessment findings

Overall, access to the Joint Monitoring Programme's definition of 'improved' water and sanitation was met in almost all facilities. However, an alarming finding was that two out of eight health centres surveyed stated that they used surface water as their primary source of water supply, even though all facilities reported that they had an improved secondary source that they could draw on. The use of an unimproved source of water in a facility has potentially negative implications on infection prevention and control in a health care setting. Infection or disease due to ingestion of untreated, unprotected water may be harmful to the health of clients and is of particular importance around the time of delivery (Benova, Cumming, & Campbell, 2014; Campbell et al., 2014).

The availability of drinking water was less frequent; however there were some water bottling plants that had been built close to selected health centres and that provided bottled water for staff free of charge or at a discounted rate. However, where there was bottled drinking water provided for staff, only one health centre made it available for clients. This is a potentially detrimental staff behaviour that requires further investigation. Only 25% of health centres provided some form of drinking water for clients, with none available at any of the referral hospitals. Clients and staff alike were observed to bring their own bottled water to the health care facility.

Encouragingly, all health care facilities had access to an improved sanitation facility in the form of a squat flush toilet. Sanitation facilities in referral hospitals were more likely to be accessible than at health centres and the only toilet facilities that were designed to support access to those with physical disabilities were at two referral hospitals. Accessible toilets are not only essential for people with physical disabilities but also for women who are pregnant, in labour, or post-delivery (WaterAid, 2012). Squatting

over a toilet becomes particularly difficult for women who are heavily pregnant, or who have recently delivered by caesarean section.

Functionality of the toilets was measured through the availability of water for the flush, with all referral hospitals and 75% of health centres having functional, improved sanitation with a safe method of excreta disposal. There were no menstrual hygiene receptacles for the safe disposal of menstrual hygiene products seen in any facility, which has implications for both staff and clients and may be a barrier for female staff work attendance (House, Mahon, & Cavill, 2012).

Waste disposal methods did not vary greatly with facility type. The majority of waste (medical and normal waste) was burned in a brick incinerator on site and sharps waste was most likely (75%) to be placed in a designated cardboard box that was reported to be removed offsite. In the majority of cases, the mother was asked to take the placenta home and dispose of it, although the larger facilities were able to bury them in an underground concrete container. Waste disposal systems were consistent with Ministry of Health Infection Prevention and Control Guidelines, however it is important to note that handling and final disposal of waste was unable to be assessed using this tool.

## Access to WASH in maternity wards and delivery units

Overall, almost all WASH checklist items were more frequent in delivery units than in maternity wards. Often the maternity ward was a room with a number of beds with wooden bases covered by a straw or plastic mat. Although the general area cleanliness of the two rooms was comparable across facilities, in general the delivery units had beds and handwashing sinks that were visibly cleaner and in better condition than the maternity wards. The delivery units were more likely to have a functioning tap available at a sink, with soap or a suitable alternative present. Access to soap and water for handwashing was also less frequent in maternity wards than delivery units, with both health centre (40%) and referral hospital (50%) maternity wards having a lower availability of soap and water than the global average of 65% (WHO, UNICEF, 2015).

Almost all delivery units had the basic equipment needed for a safe delivery, including scissors for cord cutting, disposable cord clamps and sterile gloves. The Partnership for Maternal, Newborn and Child Health (PMNCH) has described the ‘six cleans’ needed for safe birth: clean hands of the attendant, clean surface, clean blade, clean cord tie, clean towels to dry and wrap the baby, and clean towels to wrap the mother. While only the first four ‘cleans’ were assessed using this tool, it gives a positive indication of facility preparedness for safe births (PMNCH, 2006).

Waste disposal in the delivery units was segregated appropriately, following Ministry of Health Infection Prevention and Control Guidelines, with separate containers for sharps, medical waste and a method for containing the placenta. In over 60% of health centres the mother was required to take the placenta home, and as there were no interviews with mothers conducted it is not possible to know if they were finally safely disposed.

The findings of this assessment show that in the health care facilities visited, almost all had access to at least one source of improved water, improved sanitation facilities and hygiene services. While this is encouraging, it is important to note that it may not be representative of the situation in health care settings across Cambodia. One reason is that the sample for this study was small ( $n=12$ ) and was selected based on sites previously visited by RainWater Cambodia, and where there were existing relationships with local government. The results of this study are also much more positive than national level data previously collected in Cambodia, with the 2008 Health Impact Evaluation in Cambodia reporting that just 51% of health centres in rural areas, and 67% of health care facilities overall, had access to an improved water source (NCHADS, NTP, CNM, PSO, Macro International and WHO, 2009). Therefore, further assessment on a larger scale is needed in order to produce nationally representative data on access to WASH in health care facilities in Cambodia.

### Health care facility assessment tool design

The primary objective of this pilot was to test the ability of the assessment tool to capture data on a comprehensive range of components of safe WASH, with a focus on maternity wards and delivery units. Overall, sufficient data were gathered from both health centres and referral hospitals to give a description of access to different aspects of WASH in health care facilities. The time that the tool took to administer was between 45 minutes and one hour, and respondents were generally receptive to the format of the survey. Limitations of the tool were also highlighted during this process and are discussed below.

Often, definitions of ‘access to safe WASH’ used in existing health care facility assessment tools fall short of WHO’s Essential Environmental Health Standards in Health Care, issued in 2008 (WHO, 2008) and providing 11 essential environmental health standards required for varying levels of health care facilities in medium- and low-resource countries. However existing assessment tools do not have sufficient indicators to produce a comprehensive picture of quality, quantity and functionality of WASH services in facilities to mirror these standards.

To date, health care facility assessment tools such as WHO’s Service Availability and Readiness Assessment (SARA) and the World Bank’s Service Delivery Indicators Assessment have only included basic indicators to capture access to WASH based on the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation (JMP) definitions of ‘improved’ and ‘unimproved’ water and sanitation facilities. However, it has been recognised that these don’t adequately capture WASH requirements at health care facilities. These definitions provide an adequate measure for household and community settings but fall short of minimum standards in health care facilities. An ‘improved’ drinking-water source is one that, by the nature of its construction and when properly used, adequately protects the source from outside contamination, particularly faecal matter. An ‘improved’ sanitation facility is one that hygienically separates human excreta from human contact. The use of these definitions denies the ability of the assessment to consider quality, quantity or functionality of WASH facilities in a health

**Box 1. WHO's Essential environmental standards in health care**

- 1. Water quality:** water for drinking, cooking, personal hygiene, medical activities, cleaning and laundry is safe for the purpose intended
- 2. Water quantity:** sufficient water is available at all times for drinking, cooking, personal hygiene, medical activities, cleaning and laundry
- 3. Water facilities and access to water:** sufficient water collection points and water-use facilities are available in the HCF for drinking, cooking, personal hygiene, medical activities, cleaning and laundry
- 4. Excreta disposal:** adequate, accessible and appropriate toilets are provided for patients, staff and carers
- 5. Wastewater disposal:** wastewater is disposed of rapidly and safely
- 6. Health care waste disposal:** health care waste is segregated, collected, transported, treated and disposed of safely
- 7. Cleaning and laundry:** laundry and surfaces in the HCF environment are kept clean
- 8. Food storage and preparation:** food for patients, staff and carers is stored and prepared in a way that minimises risk of disease transmission
- 9. Building design, construction and management:** buildings are designed, constructed and managed to provide a healthy and comfortable environment for patients, staff and carers
- 10. Control of vector-borne disease:** patients, staff and carers are protected from disease vectors
- 11. Information and hygiene promotion:** correct use of water, sanitation and waste facilities is encouraged by hygiene promotion and by management of staff, patients and carers

care setting. Similarly, access to water services is defined as the presence of an improved water source within 500 metres of the facility. By this definition, a facility without a water source on site but within 500 metres is still considered to have acceptable water services. Using these indicators sets a low standard for WASH services and fails to meet WHO standards for WASH in health care facilities. WHO, JMP and the World Bank are currently revising these tools to include more comprehensive and appropriate indicators on WASH in health care facilities.

With the shortcomings of current assessment definitions taken into consideration, this tool has been designed to capture data on functionality and accessibility of these facilities – not just physical availability – to provide a comprehensive overview of WASH access in the selected health care facilities. The tool design was guided by WHO's Essential Environmental Health Standards in Health Care.

This tool does not include questions on all 11 standards, as some were not relevant for the study context (e.g. small, rural health centres do not have food preparation services in Cambodia) and primarily focussed on gathering data on the first seven standards. While some of the existing assessment tools contain questions that address some of the above standards, this tool aimed to extract more detail around each theme. For example, WHO's Service Availability and Readiness Assessment contains two questions on waste management practices for sharps and medical waste, whereas this assessment tool further separates waste categories into normal waste, medical waste, sharps waste and placenta disposal. Safe disposal of different categories of health care waste is essential in minimising the risk of infection and accidental injury to staff, clients and visitors, and is an example of broader WASH elements that are often overlooked in quality-of-care assessments.

Understanding the accessibility of WASH facilities for clients and staff was an important component of this assessment tool. WHO standards note the importance of accessibility for wheelchairs and people with a physical disability, specifically in relation to sanitation facilities and building design; however there is no standalone guideline for accessibility that provides detailed implementation

guidance. The lack of accessible WASH facilities may prohibit their use by staff and clients, increasing the risk of unsafe sanitation and hygiene behaviours, and negating the physical presence of an improved WASH facility.

Around the time of delivery, when the mother and newborn are at particular risk of infection transmission, access to safe WASH is of particular concern for both staff and clients. The package of ‘six cleans’ defined by WHO for childbirth, i.e. clean hands, perineum (mother), delivery surface, cord cutting, cord tying, and cord care, are six points where access to safe WASH reduces the risk of infection (Darmstadt, 2009). Similar assessments being carried out in Tanzania by WaterAid, SoapBox Collaborative, SHARE Research Consortium and the London School of Hygiene and Tropical Medicine have been designed to specifically collect data on access to WASH in maternity wards and delivery units (WaterAid, et al. 2015). Guidance from the Tanzania tool assisted in shaping the questions asked in this assessment, and were essential in maintaining the focus on WASH conditions in the areas where women give birth.

### Limitations of the assessment tool

The pilot highlighted a number of limitations of this assessment tool. The primary limitation was that there was no behavioural assessment of staff or client hygiene practices, as the tool has been designed as a checklist and the question around hygiene knowledge among staff was too vague to be an accurate assessment. Similarly, there were no key informant interviews with staff or clients and the data obtained is what was observed by the data collector at the time of visit. This limits the understanding of practices in the health care facility around hand and environmental hygiene, birth practices and both staff and clients’ perception of access to WASH in this setting.

Another key limitation of this assessment is that it does not capture any systems or processes that support the maintenance and operation of WASH facilities. Even if there were an affirmative response at the health care facility in relation to these systems being in place, this tool cannot verify this.

### Further specific limitations

**Water quality:** no water quality testing was conducted during this assessment. There was one question on whether the facility treated water for drinking but nothing specific was asked on filtration systems. Assessing the quality of drinking water for medical uses and cleaning of medical equipment may be important to understand the transmission of infection in the delivery setting. The addition of microbial swabbing of maternity wards and delivery units may be considered a valuable addition to this assessment.

**Wastewater disposal:** this tool did not assess whether wastewater was disposed of rapidly and safely, only that there was a system in place.

**Health care waste disposal:** waste disposal practices and the disposal chain were not investigated. While the majority of facilities had sharps boxes that were stated to be collected, this tool has no way of capturing handling or final disposal of waste.

**Excreta disposal:** while there were many questions aiming to capture the accessibility of toilet facilities, some of these definitions were confusing to the data collection team at the time of the survey. Usage of sanitation facilities was also not assessed by this tool.

**Operation and maintenance:** perhaps the largest gap in this tool is the capture of data on operation and maintenance of WASH infrastructure – i.e. water supply systems or sanitation and drainage facilities. Respondents seemed to be confused by the way these questions were structured and as a result the findings are inconclusive. This tool was unable to conclude reasons for non-functional systems and who may be responsible for maintenance of WASH infrastructure.

# 7. Recommendations

## Assessment tool development

Following the pilot study and the identification of the limitations of the assessment tool, revisions are required before it can be used in a larger-scale assessment. This will include incorporating the following recommendations and adapting the tool to the scale and context of subsequent assessments.

In considering the use of this tool at a district or national scale, further development of indicators and a clear analysis plan are needed to ensure that the assessment is successful in generating useful data. There are two ways in which this assessment tool can be used to assess WASH in health care facilities: to collect nationally representative data to influence decision makers and inform policies around minimum standards of service quality; and to inform improvements and investments in health care at facility level.

## Further uses of this assessment tool

First, the assessment tool can be used on a large scale to collect data on broader WASH coverage in health care facilities in Cambodia, representative of the national or provincial level. One of the ten key findings of the global landscaping report on the status of WASH in health care facilities (WHO, UNICEF, 2015), is that better data is needed, with only 54, 36 and 34 countries being able to produce national level data on water, sanitation and hygiene, respectively. This lack of data is a major barrier towards understanding and addressing the issue of WASH in health care facilities. The data received from Cambodia for this report were from the 2008 Cambodian Health Impact Evaluation (NCHADS, NTP, CNM, PSO, Macro International and WHO, 2009), which only considered water supply in its assessment of basic infrastructure and followed the JMP definition of access as being the presence of a water source within 500 metres.

Implementing this assessment tool more widely in Cambodia would contribute to the body of evidence needed not only to inform national policy, but also to drive global action. The addition of a qualitative component that extracts more in-depth data from key informants, including staff and patients, could also be used in conjunction with the existing survey. This may provide more information on staff behaviours

and practices, particularly around the time of delivery, which gives insight into the use of available WASH facilities in health care facilities. Good hygiene behaviour must be practiced by staff in order to see a reduction in health care associated infections.

Second, key indicators could be drawn from this assessment tool and from the indicators that are being developed by WHO and UNICEF for global use and inserted into existing national monitoring mechanisms, such as the Ministry of Health's Health Management Information System (HMIS) or Quality of Care Assessment level 2 of health care facilities, which collect service delivery data from health care facilities in Cambodia. Use of the HMIS for ongoing monitoring of the availability of WASH elements in all health care facilities would produce a picture of quality, quantity and functionality of WASH service. The basis of these indicators exist in this tool, though they would need to undergo consultation with the Ministry of Health to be developed for use in the HMIS or level 2 assessment.

A further consideration for the development of this assessment tool is for an adaptation to include a traffic light system that can be used to identify geographical regions or level of facilities that require attention. This would be particularly useful for a national level assessment. Similarly, a more detailed risk assessment of individual facilities, like WHO's Water Safety Plan (WSP) but specific to the health care setting, could identify key risks and prioritise investment in improvements and upgrades. As discussed previously, a key limitation of this assessment tool is that it fails to capture detail on the systems and processes at the facility level that support good upkeep, practice and maintenance of WASH facilities. Collecting these data as part of a risk assessment could be a quick method to give each facility a 'good', 'satisfactory' or 'bad' grade at completion of the assessment, which would then allow the Ministry of Health to identify and respond to facilities that score poorly. For examining both broader coverage and the individual facility level, this type of scorecard or risk assessment can be used in the development of national action plans to mitigate the risks of poor WASH access in health care facilities and inform the allocation of resources for infrastructure upgrades.

Another adaptation to consider is the addition of indicators assessing preparedness and resilience of health care facilities in the event of natural disaster, extreme climatic events or disease outbreak. Health care facilities are often the first point of call in emergencies and disasters, therefore an assessment of infrastructure resilience and facility preparedness may provide decision makers with information that is crucial to planning for disaster risk reduction and the prevention and control of disease outbreak. The need for resilient health systems was highlighted in WHO's Ebola Interim Assessment Panel report following the Ebola outbreak in Africa this year (WHO, 2015), in which health care facilities played an essential role.

Finally, when considering the development of this type of assessment, the question that needs to be asked is: how is this information useful for improving access to WASH in health care facilities? And is the objective of these assessments to inform resource allocation at the facility level, or is it to influence higher-level decision making? The tool that was tested in this study does not as yet specifically fit the requirements for either of these objectives; however it does provide an outline of a comprehensive and tested checklist of access to WASH that can be built upon, or adapted. Whether the next steps for this assessment tool are a scale-up to a provincial or national level assessment, or an adaptation of key indicators for insertion into existing health care facility monitoring mechanisms, the tool tested in this study has been shown to produce useful information on the status of WASH in health care facilities in Cambodia.

Access to safe water, sanitation and hygiene is fundamental to infection prevention and control, and good health outcomes in health care facilities – particularly for mothers and newborns. Without safe, sustainable and accessible WASH in health care facilities, aspirations to provide high quality universal health coverage and reduce neonatal and maternal mortality will not be met.

## Annex 1: Analysis of existing health care facility assessments

Tool	Developed by	Key areas of information	Data collection tools	Uses	Limitations	Relevant programme context
<b>Service Availability and Readiness Assessment (SARA)</b> *Replaced the Service Availability Mapping (SAM) tool	World Health Organization USAID	Service availability – physical presence of the delivery of services, encompassing health infrastructure, core health personnel, and service utilisation  General service readiness - overall capacity to provide general services such as basic amenities, basic equipment, standard precautions, laboratory tests, and medicines and commodities	Key informant interviews; observations of specific items in facility	Designed to assess and monitor the service availability and readiness of the health sector and to generate evidence to support the planning and managing of a health system	To calculate service availability, ALL facilities in an administrative unit must be assessed. Cannot use sampling.	Designed to be used at regional or national level

Tool	Developed by	Key areas of information	Data collection tools	Uses	Limitations	Relevant programme context
<b>Service Provision Assessment (SPA)</b>	Measure DHS USAID	Availability of infrastructure and resources Facility-level systems to support quality services and maintenance of infrastructure Information on staff qualifications, training and supervision collected through provider interviews Adherence to standards in practice, collected through client-provider observations and client exit interviews SPA modules include: family planning, child health, maternal health, sexually transmitted infection services, tuberculosis services, and an extensive module for HIV/AIDS services	Facility resources audit questionnaire; Provider interview; Client-provider observation checklist; Exit interview *Inventory component uses SARA indicators	Presents a picture of services and service quality on any given day. It validates reported information, documenting what is reported as usually present or functioning, and the actual situation on the day of the survey.	Doesn't provide “gold standard” quality indicators e.g. no validation of the accuracy of provider assessments Doesn't provide information on why services are bad or good, or why services are used or not used except as how these may relate to infrastructure, resources and systems	Best used at the regional or national level. Doesn't replace detailed programme assessments or reports but does provide objective and quantifiable information on the status of health services. Recommended repeat every 3-5 years to measure whether change has been sustained over time

Tool	Developed by	Key areas of information	Data collection tools	Uses	Limitations	Relevant programme context
<b>Rapid Health Facility Assessment (R-HFA)</b>	USAID Maternal and Child Health Integrated Program (MCHIP)	Rapid instrument for measuring a small set of key indicators to give a “balanced scorecard” for maternal, newborn and child health services at the primary healthcare level	Facility checklist; Health worker survey; Observation survey for sick child care; Client exit interview;	Originally designed for use by NGOs within USAID programs but upscaling to use by district level management teams has been shown to be successful.	Designed for emergency settings, takes quite a narrow view of WASH	Recommended frequency is 3-5 years, originally designed to be used at baseline and endline of Child Survival and Health Grants Programs (MEASURE Evaluation/World Bank/USAID).
	MEASURE Evaluation	Availability of a minimum level of infrastructure, personnel, supplies, and medications for essential neonatal and child health care. The determination of what constitutes minimal level is based on the International Health Facility Assessment Network (IHFAN) core indicators	Optional child health worker survey	Identifies key bottlenecks to quality service delivery, focusing on four key areas.	No information gathered on quality of services	

Tool	Developed by	Key areas of information	Data collection tools	Uses	Limitations	Relevant programme context
<b>The Soapbox Collaborative Needs Assessment Tool</b>	The Soapbox Collaborative	As well as infrastructure and services, collects data on policies and procedures, and staff training	Health facility checklist; Health worker interview	Designed as part of a baseline study that will be used to develop a national level intervention	Includes a qualitative component to investigate possible barriers to infection prevention and control in the labour and delivery area	Collects data on personnel training, which is useful to assess the quality of services within the health facility
		Infection control			Comprehensive infection control assessment	
<b>Service Delivery Indicators Assessment (SDI)</b>	World Bank African Economic Research Consortium	Designed for African context – also used in schools.	Health facility checklist; Staff roster; Clinical knowledge assessment; Public expenditure tracking	The Service Delivery Indicators are a set of health and education indicators that aim to examine the effort and ability of staff and the availability of key inputs and resources that contribute to a functioning school or health facility.	Assessment of WASH is limited to water supply and sanitation availability.	Designed to be used at a national or regional level, with a small number of indicators to track progress over time and across African countries.

## Annex 2: Assessment tool

<b>Safer Health Facilities in Cambodia</b>			
<b>Health Facility Assessment</b>			
<b>SECTION 1: COVER PAGE</b>			
<b>FACILITY IDENTIFICATION</b>			
<b>001</b>	<b>FACILITY NUMBER</b>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	
<b>002</b>	<b>NAME OF FACILITY</b>		
<b>003</b>	<b>LOCATION OF FACILITY</b>		
<b>004</b>	<b>REGION/PROVINCE</b>		
<b>005</b>	<b>DISTRICT</b>		
<b>006</b>	<b>TYPE OF FACILITY</b>	District/provincial hospital.....	1
		Health centre/clinic.....	2
		Maternal/child health clinic.....	3
		Other [specify]_____	96
<b>007</b>	<b>MANAGING AUTHORITY</b>	Government/public.....	1
		NGO .....	2
		Private.....	3
		Faith-based.....	4
		Other [specify]_____	96
<b>008</b>	<b>URBAN/RURAL</b>	Urban.....	1
		Rural.....	2
<b>009</b>	<b>OUTPATIENT ONLY</b>	Yes.....	1
		No.....	2
<b>INTERVIEWER VISITS</b>			
DATE			
INTERVIEWER NAME			
RESULT			
<b>RESULT CODES (LAST VISIT):</b> 1 = FACILTY COMPLETED 2 = FACILITY RESPONDENTS NOT AVAILABLE 3 = POSTPONED 4 = FACILITY REFUSED 5 = PARTIALLY COMPLETED 6 = OTHER [specify]_____			

## MODULE 1: HEALTH FACILITY CHECKLIST

<b>SECTION 2: STAFFING</b>				
	<b>I have a few questions about the staffing at this facility. Please tell me how many staff with each of the following qualifications are currently assigned to, employed by, or seconded to this facility. Please count each staff member one time only on the basis of their highest technical or professional qualification.</b>	<b>On staff</b>	<b>Here today</b>	
<b>200</b>	Generalist (non-specialist) medical doctors			
<b>201</b>	Specialist medical doctors			
<b>202</b>	Non-physician clinicians/para-medical professionals			
<b>203</b>	Nursing professionals			
<b>204</b>	Midwifery professionals			
<b>205</b>	Community health workers			
<b>206</b>	Support staff - i.e. orderly			

<b>SECTION 3: INPATIENT AND OBSERVATION BEDS</b>		
<b>301</b>	Excluding any delivery beds, how many overnight/inpatient beds in total does this facility have, both for adults and children?	
<b>302</b>	Of the overnight/inpatient beds in this facility, how many are dedicated maternity beds? [this DOES NOT include delivery beds]	

<b>SECTION 4: INFRASTRUCTURE</b>		
<b>POWER SUPPLY</b>		
<b>400</b>	Does your facility have electricity from any source (e.g. electricity grid, generator, solar or other) including for stand-alone devices (fridge)?	YES ..... 1 NO ..... 2
<b>401</b>	What is the electricity used for in this facility?	ONLY STAND-ALONE ELECTRIC MEDICAL DEVICES/APPLIANCES (e.g. cold room, fridge, suction apparatus etc.) ..... 1  ELECTRIC LIGHTING (EXCLUDING FLASHLIGHTS) AND COMMUNICATIONS ..... 2

		ELECTRIC LIGHTING, COMMUNICATIONS ANS 1-2 ELECTRICAL MEDICAL DEVICES.....3  ALL ELECTRICAL NEEDS OF FACILITY.....4	
402	What is the facility's main source of electricity?	CENTRAL SUPPLY OF ELECTRICITY (i.e. national or community grid) .....1  GENERATOR (FUEL OR BATTERY OPERATED).....2  SOLAR .....3  OTHER_____ 96	
403	Other than the main or primary source, does the facility have a secondary or back-up source of electricity?  If YES: what is the secondary source of electricity?	NO SECONDARY SOURCE CENTRAL SUPPLY OF ELECTRICITY (e.g. national or community grid) .....1  GENERATOR (FUEL OR BATTERY OPERATED).....2  SOLAR .....3  OTHER_____ 96	
404	During the past seven days, was electricity available at all times from the main or back-up source when the facility was open for services?	ALWAYS AVAILABLE (NO INTERRUPTIONS).....1  OFTEN AVAILABLE (INTERRUPTIONS OF LESS THAN 2 HOURS PER DAY) .....2  SOMETIMES AVAILABLE (FREQUENT OR PROLONGED INTERRUPTIONS OF MORE THAN 2 HOURS PER DAY) .....3	
405	On average, how many hours per day is this facility open?	4 HOURS OR LESS .....1 5 TO 8 HOURS .....2  9 TO 16 HOURS .....3  17 TO 23 HOURS .....4 24 HOURS .....5	
<b>INFECTION CONTROL</b>			
406	Does this facility have any guidelines on standard precautions for infection prevention?	YES .....1 NO .....2	
<b>PROCESSING OF EQUIPMENT FOR REUSE</b>			
<b>Please tell me if the following items used for processing of equipment for reuse are available and functional in the facility today</b>		<b>A) AVAILABLE</b>	<b>B) FUNCTIONING</b>
416   Electric autoclave		YES.....1 NO.....2	YES.....1 NO.....2
417   Non-electric autoclave		YES.....1	YES.....1

		NO.....2	NO.....2	
418	Electric dry heat steriliser	YES.....1 NO.....2	YES.....1 NO.....2	
419	Electric boiler or steamer	YES.....1 NO.....2	YES.....1 NO.....2	
420	Non-electric pot with cover for boiling/steaming	YES.....1 NO.....2	YES.....1 NO.....2	
421	Heat source for non-electric equipment	YES.....1 NO.....2	YES.....1 NO.....2	

**SECTION 5: AVAILABLE SERVICES****OBSTETRIC AND NEWBORN SERVICES**

500	Does this facility offer delivery (including normal delivery, basic emergency obstetric care, and/or comprehensive emergency obstetric care) and/or newborn care services?	YES .....1 NO .....2
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**TAKE A PHOTO OF THE BOARD THAT COUNTS DELIVERIES, DIFFERENT DISEASES ETC.**

501	Does this facility offer caesarean sections?	YES .....1 NO .....2
	Please tell me how many of the following obstetric services have been performed since the beginning of the year:	
502	Normal vaginal delivery	
503	Assisted vaginal delivery	
504	Caesarean section	

**SECTION 6: WATER AVAILABILITY****TAKE PHOTOS OF THE WATER SOURCE IF PERMISSION IS GIVEN**

600	What is the most commonly used source of water for the facility at this time?	PIPED INTO FACILITY .....1 PIPED INTO FACILITY GROUNDS .....2 BOREHOLE WITH HAND PUMP .....3 BOREHOLE WITH MECHANISED PUMP .....4 DUG WELL WITH HAND PUMP .....5 DUG WELL WITH MECHANISED PUMP .....6 SURFACE WATER .....7 RAINWATER HARVESTING TANK .....8 DELIVERED .....9	
601	Do you have a secondary water supply?	YES .....1 NO .....2 DON'T KNOW .....99	
602	What is the secondary source of water for the facility at this time?	PIPED INTO FACILITY .....1 PIPED INTO FACILITY GROUNDS .....2 BOREHOLE WITH HAND PUMP .....3 BOREHOLE WITH MECHANISED PUMP .....4 DUG WELL WITH HAND PUMP .....5	

		DUG WELL WITH MECHANISED PUMP ..... 6 SURFACE WATER ..... 7 RAINWATER HARVESTING TANK ..... 8 DELIVERED ..... 9	
603	Does the main water source provide enough water for the facility when it's functional?  [This includes drinking water and water for handwashing]	YES, ENOUGH WATER ALL YEAR ..... 1 SEASONAL (ONLY IN THE WET SEASON) ..... 2 NEVER ENOUGH WATER ..... 3 DON'T KNOW ..... 99	
604	What is the most commonly used water source in the <b>DRY</b> season?	PIPED INTO FACILITY ..... 1 PIPED INTO FACILITY GROUNDS ..... 2 BOREHOLE WITH HAND PUMP ..... 3 BOREHOLE WITH MECHANISED PUMP ..... 4 DUG WELL WITH HAND PUMP ..... 5 DUG WELL WITH MECHANISED PUMP ..... 6 SURFACE WATER ..... 7 RAINWATER HARVESTING TANK ..... 8 DELIVERED ..... 9	
605	What is the most commonly used source of water in the <b>RAINY/WET</b> season?	PIPED INTO FACILITY ..... 1 PIPED INTO FACILITY GROUNDS ..... 2 BOREHOLE WITH HAND PUMP ..... 3 BOREHOLE WITH MECHANISED PUMP ..... 4 DUG WELL WITH HAND PUMP ..... 5 DUG WELL WITH MECHANISED PUMP ..... 6 SURFACE WATER ..... 7 RAINWATER HARVESTING TANK ..... 8 DELIVERED ..... 9	
606	What is the main water source used for?  <b>Select all that apply.</b>	DRINKING ..... 1 HANDWASHING ..... 2 ANAL CLEANSING AFTER DEFECATION ..... 3 FLUSHING OR POUR FLUSH ..... 4 CLEANING ..... 5 PERSONAL HYGIENE/BATHING ..... 6 OTHER ..... 96	
607	Is a water outlet from this source available within 150m of the facility?	YES ..... 1 NO ..... 2	
608	During the past two months has the water supply been interrupted in any way?	YES ..... 1 NO ..... 2	
609	How often is the water source functioning? I.e. when is water available from this source?	ALL DAY, EVERY DAY ..... 1 EVERY DAY, BUT NOT FOR ALL 24 HOURS ..... 2 ALMOST ALWAYS, OCCASSIONALLY NO WATER AVAILABLE ..... 3 NOT AVAILABLE FOR EXTENDED PERIODS/SEASONAL ..... 4 WATER POINT NO LONGER IN USE ..... 5	
610	Is this water source functioning now?  <b>Can we see it?</b>	YES ..... 1 PARTIALLY (WORKING BUT NOT AS DESIGNED) ..... 2 NO ..... 3	
611	How long has it been non-functional, or partially	LESS THAN ONE DAY ..... 1	

	functional?	MORE THAN ONE DAY, LESS THAN A WEEK ..... 2 MORE THAN A WEEK, LESS THAN ONE MONTH ..... 3 MORE THAN A MONTH ..... 4	
612	Are these water sources adequate for all water needs?	YES ..... 1 NO ..... 2 DON'T KNOW ..... 99	
613	Are these water sources used for drinking water for staff?	YES ..... 1 NO ..... 2	
614	What is the source of water for drinking water for staff?	DELIVERED WATER ..... 1 BOTTLED WATER ..... 2 NONE PROVIDED ..... 3	
615	Is drinking water provided for clients?	YES ..... 1 NO ..... 2	
616	What is the source of drinking water for clients?	DELIVERED WATER ..... 1 BOTTLED WATER ..... 2	
617	If the drinking water comes from the main facility water source, is the drinking water treated in any way?	YES ..... 1 SOMETIMES ..... 2 NO ..... 3 <u>If 'Yes' please specify</u>	
618	If the water is not always treated, why not?  Select all that apply	WATER SOURCE IS CONSIDERED SAFE ..... 1 FACILITY DOESN'T HAVE FILTERS OR PURIFICATION MATERIAL ..... 2 NONE OF THE STAFF KNOW HOW TO TREAT WATER ..... 3 MANAGEMENT DOESN'T KNOW IF IT'S NECESSARY ..... 4 THERE IS NO TIME TO TREAT THE WATER ..... 5 THERE ARE INSUFFICIENT FUNDS FOR WATER TREATMENT ..... 6 OTHER ..... 96	
619	What is the volume of water storage at this facility, <b>in total</b> ?		
620	Are the storage containers fully functional? That is, are they free from leaks and do their taps work?	YES ..... 1 NO ..... 2	
621	When was the last time the storage containers were cleaned?		
<b>WATER POINTS</b>			
622	Total number of water points in the facility		
624	Total number of handwashing sinks with taps in the facility		
625	Is there a shower facility available for clients?	YES ..... 1 NO ..... 2	

<b>SECTION 7: SANITATION FACILITIES</b>	
700	Is there a toilet facility in <b>functioning condition</b>

SQUAT FLUSH TOILET ..... 1

	that is available for general outpatient client use?  If yes, what type?	VENTILATED IMPROVED PIT LATRINE ..... 2 PIT LATRINE WITH SLAB ..... 3 PIT LATRINE WITHOUT SLAB/OPEN PIT ..... 4 COMPOSTING TOILET ..... 5 BUCKET ..... 6 HANGING TOILET/HANGING LATRINE ..... 7 NO FACILITIES/BUSH/FIELD ..... 8	
701	How many individual facilities are there in total in the facility?  An individual facility is an individual stall/seat/squat plate when a single person can defecate in private – i.e. not a urinal	See toilet checklist	
702	Are there toilet facilities available specifically for client or staff with disabilities?  How many?	YES ..... 1 NO ..... 2 Number	
703	If the toilet facilities are external to the health facility, what is the approximate distance?		
704	Is the path to the toilet facilities wide enough for a disabled or heavily pregnant user? (90cm at least)	YES ..... 1 NO ..... 2	
705	Is the path clear of obstacles, firm and non-slippery?	YES ..... 1 NO ..... 2	
706	Could a visually impaired person follow the path?	YES ..... 1 NO ..... 2	
707	If there are steps to the facility, are these a manageable height?	YES ..... 1 NO ..... 2	
708	If there are steps, is there a ramp for a wheelchair?	YES ..... 1 NO ..... 2	
709	If there are steps, is there a handrail for support?	YES ..... 1 NO ..... 2	
710	Are the entrances to the toilet facilities wide enough for a wheelchair user to enter? (At least 100cm wide)?	YES, ALL ..... 1 SOME ..... 2 NONE ..... 3	
711	Is the toilet facility interior large enough to allow for a wheelchair/crutch user, heavily pregnant women, or a user and a helper?	YES, ALL ..... 1 SOME ..... 2 NONE ..... 3	
712	Is there a rail for support in the toilet facility?	YES, ALL ..... 1 SOME ..... 2 NONE ..... 3	
713	Are there separate toilet facilities for men and women?	YES, ALL ..... 1 SOME ..... 2 NONE ..... 3	
714	Are the toilet facilities for women able to be locked from the inside?	YES, ALL ..... 1 SOME ..... 2	

		NONE .....	3	
715	Do the toilet facilities contain cleansing materials – i.e. water, toilet tissue?	YES, ALL .....	1	
		SOME .....	2	
		NONE .....	3	
716	Does the toilet facility have a receptacle for disposal of menstrual hygiene products?	YES, ALL .....	1	
		SOME .....	2	
		NONE .....	3	
717	How is human solid waste disposed?	THROWN ON RUBBISH DUMP NEAR OR WITHIN FACILITY GROUNDS .....	1	
		BURIED WITHIN OR NEAR FACILITY GROUNDS .....	2	
		BURNED/INCINERATED WITHIN OR NEAR FACILITY GROUNDS .....	3	
		COLLECTED BY WASTE DISPOSAL SERVICE .....	4	
		OTHER .....	96	
		DON'T KNOW .....	99	
718	If the facility has an on-site sanitation system such as a septic tank or pit latrine, is there a schedule for emptying it and disposing of the sludge?	YES .....	1	
		NO .....	2	
		DON'T KNOW .....	99	
		NOT APPLICABLE .....	98	
719	Is the sludge disposed of safely?  If it's in an open pit, water source, vacant lot etc. then NO	YES .....	1	
		NO .....	2	
		DON'T KNOW .....	99	
		NOT APPLICABLE .....	98	
720	What happens when the waste receptacles are full?	COLLECTED BY A WASTE COMPANY .....	1	
		DISCHARGED BEHIND THE FACILITY .....	2	
		REMOVED MANUALLY .....	3	
		BUILD ANOTHER PIT .....	4	
		DON'T KNOW .....	99	
721	Does the facility have a drainage system for removing waste water from the facility grounds?	YES .....	1	
		NO .....	2	
722	If yes, is it functional today?	YES .....	1	
		NO .....	2	

<b>SECTION 8: WASTE DISPOSAL AND MANAGEMENT</b>				
801	How does this facility finally dispose of <b>sharps waste</b> – i.e. filled sharps containers?	<b>BURN INCINERATOR</b> 2-CHAMBER INDUSTRIAL (800-1000+ °C) .....	1	
		1-CHAMBER DRUM/BRICK .....	2	
		<b>OPEN BURNING</b> FLAT GROUND - NO PROTECTION .....	3	
		PIT OR PROTECTED GROUND .....	4	
		<b>DUMP WITHOUT BURNING</b> FLAT GROUND – NO PROTECTION .....	5	
		COVERED PIT OR PIT LATRINE .....	6	
		OPEN PIT – NO PROTECTION .....	7	
		PROTECTED GROUND OR PIT .....	8	
		<b>REMOVE OFFSITE</b> STORED IN COVERED CONTAINER .....	9	
		STORED IN OTHER PROTECTED ENVIRONMENT .....	10	

		STORED UNPROTECTED ..... 11 OTHER ..... 96 NEVER HAS SHARPS WASTE ..... 95	
802	How does this facility finally dispose of <b>medical waste</b> other than sharps boxes – i.e. used bandages etc?	SAME AS FOR SHARPS ..... 88 <b>BURN INCINERATOR</b> 2-CHAMBER INDUSTRIAL (800-1000+ °c) ..... 1 1-CHAMBER DRUM/BRICK ..... 2 <b>OPEN BURNING</b> FLAT GROUND - NO PROTECTION ..... 3 PIT OR PROTECTED GROUND ..... 4 <b>DUMP WITHOUT BURNING</b> FLAT GROUND – NO PROTECTION ..... 5 COVERED PIT OR PIT LATRINE ..... 6 OPEN PIT – NO PROTECTION ..... 7 PROTECTED GROUND OR PIT ..... 8 <b>REMOVE OFFSITE</b> STORED IN COVERED CONTAINER ..... 9 STORED IN OTHER PROTECTED ENVIRONMENT ..... 10 STORED UNPROTECTED ..... 11 OTHER ..... 96 NEVER HAS MEDICAL WASTE ..... 95	
803	How does this facility finally dispose of <b>normal solid waste</b> – i.e. non-infectious general rubbish?	SAME AS FOR SHARPS ..... 88 <b>BURN INCINERATOR</b> 2-CHAMBER INDUSTRIAL (800-1000+ °c) ..... 1 1-CHAMBER DRUM/BRICK ..... 2 <b>OPEN BURNING</b> FLAT GROUND - NO PROTECTION ..... 3 PIT OR PROTECTED GROUND ..... 4 <b>DUMP WITHOUT BURNING</b> FLAT GROUND – NO PROTECTION ..... 5 COVERED PIT OR PIT LATRINE ..... 6 OPEN PIT – NO PROTECTION ..... 7 PROTECTED GROUND OR PIT ..... 8 <b>REMOVE OFFSITE</b> STORED IN COVERED CONTAINER ..... 9 STORED IN OTHER PROTECTED ENVIRONMENT ..... 10 STORED UNPROTECTED ..... 11 OTHER ..... 96	
804	How does this facility finally dispose of the <b>placenta</b> after a woman has given birth?	SAME AS FOR SHARPS ..... 88 <b>BURN INCINERATOR</b> 2-CHAMBER INDUSTRIAL (800-1000+ °c) ..... 1 1-CHAMBER DRUM/BRICK ..... 2 <b>OPEN BURNING</b> FLAT GROUND – NO PROTECTION ..... 3 PIT OR PROTECTED GROUND ..... 4 <b>DUMP WITHOUT BURNING</b> FLAT GROUND – NO PROTECTION ..... 5 COVERED PIT OR PIT LATRINE ..... 6 OPEN PIT – NO PROTECTION ..... 7 PROTECTED GROUND OR PIT ..... 8 <b>REMOVE OFFSITE</b>	

		STORED IN COVERED CONTAINER ..... 9 STORED IN OTHER PROTECTED ENVIRONMENT ..... 10	
		STORED UNPROTECTED ..... 11 OTHER ..... 96	
805	If there is an incinerator used – is it functional today?	YES ..... 1 NO ..... 2 DON'T KNOW ..... 99	
806	Where is the incinerator located?	DIRECTLY CONNECTED TO THE FACILITY ..... 1 LOCATED NEAR THE FACILITY ..... 2 DIRECTLY CONNECTED TO THE TOILET BLOCK ..... 3 LOCATED NEAR THE TOILET BLOCK ..... 4 OTHER ..... 96	
807	Today, are the waste receptacles overflowing or obviously too full?	YES, ALL ..... 1 SOME ..... 2 NONE ..... 3	
808	How often is solid waste disposed of or collected?	AT LEAST ONCE A DAY ..... 1 BETWEEN ONCE EVERY TWO DAYS AND ONCE A WEEK ..... 2 LESS FREQUENTLY THAN ONCE A WEEK ..... 3 OTHER ..... 96 DON'T KNOW ..... 99	
809	What happens when the waste receptacles are full?	COLLECTED BY A WASTE COMPANY ..... 1 DISCHARGED BEHIND THE FACILITY ..... 2 REMOVED MANUALLY ..... 3 BUILD ANOTHER PIT ..... 4 DON'T KNOW ..... 99	

**SECTION 9: MAINTENANCE**

900	Who has primary responsibility of the maintenance of the facility's water system?	PDRD ..... 1 PROVINCIAL LEVEL AUTHORITIES ..... 2 PHD ..... 3 THE FACILITY ..... 4 NO ONE IS RESPONSIBLE ..... 5 OTHER ..... 96 DON'T KNOW ..... 99 NOT APPLICABLE ..... 98	
901	In the opinion of the administration, are the water systems sufficiently maintained and repaired when needed?	YES ..... 1 NO ..... 2 DON'T KNOW ..... 99 NOT APPLICABLE ..... 98	
902	If not, what are the primary reasons that the water system is not functional?	UNCLEAR WHO IS RESPONSIBLE FOR MAINTENANCE ..... 1 POOR MANAGEMENT AND MAINTENANCE PROCEDURES ..... 2 LACK OF SPARE PARTS ..... 3 LACK OF CONSUMABLES SUCH AS FUEL, CHEMICALS, ELECTRICITY ..... 4 POOR INITIAL DESIGN OF THE SYSTEM ..... 5	

		AGE OF THE SYSTEM ..... 6 LACK OF FUNDS FOR MAINTENANCE AND REPAIR ..... 7 LACK OF TECHNICAL SUPPORT FOR MAINTENANCE AND REPAIR ..... 8  OTHER ..... 96 DON'T KNOW ..... 99 NOT APPLICABLE ..... 98	
903	Who has primary responsibility of the maintenance of the facility's sanitation system?	PDRD ..... 1 PROVINCIAL LEVEL AUTHORITIES ..... 2  PHD ..... 3 THE FACILITY ..... 4 NO ONE IS RESPONSIBLE ..... 5 OTHER ..... 96 DON'T KNOW ..... 99 NOT APPLICABLE ..... 98	
904	In the opinion of the administration, are the sanitation systems sufficiently maintained and repaired when needed?	YES ..... 1 NO ..... 2 DON'T KNOW ..... 99 NOT APPLICABLE ..... 98	
905	Within the facility, who is responsible for cleaning the toilets?  Select all that apply	CLEANING STAFF ..... 1 HEALTH WORKERS ..... 2 NO ONE ..... 3 OTHER ..... 96 NOT APPLICABLE ..... 98	

<b>SECTION 10: HYGIENE</b>			
1000	Are staff at this facility trained in safe hygiene practices?	YES ..... 1 NO ..... 2	
1001	If yes, How are they trained?	DURING STAFF INDUCTION ..... 1 STAND-ALONE MODULE FOR ALL STAFF ..... 2 INFORMALLY or OCCASSIONALLY ..... 3 OTHER ..... 96	
1002	Is handwashing with soap a prominent part of the training?	YES ..... 1 NO ..... 2 DON'T KNOW ..... 99	
1003	Is handwashing with soap at <b>critical times</b> a prominent part of the training?  Critical times included after using the toilet and before and after seeing patients	YES ..... 1 NO ..... 2 DON'T KNOW ..... 99	
1004	Does the facility have handwashing facilities?	YES ..... 1 NO ..... 2	
<b>CLOSER INSPECTION OF HANDWASHING FACILITIES IN THE MATERNITY WARD WILL BE CONDUCTED IN MODULE 2</b>			
1005	What kind of handwashing facilities does the facility have?	SINK WITH CONNECTED TAP ..... 1 BUCKET WITH TAP ..... 2 STANDING WATER IN BUCKET ..... 3 OTHER ..... 96	
1006	How many handwashing facilities are there?	INSIDE TOILET BLOCK	

	Mark number for all that apply	CLOSE TO TOILET BLOCK IN FACILITY IN MATERNITY WARD WITHIN GROUNDS BUT NOT CLOSE TO TOILETS OTHER	
<b>1007</b>	At the time of visit, was water available at all handwashing facilities?	YES, IN ALL .....1 YES, IN >50% .....2 YES BUT IN <50% .....3 NO WATER AVAILABLE .....4	
<b>1008</b>	At the time of visit, was soap or disinfectant material available at all handwashing facilities?	YES, IN ALL .....1 YES, IN >50% .....2 YES BUT IN <50% .....3 NO SOAP AVAILABLE .....4	
<b>1009</b>	Who is responsible for supplying the facility with soap?	PDRD .....1 PROVINCIAL LEVEL AUTHORITIES .....2 PHD .....3 THE FACILITY .....4 NO ONE IS RESPONSIBLE .....5 OTHER .....96 DON'T KNOW .....99 NOT APPLICABLE .....98	
<b>1010</b>	Are all the handwashing facilities accessible by clients or staff with disabilities?  This means that the basins are low enough for someone in a wheelchair to access; that taps can be easily operated by someone with a physical disability related to their hands or arms; and that the path is accessible by someone using a wheelchair or crutches	YES, IN ALL .....1 YES, IN >50% .....2 YES BUT IN <50% .....3 NO .....4	

## MODULE 2: WARD WALKTHROUGH CHECKLIST

<b>SECTION 11: MATERNITY WARD – GENERAL AREA AND HANDWASHING</b>	
1100	The floor is:  VISIBLY CLEAN [It is free from build-up/residue]
	FREE FROM CLUTTER [unused or unnecessary equipment or furniture not in the way]
	FREE FROM FOUL OR STALE ODOURS
1101	All stock and equipment are: <b>[appropriate equipment e.g. BP machine]</b>
1102	Drinkable water is:  AVAILABLE FOR STAFF
1103	Illustrated hand hygiene posters are:  DISPLAYED AT EVERY HANDWASHING POINT DISPLAYED IN GENERAL WARD/FACILITY AREAS ALL IN A GOOD STATE OF REPAIR [they can be read and the information is complete]
<b>HAND WASHING FACILITY</b>	
1104	Handwashing facilities in the ward/facility are:  AVAILABLE AT A SINK WITH A CONNECTED TAP AVAILABLE AT A BUCKET WITH A TAP STANDING WATER IN A BUCKET OTHER [please specify in comments box]
1105	Near or at the handwashing facility for staff:  WATER IS CURRENTLY AVAILABLE SOAP, OR SUITABLE ALTERNATIVE, IS CURRENTLY AVAILABLE

		THERE IS DISPOSABLE MATERIAL ON WHICH TO DRY HANDS	YES .....1 NO .....2
1106	Handwashing facilities for staff are:	ACCESSIBLE	YES .....1 NO .....2
		LOCATED NEAR THE CLIENT'S BED	YES .....1 NO .....2
		VISIBLY CLEAN	YES .....1 NO .....2
		FREE FROM ITEMS THAT ARE NOT NEEDED FOR HANDWASHING	YES .....1 NO .....2
1107	Tap mechanism is:	VISIBLY CLEAN	YES .....1 NO .....2
		FREE FROM VISIBLE SIGNS OF DAMAGE	YES .....1 NO .....2
		FUNCTIONING	YES .....1 NO .....2
		<b>BED</b>	
1108	Bed frame is:	VISIBLY CLEAN	YES .....1 NO .....2
		FREE FROM VISIBLE SIGNS OF DAMAGE, RUST, RIPS OR CRACKS	YES .....1 NO .....2
1109	Fixed mattress cover for bed is:	VISIBLY CLEAN	YES .....1 NO .....2
		INTACT, FREE FROM SIGNS OF DAMAGE, RIPS OR CRACKS	YES .....1 NO .....2
		MADE FROM EASILY CLEANED, WATERPROOF MATERIAL	YES .....1 NO .....2
1110	Hard and horizontal surface next to the client is:	VISIBLY CLEAN, FREE FROM BUILD UP OF RESIDUE/DIRT	YES .....1 NO .....2
		FREE FROM VISIBLE SIGNS OF RUST AT OR ABOVE CLIENT LEVEL	YES .....1 NO .....2
		WASHABLE AND IMPERVIOUS TO MOISTURE	YES .....1 NO .....2

**SECTION 12: DELIVERY UNIT – GENERAL AREA AND HANDWASHING**

1200	The floor is:	VISIBLY CLEAN	YES .....1
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		<b>[It is free from build-up/residue]</b>	NO .....2
		FREE FROM CLUTTER [unused or unnecessary equipment or furniture not in the way]	YES .....1 NO .....2
		FREE FROM FOUL OR STALE ODOURS	YES .....1 NO .....2
		STORED ABOVE FLOOR LEVEL	YES .....1 NO .....2
		VISIBLY CLEAN	YES .....1 NO .....2
		FREE FROM VISIBLE SIGNS OF DAMAGE, RIPS OR CRACKS	YES .....1 NO .....2
		FREE FROM BROKEN OR UNNECESSARY EQUIPMENT	YES .....1 NO .....2
		<b>HANDWASHING FACILITY</b>	
		Handwashing facilities for staff are:	AVAILABILITY AT A SINK WITH A CONNECTED TAP NO .....1 YES .....2
			AVAILABLE AT A BUCKET WITH A TAP NO .....1 YES .....2
			STANDING WATER IN A BUCKET NO .....1 YES .....2
			OTHER [please specify in comments box] NO .....1 YES .....2
			WATER IS CURRENTLY AVAILABLE NO .....1 YES .....2
			SOAP, OR SUITABLE ALTERNATIVE, IS CURRENTLY AVAILABLE NO .....1 YES .....2
			THERE IS DISPOSABLE MATERIAL ON WHICH TO DRY HANDS NO .....1 YES .....2
			ACCESSIBLE NO .....1 YES .....2
			LOCATED NEAR THE CLIENT'S BED NO .....1 YES .....2
			VISIBLY CLEAN NO .....1 YES .....2
1201	All stock and equipment are: <b>[appropriate equipment e.g. BP machine]</b>		
1202	Main equipment trolley is:		
1203			
1204	Near or at the handwashing facility for staff:		
1205	Handwashing facilities for staff are:		

		FREE FROM ITEMS THAT ARE NOT NEEDED FOR HANDWASHING	YES .....1 NO .....2
1206	Tap mechanism is:	VISIBLY CLEAN	YES .....1 NO .....2
		FREE FROM VISIBLE SIGNS OF DAMAGE	YES .....1 NO .....2
		FUNCTIONING	YES .....1 NO .....2
1207	If there is not a handwashing facility in the delivery unit, how close is the nearest one?	IS THE NEAREST HANDWASHING FACILITY MORE THAN 20 SECONDS AWAY?	YES .....1 NO .....2
1208	A dedicated deep sink for washing used equipment is:	VISIBLY CLEAN	YES .....1 NO .....2
		FREE FROM VISIBLE SIGNS OF DAMAGE, CRACKS, AND FITTED CORRECTLY	YES .....1 NO .....2
		WATER IS CURRENTLY AVAILABLE	YES .....1 NO .....2
		<b>BED IN DELIVERY UNIT</b>	
1209	Bed frame is:	VISIBLY CLEAN	YES .....1 NO .....2
		FREE FROM VISIBLE SIGNS OF DAMAGE, RUST, RIPS OR CRACKS	YES .....1 NO .....2
1210	Fixed mattress cover for bed is:	VISIBLY CLEAN	YES .....1 NO .....2
		INTACT, FREE FROM SIGNS OF DAMAGE, RIPS OR CRACKS	YES .....1 NO .....2
		EASILY CLEANED, WATERPROOF MATERIAL	YES .....1 NO .....2
1211	Hard and horizontal surface next to the client is:	VISIBLY CLEAN, FREE FROM BUILD UP OF RESIDUE/DIRT	YES .....1 NO .....2
		FREE FROM VISIBLE SIGNS OF RUST AT OR ABOVE CLIENT LEVEL	YES .....1 NO .....2
		WASHABLE AND IMPERVIOUS TO MOISTURE	YES .....1 NO .....2

1212	Other aspects of the area observed during inspection:	[Record here any other areas not mentioned above]
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<b>SECTION 13: DELIVERY UNIT – AVAILABILITY OF BARRIER CLOTHING</b>			
1300	Plastic heavy duty apron is:	AVAILABLE IN THE DELIVERY UNIT	YES .....1 NO .....2
		STORED AWAY FROM CONTAMINATION RISK [not near the delivery bed, not on the floor, appropriately hung somewhere]	YES .....1 NO .....2
		VISIBLY CLEAN	YES .....1 NO .....2
1301	Sterile gloves are:	CLOSE TO POINT OF CARE [within the delivery unit]	YES .....1 NO .....2
		STORED AWAY FROM CONTAMINATION RISK	YES .....1 NO .....2
1302	Other aspects of the area observed during inspection:	[Record here any other areas not mentioned above]	

<b>SECTION 14: DELIVERY UNIT – WASTE STORAGE AND DISPOSAL</b>			
1400	Waste segregated into different bins according to their category – i.e. sharps (needles); non-sharps solid infectious waste (gloves, bandages); non-sharps wet infectious waste (placenta); non-sharps non-infectious waste (paper);	WASTE SEGREGATED AND DISPOSED OF IN APPROPRIATE CATEGORIES	YES .....1 NO .....2
		CONTAINERS ARE COLOUR-CODED ACCORDING TO CATEGORY	YES .....1 NO .....2
1401	Waste container for non-sharps infectious waste (wet or solid) is:	AVAILABLE	YES .....1 NO .....2
		VISIBLY CLEAN	YES .....1

		INTACT, FREE FROM SIGNS OF DAMAGE	NO .....2 YES .....1
		LID AVAILABLE	NO .....2 YES .....1
		FOOT PEDAL OPENS LID	NO .....2 YES .....1
		LESS THAN TWO THIRDS FULL	NO .....2 YES .....1
1402	The sharps container is:	AVAILABLE	YES .....1 NO .....2
		VISIBLY CLEAN	YES .....1 NO .....2
		INTACT, FREE FROM SIGNS OF DAMAGE	YES .....1 NO .....2
		LESS THAN TWO THIRDS FULL	YES .....1 NO .....2
		CLOSE TO THE DELIVERY BED	YES .....1 NO .....2
1403	Other aspects of the area observed during inspection.	<b>[Record here any other areas not mentioned above]</b>	

SECTION 15: DELIVERY UNIT – CLEANING AND DECONTAMINATION		
1500	Decontamination bucket is:	AVAILABLE IN THE DELIVERY AREA OR NEAR IT
		YES .....1 NO .....2
	LABELLED	YES .....1 NO .....2
	VISIBLY CLEAN	YES .....1 NO .....2
	DECONTAMINATION CHEMICAL WAS REFRESHED TODAY	YES .....1 NO .....2
	LID AVAILABLE	YES .....1

1501	Rinsing bucket is: [if a dedicated sink is used instead, please specify in the comments box. If an alternative method is used, please specify]	AVAILABLE NEXT TO THE DECONTAMINATION BUCKET LABELLED	NO .....2 YES .....1 NO .....2
		WATER HAS BEEN CHANGED TODAY	YES .....1 NO .....2
		VISIBLY CLEAN	YES .....1 NO .....2
		FREE FROM SIGNS OF DAMAGE	YES .....1 NO .....2
		VISIBLY CLEAN	YES .....1 NO .....2
		FREE FROM SIGNS OF DAMAGE	YES .....1 NO .....2
		STORED FACE UPWARDS	YES .....1 NO .....2
<b>SECTION 16: DELIVERY UNIT – CLEAN CORD CUTTING</b>			
1600	Reusable scissors/blades for cutting the cords are:	AVAILABLE IN THE DELIVERY AREA OR NEAR IT STORED APPROPRIATELY	YES .....1 NO .....2
		VISIBLY CLEAN AND FREE FROM RUST	YES .....1 NO .....2
		KEPT DECONTAMINATED BEFORE USE	YES .....1 NO .....2
		DISPOSABLE SCISSORS OR BLADES FOR CUTTING THE CORD ARE:	AVAILABLE IN THE DELIVERY AREA OR NEAR IT STORED IN A STERILE PACKET KEPT DRY [not near a wet surface]
<b>CORD CLAMPS</b>			
1602	Reusable cord clamps are:	AVAILABLE IN THE DELIVERY AREA OR NEAR IT	YES .....1 NO .....2

		STORED APPROPRIATELY	YES .....1 NO .....2
		VISIBLY CLEAN AND FREE FROM RUST	YES .....1 NO .....2
		KEPT DECONTAMINATED BEFORE USE	YES .....1 NO .....2
		AVAILABLE IN THE DELIVERY AREA OR NEAR IT	YES .....1 NO .....2
		STORED IN A STERILE PACKET	YES .....1 NO .....2
1603	Disposable cord clamps are:	KEPT DRY [not near a wet surface]	YES .....1 NO .....2

<b>SECTION 17: DELIVERY UNIT – BIRTHING SURFACE</b>			
1700	Material used on delivery bed for delivery is: [e.g. cloth, mackintosh etc. please specify in comments box; if they deliver straight onto the mattress/bed please specify in the comments box]	IN FACILITY [if women bring their own please specify in the comments box] RE-USABLE	YES .....1 NO .....2
		WASHABLE MATERIAL	YES .....1 NO .....2
		VISIBLY CLEAN	YES .....1 NO .....2

# References

- Benova L, Cumming O, Campbell OM (2014) Systematic review and meta-analysis: association between water and sanitation environment and maternal mortality. *Tropical medicine and international health*, vol 19, no 4, pp 368-387
- Black R (2010) Global, regional and national causes of child mortality in 2008: a systematic analysis. *Lancet*, vol 375, no 9730, pp 1969-1987
- Campbell OM, Benova L, Gon G, Afsana K, Cumming O (2014) Getting the basic rights – the role of water, sanitation and hygiene in maternal and reproductive health: a conceptual framework. *Tropical medicine and international health*, vol 20 no 3, pp 252-267
- Countdown to 2015 (2014) *Fulfilling the health agenda for women and children: the 2014 report*. Countdown to 2015
- Darmstadt, GL (2009) Impact of Clean delivery-kit used on newborn umbilical cord and maternal puerperal infections in Egypt. *Journal of Health, Population and Nutrition*, 746-754
- House S, Mahon T, Cavill S (2012) *Menstrual hygiene matters: a resource for improving menstrual hygiene around the world*. WaterAid
- MoH, MoP and ICF International (2015). *Cambodia Demographic and Health Survey 2014*. Phnom Penh: National Institute of Statistics
- NCHADS, NTP, CNM, PSO, Macro International and WHO (2009) *Global Fund 5-year evaluation: Cambodia health impact evaluation 2008*. Calverton, Maryland: NCHADS, NTP, CNM, Macro International and WHO
- Partnership for Maternal, Newborn and Child Health (2006) *Opportunities for Africa's newborns: Practical data, policy and programmatic support for newborn care in Africa*. World Health Organization, Geneva
- Royal Government of Cambodia (2013) *Annual progress report: achieving the Millennium Development Goals*. Ministry of Planning, Phnom Penh, Cambodia
- Save the Children (2014) *Ending newborn deaths: ensuring every baby survives*. Save the Children, London
- Say L (2014) Global causes of maternal death: a WHO systematic analysis. *The Lancet Global Health*, vol 2, no 6, pp 323-333
- United Nations (2014) *The Millennium Development Goals Report 2014*. United Nations, New York
- Velleman Y (2014) From joint thinking to joint action: a call to action for improving water, sanitation and hygiene for maternal and newborn health. *PLoS Med*, vol 11, no 12, e1001771
- WaterAid (2012) *Towards inclusive WASH: sharing evidence and experience from the field*. WaterAid, UK
- WaterAid, SoapBox Collaborative, SHARE Research Consortium, London School of Hygiene and Tropical Medicine (2015) *Improving maternal and newborn health in Zanzibar: a needs assessment of IPC and WASH across maternity units*
- WHO (2008) *Essential environmental standards in health care*. World Health Organization, Geneva
- WHO (2010) *The burden of healthcare-associated infection worldwide*. World Health Organization, Geneva
- WHO (2015) *Report of the Ebola interim assessment panel*. World Health Organization, Geneva
- WHO WPRO. (n.d.). *Health information and intelligence platform*. <http://hiip.wpro.who.int/portal/Dataanalytics.aspx> (retrieved 7 October 2014)
- WHO, Cambodian Ministry of Health (2012) *Health Service Delivery Profile: Cambodia*. World Health Organization
- WHO, ICM & FIGO. (2004). *Making pregnancy safer: the critical role of the skilled attendant*. World Health Organization, Geneva
- WHO, UNICEF. (2015). *Water, sanitation and hygiene in health care facilities: status in low and middle income countries and way forward*. World Health Organization, Geneva
- WHO, UNICEF, UNFPA, World Bank, UNPD. (2014). *Trends in maternal mortality: 1990-2013*. World Health Organization, Geneva