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Maternal and Child Survival Program

Water Sanitation and Hygiene (WASH) for Newborn and Maternal Sepsis Reduction in Nigeria

Final Activity Report

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The Maternal and Child Survival Program (MCSP) is a global, $560 million, 5-year cooperative agreement funded by the United States Agency for International Development (USAID) to introduce and support scale-up of high-impact health interventions among USAID's 25 maternal and child health priority countries, as well as other countries. MCSP is focused on ensuring that all women, newborns and children most in need have equitable access to quality health care services to save lives. MCSP supports programming in maternal, newborn and child health, immunization, family planning and reproductive health, nutrition, health systems strengthening, water/sanitation/hygiene, malaria, prevention of mother-to-child transmission of HIV, and pediatric HIV care and treatment.

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Acronyms

CHX	Chlorhexidine
COM-B	Capability, Opportunity, Motivation, and Behavior
CPAP	Continuous Positive Airway Pressure
DOB	Day of Birth
HCF	Health Care Facility
HCW	Healthcare Worker
HHC	Hand Hygiene Compliance
HWF	Handwashing Facility
HWWS	Handwashing With Soap
IRB	Institutional Review Board
IPC	Infection Prevention Control
JMP	Joint Monitoring Programme
KII	Key Informant Interview
KMC	Kangaroo Mother Care
LGA	Local Government Area
LMIC	Low and Middle Income Countries
LSHTM	London School of Hygiene and Tropical Medicine
MCSP	Maternal and Child Survival Program
MNCH	Maternal Newborn and Child Health
NICU	Newborn Intensive Care Unit
NNM	Neonatal Mortality
TBA	Traditional Birth Attendants
TSHIP	Targeted States High Impact Project
USAID	United States Agency for International Development
WASH	Water, Sanitation and Hygiene

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Executive Summary

Background and Overview of Activities

The time from the onset of labor through the first two days of life is a critical window to prevent infection in neonates and mothers. However, a lack of adequate infrastructure and basic infection prevention commodities make infection prevention difficult across low and middle-income countries. These challenges are exacerbated by a lack of training among healthcare staff and non-compliance with standard infection prevention protocols. All of these challenges exist in Nigeria, where 16% of neonatal deaths are due to infection (Friday et al. 2012, Liu et al. 2014). It is estimated that 50% of Nigerian health care facilities (HCFs) lack a basic water service, while 88% lack basic sanitation services (WHO 2019).

USAID's flagship Maternal and Child Survival Program (MCSP) launched in Nigeria in 2014 to improve the quality of facility-based maternal, newborn and child health (MNCH)/postpartum family planning services and of community-based child health services; improve health information systems to monitor service delivery and health outcomes and increase the use of lifesaving innovations. MCSP provided facility-based training on basic and comprehensive obstetric and newborn care, essential newborn care, and quality of care. While hand hygiene, infection prevention and the "six clean birth practices" were components of MCSP's quality of care improvement efforts, they were not a primary focus. As evidence and project implementation experience mounted, so did MCSP's recognition that infection prevention practices and supporting environments and systems would benefit from additional attention.

In order to further improve the quality of facility-based services in Nigeria, MCSP conducted a three-phased learning activity aimed at reducing maternal and newborn sepsis and improving hygiene around the day of birth. In March 2017, MCSP initiated Phase I of the activity, which was comprised of a literature review, scoping visit and key informant interviews staff from primary, secondary, and tertiary HCFs in Kogi and Ebonyi states; academic institutes; United Nation (UN) agencies and nongovernmental organizations; the government of Nigeria; and a pharmaceutical company. The findings from these activities helped inform the development of a research protocol for the next phase of the activity. Phase II consisted of observational and qualitative data collection during labor and delivery, post-delivery care, discharge and newborn care at home. Similarly, findings from Phase II study were used to inform the design of a pilot implementation activity, or Phase III. The pilot was implemented in 30 MCSP-supported facilities in Kogi and Ebonyi states over three months.

Learning Activities and Findings

Phase I revealed that, in addition to opportunity-related barriers like poor infrastructure and lack of sufficient supplies, behavioral factors including poor motivation, time demands and perceived lack of self-risk by health care workers and new mothers played a critical role in affecting hygiene practices. These findings are similar to those in other contexts (Erasmus et al 2009, Zakeri et al 2017). In order to address this gap, MCSP collaborated with the London School of Hygiene and Tropical Medicine (LSHTM) to investigate the underlying motivators and barriers to hand hygiene compliance.

As part of the Phase II formative research, information was gathered through structured observations of labor, delivery; postnatal care and discharge in six MCSP- supported facilities and via qualitative interviews conducted with facility heads, nurses, auxiliary workers and mothers in each of the six healthcare facilities. Out of the six facilities assessed, five reported having a standardized procedure for handwashing but only two had the written standards (either national or facility-generated standards). All six facilities had a functioning handwashing facility (HWF) with soap and water in the delivery unit at the time of the walk-through inspection. All units had a sink with a connected tap available in the delivery unit, but two facilities used Veronica buckets (a bucket with a tap and basin beneath it) because of broken taps. Soap and water were available in the room during 30 of the 31 births observed.

Despite the convenient presence of functional handwashing stations, only 7 (3%) out of the 201 observed events requiring aseptic procedures, were conducted when hands had been washed with soap and sterile gloves applied with no observed recontamination of the hands. The majority of events requiring aseptic procedures 172 (68%) were conducted when no hand hygiene action had been taken following potential recontamination of hands/gloves through lesser or higher risk exposures. In the postnatal period, 250 of 265 (94%) observed contacts with neonates (mothers, healthcare workers, caregivers) occurred without any prior hand hygiene event taking place. These findings align with similar studies conducted in other contexts and indicate a need for multi-modal interventions to increase motivation for hand hygiene compliance (WHO 2019).

The Phase II findings informed a Phase III pilot intervention aimed at addressing opportunity, ability, and motivational factors to hand hygiene compliance. The intervention included establishment of detailed WASH and infection prevention standards alongside user-friendly monitoring and performance recognition systems. Health care facility (HCF) managers, ward supervisors and Local Government Area (LGA) Ministry of Health (MoH) staff were oriented to the standards and trained in simple techniques to enforce the standards. Interpersonal communication materials on emotional and motivational interest in behavior compliance were developed. A limited number of handwashing stations and healthcare waste management containers were provided to specific wards, along with guidance on convenient placement to reduce barriers to use.

Assessment results following the brief, three month Phase III intervention showed ward-level improvements in seven of nine WASH and infection prevention indicators assessed. Improvements were even made against criteria that were not a focus of the training or material provision, such as the proportion of wards with functional bathing facilities (35% to 53%) and the proportion of wards with impermeable, cleanable bed coverings/surfaces (78% to 94%). The results show that even in the absence of large funding sources aimed at construction, HCF staff can make many incremental improvements in WASH services and infection prevention once useful data and incentives are provided. Inexpensive, multi-modal strategies that achieve the following objectives can lead to quick improvements in HCF infection prevention readiness:

- Clarifying standards, roles and responsibilities. Integrating the use of common tools within existing quality of care and infection prevention improvement systems.
- Collecting detailed, ward-specific data and making that data available to HCF staff, managers and local government health offices to inform resource and funding allocation decisions.
- Sharing formal assessment results with the public/serviced communities
- Incorporating individual and collective performance –based recognition/reward systems that are sanctioned and managed by the ministry of health. Recognition systems can be tied to monetary incentives (e.g. performance-based financing), certificates of achievement, ward and HCF annual certifications, or public
- Identifying (through research) effective motivating factors for staff, patients and visitors to comply with basic hand hygiene and infection prevention protocols.

Background

An estimated 2.6 million deaths (46% of all under-five deaths), occur within the neonatal period (first 28 days of life (WHO 2017). The majority of the neonatal deaths are concentrated in the first day and week, with about 1 million dying on the first day and close to another one million dying within the next six days (WHO 2017). In Nigeria, sepsis is one of the three leading causes of neonatal mortality (DHS 2013). Nationally, sepsis and other infections account for 16% of neonatal deaths (Liu et al. 2014).

Neonates are particularly vulnerable to infection due to their immature immune systems. Neonatal infections most often occur in the form of umbilical cord infection and sepsis, with pathogen transmission believed to occur largely due to translocation of organisms during vaginal delivery or transmission of pathogens directly to the neonate, likely by contaminated hands (Simonsen et al 2014). A study in a Nigerian Newborn Intensive Care Unit (NICU) reported that risk factors for neonatal septicemia and death included an estimated gestational age of less than 32 weeks (OR: 5.5; CI 1.529 - 20.151), respiratory distress (Odds Ratio (OR): 3.4; Confidence Interval (CI) 1.406 - 8.703), abdominal distension (OR: 2.7; CI 1.069 -7.146), poor skin color (OR: 3.3; CI 1.307-8.528), and hypoglycemia (OR: 5.2, CI 2.046 -13.456) (Ogunlesi and Ogunfowora 2010).

Rhee and colleagues reported that birth attendant handwashing and maternal handwashing were associated with a 19% and 44% lower neonatal mortality risk, respectively (Rhee et al. 2008). Mullany and colleagues reported that neonates whose caregivers reported handwashing were at 24% lower risk of umbilical cord infection compared to neonates whose caregivers did not report handwashing (RR 0.76, 95% CI 0.60 – 0.95); similarly, the relative risk of umbilical cord infection among neonates with birth attendants who were reported to wash hands was 0.73 (95% CI 0.64 – 0.84) (Mullany et al. 2007).

Six clean practices are widely promoted around the day of birth. These "six cleans" include clean hands, clean perineum, clean delivery surface, clean cord cutting instrument, clean cord tying, and clean cord care (Blencowe et al. 2010). To achieve the "six cleans", a few basic commodities are required: soap (to wash hands and perineum), a piece of plastic (to provide a clean delivery surface), a clean blade (to cut the cord) and clean thread (to tie the cord)). Though the evidence base is limited, utilization of clean birth kits (often including a clean blade, a cord tie or clamp, soap, antiseptic, a plastic sheet, and instructions) has been associated with reductions in neonatal mortality (Seward et al. 2012). Unfortunately, these commodities are often unavailable or inaccessible (cost). When available, these commodities are often not used to practice hygienic behaviors. Low water access can be a barrier to practicing appropriate Water, Sanitation and Hygiene (WASH) behaviors and complying with infection prevention protocols. In Nigeria an estimated 50% of health facilities lack access to basic water services (WHO 2019).

Application of Chlorhexidine (CHX) gel and/or the practice of clean dry cord care (keeping the cord clean without application of anything and leaving it exposed to air or loosely covered by a clean cloth, in case it becomes soiled it is only cleaned with water), is recommended by the World Health Organization (WHO) as the best means to reduce infection of the umbilical cord in neonates. CHX was first introduced in Nigeria through the USAID's Targeted States High Impact Project (TSHIP) in Sokoto and Bauchi states as 4% CHX gel. A 2015 research study by Orobatan and colleagues reported a very low neonatal mortality rate (1 per 1,000 live births) in the cohorts that received chlorhexidine digluconate 7.1% gel and instructions on hygienic care of cord after application (Orobaton et al. 2015). Following the results of this study and other research, the Federal Ministry of Health began working to standardize the specifications and use of this product in Nigeria. Nigeria's Federal Government has finalized a National Strategy for Scale-up of Chlorhexidine to implement its use across the country.

The time from the onset of labor through the first two days of life is a critical window to prevent infection in neonates and mothers. The challenges are many and due to a variety of factors, including varying behaviors practiced across a range of actors - doctors, hospital birth attendants, Traditional Birth Attendants (TBAs), health care maternity staff, nurses, midwives, mothers, caregivers, etc. For facility-based births, ideal practices are not applied everywhere. In addition, the transition from the facility to the home exposes the neonate to

new environments and less skilled caregivers. For home-based births, this facility-to-home transition does not occur, but the skill of attendants is lower and the environment may not be as hygienic. Home births are discouraged in many countries.

Activity Purpose and Objectives

Program Approach

The USAID- funded Maternal and Child Survival Program (MCSP) in Nigeria aimed to improve maternal, newborn and child health (MNCH) outcomes in Nigeria by increasing access to quality life-saving interventions. The program's three key objectives were as follows:

1. Improvement of the quality of facility-based maternal, newborn and, child health (MNCH)/postpartum family planning services and of community-based child health services
2. Improvement of health information systems to monitor service delivery and health outcomes
3. Increase utilization of life-saving innovations

In an effort to improve the quality of facility- based MNCH services, in 2017 MCSP launched a three-phased learning activity on improved hygiene for maternal and newborn sepsis reduction focused on improving hygiene around the day of birth in Nigeria. The purpose of this activity was to build on the quality improvement activities being implemented by MCSP by investigating the current hygiene practices of health care staff, mothers, and other caregivers and collaborating with health workers in selected health facilities in Kogi and Ebonyi States of Nigeria to identify methods for strengthening appropriate behaviors around cord care and hygiene practices (including handwashing) during the period from the onset of labor through the first 48 hours of life. MCSP then piloted the integration of these solutions into existing health facility day-of-birth (DOB) activities and follow-up efforts to strengthen quality of care.

The key objectives of the learning activity were to:

1. Identify barriers that prevent the practice of appropriate hygiene behaviors (handwashing, clean perineum, clean delivery surface, clean cord cutting, clean cord tying, clean cord care) by birth attendants, mothers, and caregivers during the period from onset of labor through the first 2 days of life
2. Identify motivators and solutions to increasing the practice of ideal hygiene behaviors (appropriate cord care, handwashing, and general hygiene) by birth attendants, mothers, and caregivers during the period from onset of labor through the first 2 days of life.
3. Develop and test programmatic interventions that circumvent identified barriers and optimize recognized motivators to promote better practice of ideal hygiene behaviors (appropriate cord care, handwashing, and general hygiene) by birth attendants, mothers, and caregivers during the period from onset of labor through the first 2 days of life.
4. Improve identification of at-risk newborns (low birth weight, premature, born after prolonged labor, etc.) and increase provision of appropriate hygiene, counseling and care for them during the day of birth and the first 2 days of life.
5. Improve hygiene behaviors related to puerperal sepsis reduction on mothers during labor, delivery, and post-delivery.
6. Identify barriers and motivators, and test solutions, to caregiver handwashing at the household level during a newborn's first week (first 7 days of life) at home after discharge from a health facility birth.

Overview of Learning Activity Phases

This learning activity was initially designed to have four phases. However, in order better align with the timeline of the MCSP Nigeria program the activities were revised and condensed into three phases.

- Phase I of the activity, which was completed in March 2017, consisted of a literature review, scoping visit and key informational interviews. Findings from this first phase helped inform the design of a study protocol for Phase II research activities.

- Phase II consisted of formative research (observational and qualitative) in six MCSP-supported facilities during delivery, post-delivery care, discharge and newborn care at home was completed in October 2017.
- Phase III was a pilot effort to design and incorporate Phase II findings into existing day of birth program activities to improve the quality of care at facilities. Phase III activities were implemented in 30 MCSP-supported facilities in Kogi and Ebonyi State for a period of 4 months. At the end of the Phase 3, MCSP conducted a quantitative analysis to assess improvements in WASH conditions in Health care facilities (HCFs) and proxy indicators of hand hygiene and infection prevention compliance among health providers and caregivers.

Phase 1: Literature Review and Key Informant Interviews (KIIs)

Overview of activities

In order to inform the design of a formative research study protocol for the second Phase of this activity, MCSP commissioned a research team at the London School of Hygiene and Tropical Medicine (LSHTM) to complete three information-gathering activities as part of Phase I. These include:

a. A global (and Nigeria-specific) literature review to summarize existing evidence and practices around DOB hygiene for births taking place within health facilities. Data from the MCSP Nigeria MNCH program baseline assessment and quality of care assessment was also reviewed to identify facilities for participation.

b. A scoping visit to Nigeria to facilitate a series of KIIs, meet MCSP/Nigeria staff, and visit MCSP-supported health care facilities. The KIIs with global and national experts in maternal, newborn health and WASH to identify global and national challenges, successes, opportunities and policies on Infection Prevention Control (IPC) in healthcare facilities. Through these interviews, MCSP and LSHTM aimed to identify additional sources for the literature review, seek clarification on the literature review findings, and document known challenges, successes, opportunities, and policy implications related to DOB hygiene that are not documented in the literature.

c. Development of Phase II study protocols submitted for Institutional Review Board (IRB) approval in the US and Nigeria. Other tools and consent forms were also prepared

Summary of findings

Contextual Factors

In 2015, Nigeria's maternal mortality ratio[1] was 560 per 100,000 live births (WHO 2015a). Mortality during the critical neonatal period is also persistently high, estimated at 34 deaths per 1,000 live births (UNICEF 2016). The quality and adherence to hygiene standards and protocols on hygiene in HCFs are also concerning (Friday et al. 2012). Training on IPC is limited for most staff, especially cleaners, who are ultimately responsible for routine cleaning of the facilities and equipment. The desire for training was noted by facility staff during the KIIs. These statistics and realities provide significant room for improvement and motivation, but they may also be very demotivating.

While not a focus of this review, two studies from Nigeria found poor sanitary conditions of HCFs to be a major cause of dissatisfaction for patients, potentially influencing care-seeking behavior during the pre- and postnatal periods (Adekanye et al. 2013; Oyo-Ita et al. 2007).

Social Factors

A number of important social factors identified in the literature review were considered for Phase II and Phase III of this activity. From available global and national evidence, hand hygiene compliance is likely to be very low for both health care workers and new mothers (WHO 2009, Friday 2012). Multimodal interventions, including feedback activities, should be considered to enhance handwashing during labor, delivery, and postnatal care. However, to design an effective intervention, there needs to be more understanding around the motivators for handwashing, especially handwashing before touching a mother/newborn, which is often the least-adhered-to moment for both health care workers and new mothers. Health care workers' perceived risk to themselves but not their patients should be examined.

[1] Number of maternal deaths during a given time period per 100,000 live births during the same time period

For health care workers, including cleaners, it is imperative that they have a clear understanding of the rationale for practicing the various hygienic behaviors because their level of compliance determines the level of infection risk for their patients. For routine cleaning, this might require the use of microbiological swabbing to highlight that visibly clean surfaces are not always safe, helping to reinforce the importance of regular, systematic cleaning. Nurses and other health care workers play a potentially important role in influencing the hygiene practices of new mothers, identifying opportunities or moments for health care workers to provide new mothers with accurate and digestible hygiene information (e.g., about cord care or handwashing) should be considered.

Technological Factors: Infrastructure and Supplies

Insufficient infrastructure and supplies are likely to be some of the major barriers to health care workers and new mothers practicing hygienic behaviors. Availability of basic water, sanitation, hygiene, waste management and cleaning services in Nigeria is low (WHO 2019). The literature review, KIIs, and scoping visit all suggest that HCFs, especially lower-level facilities, do not have an adequate and consistent supply of products needed for staff to effectively carry out their job. Understanding and addressing the bottlenecks related to this issue was likely a necessary starting point.

Understanding the purpose of certain products (e.g., CHX) that are acceptable in various contexts will be important. New products or technologies may also be worth exploring (e.g., the provision of alcohol-based gels in areas where there is frequent contact between the health care worker and mother/newborn). Any new products or technologies that are identified could be delivered as part of existing and established quality of care initiatives, such as delivery kits or the Safe Birth Checklist. For products targeted at households, consideration will need to be given to cost to ensure they are not beyond the reach of the poorest.

Conclusions

There is global consensus about the importance of good hygiene practices at the time of birth and the hours and days immediately after. Handwashing and IPC procedures are considered standard practice in HCFs across the world. Despite this, the impact of improved hygiene on neonatal and maternal health in Low and Middle Income Countries (LMIC) has been difficult to quantify. Nevertheless, there is clear evidence that improvements in hygiene practices at the time of birth need to be made. Findings from the literature review, KIIs, and scoping visits suggest priority should be given to the following areas: ensuring clean cord care, especially the provision and use of CHX on the cord stump; improving hand hygiene compliance among health care workers and mothers; ensuring staff have sufficient infrastructure, such as running water, and continued access to essential supplies, such as soap; and exposing staff to regular IPC training. Several larger challenges were also identified, especially for primary HCFs, which are beyond the scope of this study and MCSP, such as inadequate staffing and onsite water supply. MCSP and LSHTM used these findings to inform the development of the Phase II protocol and data collection tools. Findings from the scoping visit also allowed LSHTM to select optimal HCFs for participation within each state (based on HCF level, birth-rate, and willingness to participate).

Documentation and Dissemination

Upon completion of phase I, MCSP published a summary report detailing the methods, findings and implications of the literature review, key informant interviews and scoping visit. The report is publically available and can be found on MCSP's webpage, here. The report was distributed to Federal and State Ministries of Health in Nigeria.

Phase II: Formative Research Study

Overview of activities

With the information collected in Phase I, MCSP and LSHTM designed a Phase II formative research study to elucidate barriers and motivators to practicing appropriate hygiene behaviors during the period from the onset of labor through the first two days of life (including follow-up visits at home). A study protocol was designed to include three components:

a. Facility walk-through assessments conducted in six MCSP- supported HCFs in two states (Ebonyi and Kogi) (July 2017)

b. Structured observations conducted in the same six HCFs to observe 31 mothers from onset of labor through post-natal care, discharge and the first six hours in the home. (July 2017)

c. Qualitative interviews conducted with facility head; one nurse/midwife; one auxiliary worker; and one mother in each of the six HCFs.

Below are summary of the methods and findings for the structured observations of labor, delivery, post-natal care, discharge, and return to the home, as well as findings from qualitative interviews with health workers and patients.

Methods Summary

The study took place across six HCFs that were purposefully recruited for the study (two primary, two secondary, two tertiary facilities). Three facilities from Kogi state and three from Ebonyi state participated. A total of 31 pregnant women were recruited and observed during labor, delivery, postnatal care, discharge and in the home environment. Participant selection criteria can be found in Appendix II.

LSHTM used structured facility assessments instruments adapted from existing tools (WHO WASH FIT and SoapBox WASH & Clean Toolkit) to assess all six participating facilities prior to observing labor and delivery events. These included a structured facility observational checklist (walk-through) that included information on hygiene infrastructure and supplies at multiple locations in the health care facility and facility staffing. A facility needs assessment survey was completed in interview format with the officer-in-charge of the maternity ward. Further details on the tools and key findings are reported in a forthcoming publication (referenced in the documentation and dissemination section).

Birth observations were conducted by six qualified midwives. A standardized direct observation tool was developed based on WHO's WASH FIT tool and Soapbox Collaborative' s WASH & Clean Toolkit. The study tool was iteratively refined in collaboration with study midwives over a 7-day pre-test period in HCFs in Abuja. All data collectors received seven days of training, including simulated birth observation practice and field practice in non-study HCFs in Ebonyi state.

The focus of the analysis was patient protection from pathogen transmission. LSHTM identified all procedures conducted by Healthcare Workers (HCWs) which require aseptic technique were —defined here as requiring Handwashing with soap (HWWS)/alcohol rub, sterile gloves to be worn, and that gloved hands have no contact with nonsterile surfaces prior to the procedure. Specific procedures of interest were: vaginal examinations, insertion of urine catheter, insertion of IV cannula, artificial rupture of membranes, manual removal of placenta, manual removal of blood clots, cord tie/clamping, and cord stump contact.

To analyze observations, a dynamic hygiene score was calculated for each action conducted by each actor based on his/her hand hygiene actions and any previous activities that could increase the probability of contaminated hands (described in Table 1).

Table 1: Hygiene Risk Categories used during observational study

Category #	Definition	Infection risk
1	Hands washed with soap and new gloves applied, no potential recontamination observed	Least infection risk
2	Hands washed with soap, but no gloves are worn, no potential recontamination observed	Minimal infection risk
3	Gloves are changed but HWWS is not observed, no potential recontamination observed	Moderate infection risk
4	No hand hygiene actions taken following observed invalidation of aseptic technique (contact with intact skin of the woman/new born or surroundings). No hand hygiene actions taken following observed potential recontamination from high	Substantial infection risk
5	risk exposure (contact with another patient, bodily fluids, mucous membranes, non-intact skin, clinical waste or feces)	High infection risk

Low risk contamination included any contact with surfaces, persons, or objects. High risk contamination events were limited to: 1) contact with another patient, 2) contact with feces, 3) contact with medical waste, and 4) contact with the placenta. Hygiene scores for any one individual changed multiple times during the course of observation.

Hygiene scores were then assessed at any point a critical juncture was observed. During labor and delivery, critical junctures included: vaginal examinations, insertion of a urine catheter, insertion of the IV cannula, artificial rupture of the membranes, manual removal of the placenta or blood clots, and cord tie / clamping. During other periods of observation, critical junctures included any contact with the mother, contact with the newborn, or cord cleaning. For more information on the design and implementation of the study, please see the following peer-reviewed publications:

1. Manuscript 1, titled: Hygiene during Childbirth: An Observational study to understand infection risk in health facilities in Kogi and Ebonyi states, which can be accessed here
2. Manuscript 2, titled: Barriers and opportunities experienced by staff when implementing infection prevention and control guidelines during labour and delivery in healthcare facilities in Nigeria, which can be accessed here

Summary of findings

Standardized procedures and policies for IPC

5/6 HCFs surveyed had a standardized procedure for infection prevention and control (IPC), and staff training on IPC. 5/6 HCFs reported having a standardized procedure for handwashing, though written standards were only available in 2/6 HCFs. 4/6 HCFs had standardized procedures for waste disposal; and 5/6 had procedures in place for sharps disposal. In only 2/6 HCF was there budget allocated for hospital cleaning.

Labor, delivery and post-natal care

Labor and delivery observation findings

All six HCF surveyed had at least one functioning Handwashing facility (HWF) in the labor and delivery unit. Though a sink and connected tap was present in all the delivery units, in two units the tap was not functioning and replaced with a Veronica bucket. Water and soap was present in all six units. There were no disposable towels for hand drying and no hand hygiene posters present at any facility.

Observation data was analyzed to capture the hygiene status of each actor at any moment in time based on observed hand hygiene practice and any observed exposure risk. As displayed in Table 2, a total of 256 critical hygiene junctures were observed. Only 3% of critical junctures were conducted with hands which were both gloved and washed with soap; and the clear majority were conducted with hands/gloves in category 4 (45%) or category 5 (21%).

Table 2: Hygiene status prior to aseptic procedure[2]

Category #	Hygiene status	Prior to any aseptic procedure	
		Number	Percentage
1	Hands washed with soap and new gloves applied, no potential recontamination observed	7	3%
2	Hands washed with soap, but no gloves are worn, no potential recontamination observed	60	27%
3	Gloves are changed but HWWS is not observed, no potential recontamination observed	7	3%
4	No hand hygiene actions taken following observed invalidation of aseptic technique (contact with intact skin of the woman/new born or surroundings). No hand hygiene actions taken following observed potential recontamination from high	116	45%
5	risk exposure (contact with another patient, bodily fluids, mucous membranes, non-intact skin, clinical waste or feces)	56	21%
	Total	256	

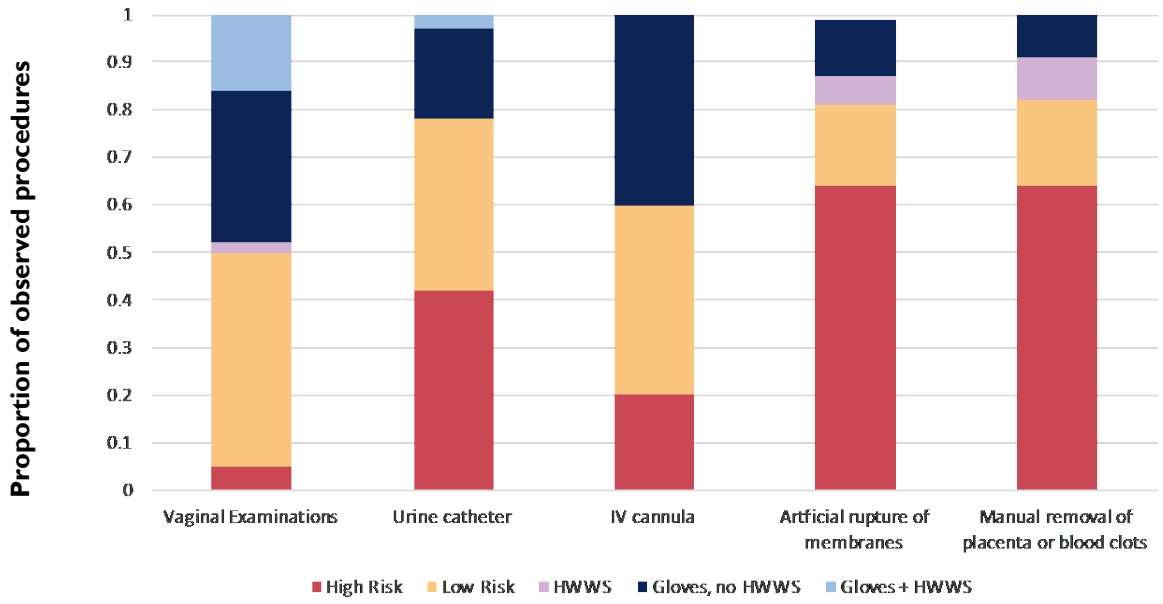
Hygiene scores varied among specific clean / aseptic procedures during labor. In general, hygiene scores were better during vaginal examinations and IV cannula insertions compared to urine catheter, membrane rupture, or manual removal of placentas and blood clots. However, across all procedures, the majority were done with hands or gloves in categories 4 or 5 (see Table 1).

> *"I have to wash my hands before starting delivery. Then after delivery I will wash my hands".*
>
> ***- Nurse/midwife, Primary facility.***

The data also indicates that changing gloves is often conducted in place of hand washing, and that this trend is consistent when the aseptic procedures are looked at individually (Figure 1). These results were not found to be statistically different when examined by provider type (nurse/midwife vs doctor); facility type (primary, secondary or tertiary) or state. However, staff in the morning shift were found to have a greater level of hand hygiene compliance than during other times of the day. Qualitative interviews with nurse/midwives generally revealed good comprehension of moments for handwashing, including: before touching a patient; when hands are soiled; after removing gloves; between patients and after touching the environment. However not all responses were as comprehensive, as in the above quote.

[2] For the purpose of this study, an aseptic procedure is any contact with intact skin of the woman/new born or surroundings

Figure 1: Observed hygiene status prior to individual aseptic procedures



Needs assessment interviews indicated that in 5/6 HCFs nothing was used to clean the cord prior to clamping and sterile water was used in the 6th HCF. All 6 HCFs use disposable cord clamps, and 2/6 use a disposable blade to cut the cord. 4/6 nurse/midwives interviewed had clear knowledge of the need to conduct hand hygiene prior to cutting the cord. However in 100% of observations there was no hand hygiene observed prior to cutting the cord. CHX was available and provided for free to mothers in all six HCFs (please refer to Appendix I for detailed results).

Postnatal observation findings

4/6 facilities had a handwashing facility in the maternity ward however only two of these facilities had functioning taps; it was therefore only possible to wash hands in two maternity wards (2/6).

Across all observations, handwashing with soap was only observed five times (different providers). Almost all contact with the mother or newborn was performed after hands or gloves had been exposed to a risk of contamination. Cleaners were observed playing active roles in postnatal care, and this was mentioned in interviews:

> *"We stay with the nurses to help carry this one, carry this one and collect the baby and clean it, dress the baby, and maintain it"*
>
> **– Cleaner, tertiary facility**

Visitors were also found to play an active role in postnatal care, with an average of seven visits per mother. Visitors were observed carrying the baby, bathing the baby, cleaning feces and changing nappies – all activities which have increased risk of cord contact, yet none of the visitors were observed washing hands with soap (please refer to Appendix I for detailed results).

Recommendations

- Increased emphasis on handwashing *frequency* at critical moments to ensure that mothers and newborns have reduced risk of infection.
- Increased emphasis on need to protect client, not just self
- Focus on improving skills and capacity during shifts with reduced personnel (afternoon and night)
- Provision/maintenance of functioning HWF infrastructure in post-natal wards
- Increased emphasis on visitor, cleaner, and health care worker washing hands with soap
- Regular training/On the job orientation for health care workers on need to adhere to hygiene rules.

Facility discharge and newborn care at home

Observation findings

5/6 HCFs had a standardized discharge procedure; however, five mothers observed were given no health advice at all during facility discharge. Just over half (17/33) were advised to wash hands before handling the baby while two thirds (23/33) were given advice on how to care for the cord. Advice given to mothers was varied, and rarely adhered to WHO guidelines for maternity discharge instructions.

Interviews with nurse/midwives indicated that key information disseminated at discharge included: washing hands before and after applying CHX; applying nothing but CHX; ensuring the cord is not trapped inside the baby's diaper; and washing hands before breastfeeding. 3/6 mothers interviewed also reported they had been advised to apply CHX; though none mentioned the need to wash hands prior to application. 3/6 mothers mentioned other substances they were applying to the cord in addition to CHX (spirit, Vaseline, and boiled water).

"I can't tell visitors like that!"
- Mother, tertiary facility

The study team visited 30 households. At home 27 households (90%) of households had water stored and 67% had a dedicated HWF. Although 29 (97%) of households had soap within the home, soap was only present at 9 (30%) of the HWFs. Washing hands with soap was only observed 12 times across all 30 home observations. Visitors were again observed playing a very active role in newborn care: bathing the newborn; changing diapers, and applying chlorhexidine on the cord. Only one visitor was observed washing hands with soap. Mothers interviewed did not feel able to request that visitors wash their hands prior to contact with the newborn (please refer to Appendix I for detailed results).

Recommendations

- State and local health systems (and individual facilities) are encouraged to systematize infection prevention advice given to new parents at facility discharge
- Healthcare providers and their supporting partners (NGOs, government, professional organizations) are encouraged to focus behavior change on a wider audience than just the mother, as many other actors are engaged in intimate care of the new-born
- Research partners are encouraged to investigate the acceptability of keeping soap available at the HWF within the household, along with exploring interventions that would empower parents or other caregivers to enforce handwashing among visitors.

Documentation and Dissemination

Findings from Phase II of the newborn sepsis activity were disseminated in a national workshop in Abuja, Nigeria and a global Saving Newborn Lives meeting in Jakarta, Indonesia, in November 2018. As part of the broader dissemination plan, the study team lead from LSHTM also gave two presentations on findings from Nigeria: one for USAID/Washington and a second via webinar for the global MCSP team. Participants from the national workshop in Nigeria appreciated the quantification of a problem they view as widespread but unclear. Officials from the FMOH, SMOH and LGA officials from the two MCSP- supported states committed to integrating hygiene compliance in broader quality of care efforts moving forward and contributed to the development of MCSP monitoring and evaluation tools for use in labor, delivery and postnatal care wards. Participant's findings from these studies also informed MCSP's implementation approach in Guatemala, where MCSP aimed to support WASH improvements within delivery rooms and postnatal care spaces in 11 MCSP-priority facilities.

Following the completion of the Phase II research, three peer-reviewed manuscripts were published and are publically available at the following links:

1. Manuscript 1, titled: Hygiene during Childbirth: An Observational study to understand infection risk in health facilities in Kogi and Ebonyi states, which can be accessed here
2. Manuscript 2, titled: Barriers and opportunities experienced by staff when implementing infection prevention and control guidelines during labour and delivery in healthcare facilities in Nigeria, which can be accessed here
3. Manuscript 3: A systematic review on WASH and infection prevention for mothers and newborns, which is forthcoming.

Phase III: Design and Pilot Implementation

The results from the Phase II formative research informed the design and incorporation of a pilot implementation phase of WASH and infection prevention activities into the existing MCSP Nigeria MNCH program strategies to improve the quality of care in 30 program-supported health care facilities that had high delivery rates (2-tertiary, 9-secondary, 19-primary).[3] Phase III design and preparation activities took place from March – June 2018, with implementation activities taking place in the 30 priority facilities (15 in Ebonyi State, 15 in Kogi State) for a period of four months between July-October 2018.

Design Workshop

In conjunction with the in-country dissemination efforts of the Phase II findings, MCSP and LSHTM hosted the first of a two part Phase III design workshop with national and state stakeholders. To guide the design of the pilot interventions, LSHTM oriented workshop participants to a behavior-change framework commonly used in the WASH sector called the COM-B (capability, opportunity, motivation and behavior) model. The COM-B Model recognizes that behavior change and maintenance is part of an interacting system involving nine determinants outlined in Table 3 below (Michie et al 2011). Each intervention function contributes towards the capability, opportunity and/or motivation of an individual to practice a specific behavior. The COM-B theory posits that successful interventions leverage multiple behavior functions that affect all three behavioral components.

Table 3: COM-B Behavior Change Model

Determinants	Description	Capability	Opportunity	Motivation
Education	Increase knowledge	X		
Environmental restructuring	Change the physical or social context		X	X
Training	Improve skills	X		
Persuasion	Use communication to induce positive or negative feelings and stimulate action			X
Incentives	Create expectations of reward			X
Coercion	Create expectation of punishment			X
Restrictions	Rules to reduce opportunity in the behavior (or to increase the target behavior by reducing opportunities to engage in competing behaviors)		X	
Modeling	Provide an example for people to aspire or imitate			X
Enablement	Increase means / reduce barriers	X	X	X

Typical WASH interventions focus primarily (or exclusively) on only three of the determinants; education, environmental restructuring, and/or training of healthcare providers. Many of the motivational-related determinants have been ignored in previous WASH and infection prevention programs. Therefore, MCSP guided the workshop participants in identifying pilot activities that would incorporate more motivational determinants, while also addressing the capability and opportunity-related determinants as required. Following the workshop, MCSP refined the activity workplan to include six activities.

[3] While MCSP aimed to focus Phase III activities in HCFs with the highest birth rates, access to secondary MCSP-supported secondary facilities was limited due to ongoing health facility worker strikes. Therefore, MCSP selected additional primary care facilities in Kogi.

One important limitation considered during the workshop was the Phase III implementation timeline and remaining resources. While it would have been ideal to establish a rigorous methodology for assessing changes in provider behaviors (similar to Phase II), MCSP did not have enough remaining time or resources to conduct rigorous behavior-compliance assessment visits. Therefore, Phase III activities and monitoring systems focused on assessing proxy indicators for behavior using cross-sectional readiness assessments. During the Phase III Design Workshop, MCSP prioritized the following implementation activities.

Implementation Activities:

Baseline readiness assessment in Target Health Facilities

Following the Phase III design workshop, MCSP conducted a comprehensive WASH and IPC baseline assessment in delivery rooms and postnatal care wards in order to determine the status of WASH and infection prevention within the 30 Phase III target facilities.

30 HCFs were assessed, including 19 primary care facilities, 9 secondary facilities and 2 tertiary facilities (15 facilities in Kogi State and 15 facilities in Ebonyi State). MCSP examined the WASH infrastructure at all 30 facilities that were assessed using the Joint Monitoring Programme's (JMP) newly published global standards for WASH in HCFs. MCSP also evaluated the WASH and infection prevention readiness of 30 delivery rooms, 28 routine postnatal care wards, and 19 special newborn care wards (including out-born units, Kangaroo Mother Care (KMC), sick newborn units, and neonatal intensive care units - NICUs). Since no global or nationally standardized WASH-related indicators exist for these wards, MCSP tailored the JMP standards for health care facilities to the various wards. MCSP also drew upon other global and national surveys to select questions related to basic infection prevention. The full survey assessed a selected number of attributes within each space (as applicable), please see Table 4 below.

Table 4: Topics assessed within each space through the survey

Topics Assessed	Reference Resources
• Water access • Sanitation access, cleanliness, privacy, accessibility, etc. • Hygiene infrastructure and supplies • Healthcare Waste Management • Cleaning/Disinfection supplies • Placenta disposal • Bathing Facilities • Laundry Facilities • Existence and content of written standards and protocols for cleaning and disinfection • Staff training on WASH/IPC (reported)	• JMP WASH in HCF standards • WASH FiT tool (WHO & UNICEF) • Core Components of Infection Prevention and Control Programmes in Health Care Healthcare (WHO) • Essential Environmental Health Standards in Health Care (WHO)

The data collected within this 'baseline assessment' provided a detailed snapshot of available WASH services and IPC supplies within the targeted HCFs. While detailed results for the basic WASH services and infection prevention standards can be found in Table 5 summary findings are highlighted below, by category:

Water access: To meet the global standard of having access to a "basic" water service, a HCF must have water available from an improved water source on the premises. 23 of 30 HCFs assessed met the 'basic service' standards on the day of visit. However, 20 HCFs reported having either weekly or seasonal disruptions in water service. Within HCFs, water was generally more available within the general facility compared with the delivery, postnatal care and special newborn care wards. One-third (11 of 30) of delivery rooms, one half of postnatal care wards, and one-third of special newborn care wards did not have water at the time of visit.

Sanitation services: To meet the global standard of having access to a "basic" sanitation service, a HCF must have access to improved sanitation facilities that are usable with at least one toilet dedicated for staff, at least one sex-separated toilet with menstrual hygiene facilities, and at least one toilet accessible for people with limited mobility. Only two HCFs had sanitation facilities that met the "basic access" standards and only one HCF had no functional sanitation facilities on premises. Delivery and postnatal wards did not have sanitation facilities that were dedicated to mothers. Dedicated sanitation facilities for mothers were most common in delivery wards (11/30), while only 7 of 28 PNC wards and 5 Special Newborn Care wards had dedicated sanitation facilities for new mothers.

Handwashing services: To meet the global standard of having access to "basic" hygiene services, a HCF must have access to hand hygiene facilities (with water and soap and/or alcohol based hand rub) that are available at points of care, and within 5 meters of toilets. Functional handwashing stations with soap and water present were more common within wards compared to the general facility (outpatient areas). As displayed in Table 4, a substantial proportion of facilities (10/30 delivery wards, 17/28 of postnatal wards and 8/19 special newborn care wards) lacked basic hygiene services at the time of visit.

Healthcare waste management: To meet the global standard of having access to a "basic" healthcare waste management service, a HCF must have access to improved sanitation facilities s safely segregated into at least three bins and sharps and infectious waste are treated and *disposed of safely*. Compliance with 'basic' healthcare waste management standards was uncommon across HCFs and wards. The vast majority of spaces assessed (80% of general facility spaces, 93% of delivery wards, 82% of PNC wards and 52% of special newborn wards) met the criteria for 'limited' healthcare waste management services – meaning that there is limited separation and/or treatment and disposal of sharps and infectious waste, but not all the requirements for a basic service are met.

Table 5: Baseline Results

Indicator	Category	General Facility (n=30)	Delivery (n=30)	PNC (n=28)	Special Newborn Care (n=19)
Water*	Basic Service	23	19	14	14
	Limited Service	6	0	0	0
	No Service	1	11	14	5
Sanitation (dedicated to mothers)*	Basic Service	0	2	0	1
	Limited Service	0	8	7	5
	No Service	0	1	0	0
Sanitation (public use)*	Basic Service	2	0	2	0
	Limited Service	26	19	19	13
	No Service	2	0	1	0
Hygiene*	Basic Service	1	21	11	11
	Limited Service	26	0	0	0
	No Service	3	9	17	8
Health Care Waste Management*	Basic Service	3	0	1	2
	Limited Service	24	28	23	10
	No Service	3	2	4	7
Environmental Cleaning*	Basic Service	2	0	1	2
	Limited Service	4	4	9	6
	No Service	24	26	18	11
Functional shower / bathing area	Yes	Not assessed	17	4	6
	No	Not assessed	13	24	13
Sterile gloves	Yes	Not assessed	20	12	10
	No	Not assessed	10	16	9
Examination (or sterile) gloves	Yes	Not assessed	Yes	26	15
	No	Not assessed	No	2	4
Waterproof mattress/bed in PNC	Yes	Not assessed	22	21	17
	No	Not assessed	8	7	2

Indicator	Category	General Facility (n=30)	Delivery (n=30)	PNC (n=28)	Special Newborn Care (n=19)
Chlorhexidine gel for umbilical cord care	Yes	Not assessed	22	21	16
	No	Not assessed	8	7	3

*basic, limited and no service categories are based off the Joint Monitoring Programme definitions found here

Environmental Cleaning: To meet the global definition of a "basic" environmental cleaning service, a healthcare facility must have protocols for cleaning available, and staff with cleaning responsibilities have all received training. Only two facilities (7% - both tertiary facilities) met the 'basic' environmental cleaning standards. No other wards and general facility spaces met basic service criteria, and few met the criteria for 'limited environmental cleaning service'. Compliance was highest within postnatal care and specialty newborn care wards.

Chlorhexidine gel: The majority of delivery rooms (73%), postnatal care wards (75%) and sick newborn wards (84%) had a stock of chlorhexidine gel available for umbilical cord care. Following the FMOH's roll-out of the National CHX Scale- Up strategy in 2016, SMOH's and local manufacturers procured large volume of Chlorhexidine gel in Ebonyi and Kogi states. Furthermore, MCSP supported the SMOHs in the two states to develop action plans to operationalize scale -up in their respective states thus creating more opportunities for access of the gel.

Sterile and/or examination (non-sterile) gloves: One-third of delivery wards (33%), three-fourths of postnatal wards and nearly half (47%) of special newborn care wards lacked a stock of sterile gloves at the time of visit. The majority of postnatal care wards (93%) and special newborn care wards (79%) had a stock of examination (non-sterile) gloves at the time of visit.

The results from these comprehensive assessments, coupled with the Phase 2 results on behavior compliance, helped guide MCSP and its partners identify priority activities for the Phase 3 implementation phase. The most valuable learning points from the Phase 2 and Phase 3 data collection activities included:

- While MCSP had provided limited hygiene products (handwashing stations) to select delivery and postnatal care wards, HCFs face water resource and supply chain challenges to maintain basic service levels
- While there are certainly infrastructure needs in many of the assessed HCFs, the assessment results point to several immediate and inexpensive opportunities to quickly improve cleanliness, waste management and infection prevention compliance within wards and the general facilities.
- With the exception of sanitation and cleaning, there were no clear differences in WASH and infection prevention between various facility levels (primary, secondary, and tertiary).

With the assessment results in hand, MCSP hosted a second of a two part Phase III design workshop with its partners, local, state and national government officials, and other stakeholders to present the results and solicit input into the design and prioritization implementation activities. Referring back to the COM-B behavior change model, workshop participants identified five activities for MCSP to carry forward, which are listed in Table 6. *(Note: while MCSP identified additional priority implementation activities, the program only had five implementation months for Phase III.)*

Table 6: COM-B Behavior Change Model

Phase III Activity	Relevant Behavioral Determinants	Capability	Opportunity	Motivation
Activity 1: Clean Clinic Monitoring and Certification System Development	• Education • Persuasion • Incentives • Modeling	X		X
Activity 2: Creating interpersonal Communication Materials that integrate Emotional Drivers	• Persuasion • Modeling			X

Phase III Activity	Relevant Behavioral Determinants	Capability	Opportunity	Motivation
Activity 3: Provision of Materials and Resources for Delivery Rooms and Postnatal Care Spaces	• Environmental Restructuring • Enablement	X	X	
Activity 4: Hygiene and Cord Care Counseling	• Education • Persuasion	X		X
Activity 5: WASH in HCF management trainings for HCF administrators and ward supervisors	• Education • Training • Restrictions • Enablement	X	X	

Activities

Activity 1: Clean Clinic Monitoring and Certification System Development:

During the implementation of Phases I- II, MCSP recognized the lack of practical tools for healthcare facility staff, managers or evaluators to use for routine assessments and compliance checks with national and global standards and prioritize limited resources for improvements. While global tools and standards do exist, they are spread across various documents. Furthermore, when combined these standards can be very technical and overwhelming to HCF staff that have limited resources and high patient volumes. The lack of these tools likely result in an inability among MoH stakeholders to fully apply, monitor and enforce national and global expectations for WASH and infection prevention in various healthcare environments.

Building off of MCSP's experience implementing the Clean Clinic Approach in other country programs, MCSP worked with national, state and local stakeholders to design a comprehensive WASH and infection prevention monitoring and certification system base on a set of four "Clean Clinic" scorecards.[4] These scorecards were intended for healthcare facility staff, LGA and State Ministry of Health (SMOH) staff to use for supportive supervision visits, monitoring and evaluating the WASH and infection prevention readiness of participating HCFs. The development of these scorecards was critical for three reasons:

1. **There are scorecards for different healthcare environments:** While many WASH, cleaning and infection prevention standards exist, few resources comprehensively examine the continuum of WASH services and infection prevention considerations and overarching management requirements needed throughout a healthcare facility and the unique needs within specific wards to provide basic quality services. Therefore, MCSP drafted 4 scorecards for use in various HCF contexts:
    a. A scorecard that aligns with JMP standards on WASH services at the general HCF level (HCF infrastructure and outpatient areas)
    b. A scorecard for labor and delivery wards, which consider the elevated level of infection risk that labor and delivery entail for patients and providers
    c. A scorecard for all postnatal care wards (routine PNC and special newborn care). Previously, MCSP was not aware of any comprehensive list of WASH and infection prevention standards for postnatal care settings
    d. A scorecard for special newborn care environments that recognizes the elevated infection risk that exists for sick or at-risk newborns

[4] The "Clean Clinic" scorecards and certification system used in Nigeria were based on MCSP's experience implementing its Clean Clinic Approach (CCA) in previous MCSP country programs. The CCA supports health facilities to make incremental and effective cleanliness and infection prevention improvements without relying on external investments. Through the CCA's 10-step process, we work with ministries of health to define criteria to institutionalize performance recognition and accountability systems within health systems.

2. **The scorecards are digestible for end users:** The global standards and recommendations for WASH services, cleaning and disinfection are lengthy and often very technical. These scorecards synthesized new and existing standards and recommendations into a more digestible tool for HCF staff, managers and evaluators. Each criteria within the scorecards carries a weight, which allows HCF staff to prioritize the criteria that are most-associated with infection risks. HCF staff, managers and evaluators all use the same tool so that expectations are universally understood.
3. **When properly used, the scorecards can stimulate motivation to perform:** To ensure that healthcare providers and cleaners understood all of the minimum national and global standards (some recently published/modified) for WASH, cleaning and disinfection within specific wards and within the general HCF. An annual "Clean Clinic" certification system was embedded within the scorecards to stimulate individual and collective motivation within the health system. The scorecard guidelines recommend semi-annual information monitoring visits and formal annual certification visits by the SMOH. Based on MCSP's experiences in Haiti and DRC, MCSP recommends that SMOH offices publically share annual HCF scores to maintain HCF performance, recognize high achieving cadre, and increase public awareness (and hopefully stimulate public demand for cleaner/safer healthcare services).

During the post-baseline workshop, MCSP worked with state and national stakeholders to design and finalize the "Clean Clinic" scorecards. The final scorecards are available here . HCF staff in MCSP partner facilities were oriented to the scorecards during WASH in HCF management trainings (see activity 5).

Activity 2: Integrating Emotional Drivers into Interpersonal Communication Materials (Posters)

Following the Phase II research, the LSHTM research team recommended interventions that would reinforce the following behaviors among HCF staff [5]:

- Increased emphasis on handwashing *frequency* at critical moments to ensure that mothers and newborns have reduced risk of infection.
- Increased emphasis on need to protect client, not just self
- Focus on improving skills and capacity during shifts with reduced personnel (afternoon and night)

MCSP contracted a graphic artist to develop images that communicated the priority behaviors. The images were pre-tested in HCFs within Kogi and Ebonyi states that were not participating in the phase III pilot activity. The images were then revised. State and Federal Ministry of Health stakeholders reviewed the draft images and approved of the final versions. The posters were printed and distributed to all 30 Phase III focus HCFs. HCF staff were instructed to place the images in strategic locations within wards to prompt increased compliance with hygiene and cord care practices among healthcare workers. Digital copies of the images were also shared with HCF management, SMOH and FMOH officials and were posted to MCSP's public webpage here.

Activity 3: Postnatal Care Hygiene and Cord Counseling Message Development

Another recommendation from the Phase II study results was the importance of encouraging facilities to systematize advice and counseling on hygiene and core care in the home environment when discharging patients. While there were additional recommendations relating to the home environment provided by LSHTM, the MCSP Nigeria program focused almost exclusively on providing support to the health care facilities. Therefore, MCSP did not design Phase III activities to address the recommendations in the home environment. In order to establish and improve the counseling on standard provision of hygiene and cord

[5] While MCSP would have ideally designed a lengthy and comprehensive behavior change and maintenance intervention that worked with pre-service education institutions alongside in-service systems, the program was limited to a 3-month implementation period for Phase III. Therefore, MCSP focused on creating effective hygiene and cord care promotional materials for use in the delivery room and inpatient newborn care wards

care provided to new parents during postnatal discharge counseling, MCSP referred to existing national and global guidance. The counseling messages included:

Hand hygiene:

- As parents it is important that your hands are washed with soap and water before caring for your baby
- It is important as responsible parents that you invite other caregivers and visitors that touch the baby to wash their hands prior to contact with the baby.
- Wash hands with soap and water before and after applying chlorhexidine gel

Cord Care:

- Remember to apply the chlorhexidine gel to the umbilical cord once daily
- This chlorhexidine gel is reserved for your newborn. Do not share the chlorhexidine gel with another baby
- Only use chlorhexidine gel for the cord. Avoid applying other substances to the cord and do not allow any other caregivers or visitors to apply other substances to the cord. Other substances (such as motor oil, animal dung) can cause infection.
- Avoid tucking the cord into the nappy

The counseling messages were incorporated into WASH in HCF Management trainings (see activity 4 below).

Activity 4: WASH in HCF Management trainings

To ensure the effective use of the products and systems developed under activities I-III, MCSP developed a training for HCF leadership by modifying the World Health Organization (WHO)'s Leadership and Programme Management in Infection Prevention and Control: a Trainer's Guide. A modified version of the training package used can be found here. MCSP trained a total of 131 health facility managers and ward supervisors from the 30 priority partner facilities. Since MCSP's partner, the National Association of Nigeria Nurses and Midwives (NANNM) was rolling out IPC trainings for midwives and nurses, MCSP strategically focused trainings on HCF administrators and ward supervisors. Representatives from the LGA and SMOH also attended each trainings. MCSP held six trainings (3 per state) with approximately 20 participants in each training.

During these one-day off-site trainings, participants were briefed on the results from MCSP Phase II research and results from the Phase III baseline assessment. Participants then partook in practical exercises and lectures that oriented them to the WASH and IPC standards, along with the scorecard tools and the certifications systems. At the end of the training, participants began drafting action plans related WASH and infection prevention for mothers and newborns and assigning responsibilities for their staff and various stakeholders within the health system. MCSP committed to provide the participants with 'start-up' materials as an incentive to begin incremental improvements (see activity 5). Lastly, participants were provided with a digital and paper copy of the training material and trainer's manual for use within their HCFs and wards and were given 6-8 weeks to begin making improvements before receiving a monitoring visit from MCSP and the LGA MoH representatives (using the established scorecards).

Activity 5: Provision of Materials and Resources for Delivery Rooms and Postnatal Care Spaces

In accordance with the COM-B framework and the known gaps in previous programs, MCSP sought out intervention activities that stimulated or maintained stakeholder motivation to comply with WASH and infection prevention practices, the baseline assessment highlighted a number of key infrastructure and supply gaps in MCSP-supported facilities. While it was outside the scope of MCSP's mandate to implement any

construction or rehabilitation projects, MCSP did recognize that providing a limited set of structural supplies to HCFs would help them improve compliance with basic WASH and infection prevention standards. MCSP decided to provide a small number of non-consumable items that could support a HCF over time. Specifically, MCSP procured handwashing stations and healthcare waste management containers (color-coded and labeled) that could support quick and sustained improvements in hygiene and healthcare waste management practices.

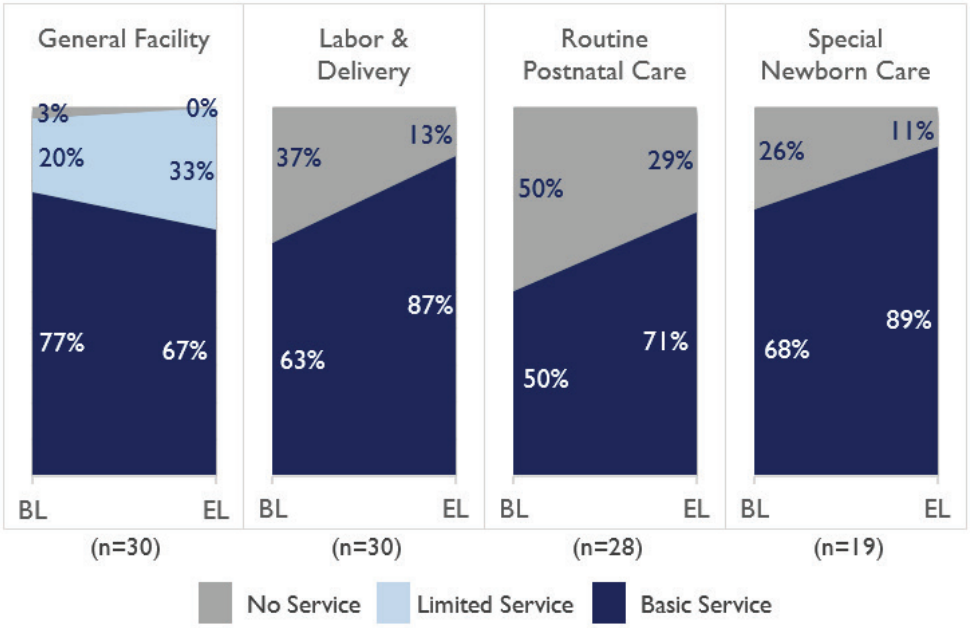
After the WASH in HCF Management trainings, where participants learned about optimal placement and use of the supplies, MCSP distributed 90 handwashing stations to participating facilities (3 per facility). MCSP encouraged HCF administrators and ward supervisors to prioritize the provision of handwashing stations within delivery wards, special newborn wards and postnatal wards, where mothers and newborns are most at risk of infection. Guidance was provided on convenient placement of handwashing stations to facilitate use. Furthermore, virtually all of the supported HCFs were in need of properly marked, color-coded waste management containers to facilitate the separation of medical, sharps and general waste within wards. Although general waste management containers are available within facilities, MCSP provided a total of two containers (1 – infectious waste, 1 – sharps waste) to each facility (total of 60 containers), along with guidance to prioritize placement of these containers within delivery wards as needed.

Endline Assessment Results

After the completion of Phase III intervention activities from July – October 2018, MCSP collaborated with LGA staff and State Ministry of Health Staff to conduct a second WASH and IPC readiness survey in all 30 participating facilities in October 2018, using the new ward scorecards that were established (the scorecard tools can be found in here). Although all criteria in the scorecards were assessed, this report highlights the results of the basic WASH services and critical infection prevention standards that were examined.

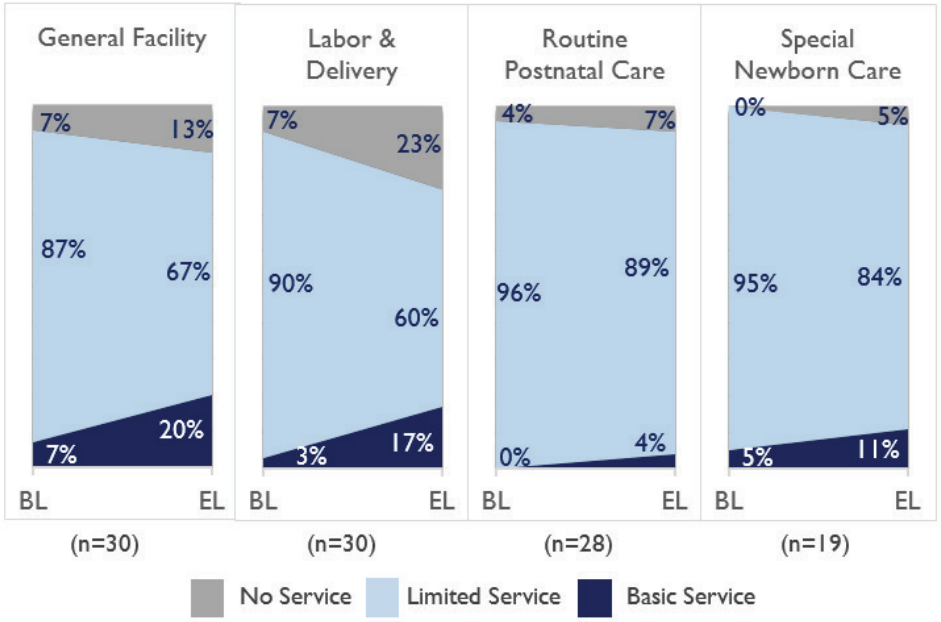
Water Services: While access to basic water services decreased at the HCF level, Figure 2 shows that access to water increased among delivery wards, postnatal care spaces and special newborn care spaces. These results demonstrate that HCF and ward staff are prioritizing the transportation and storage of water despite the challenges faced with functional HCF infrastructure.

Figure 2: Change in the Health Care Facility Water Service Level by Ward from Baseline to Endline



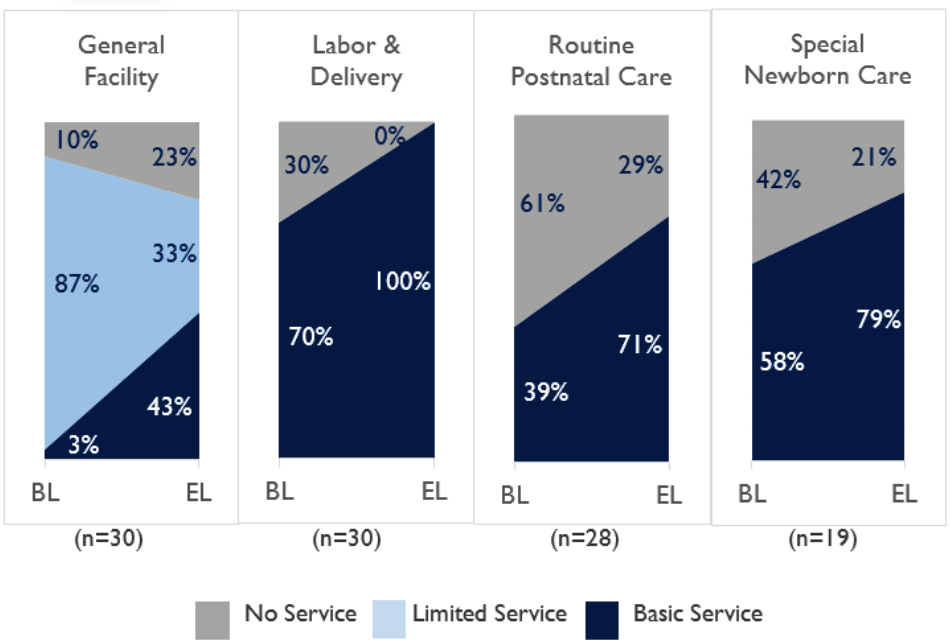
Sanitation Services: Figure 3 shows slight improvements were made in access to dedicated sanitation facilities increased across within labor & delivery wards, while access largely remained stagnant across other wards. This stagnation could be due to a lack of required infrastructure investments to improve services or it could be a result of the numerous indicators required (privacy, limited-mobility access, gender separated, containing menstrual hygiene materials) to jump from "limited service" to "basic "service.

Figure 3: Change in Health Care Facility Sanitation Service Level by ward from baseline to endline



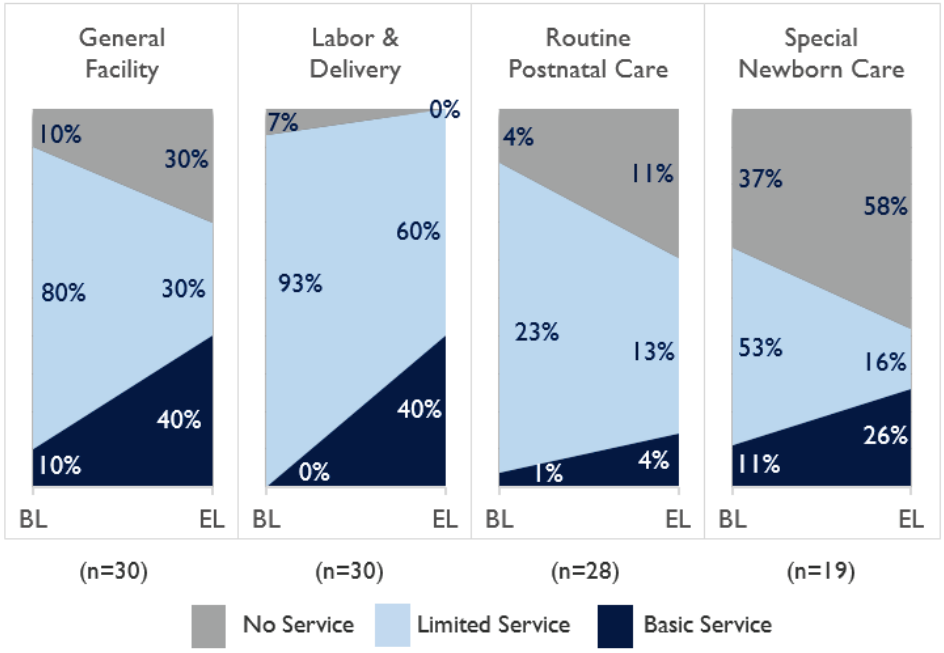
Hygiene Services: Hygiene service levels increased across wards, which can be seen in Figure 4. At the endline assessment, 100% of delivery wards had access to a functional handwashing station (soap and water).

Figure 4: Change in the Health Care Facility Hygiene Service Level by Ward from Baseline to Endline



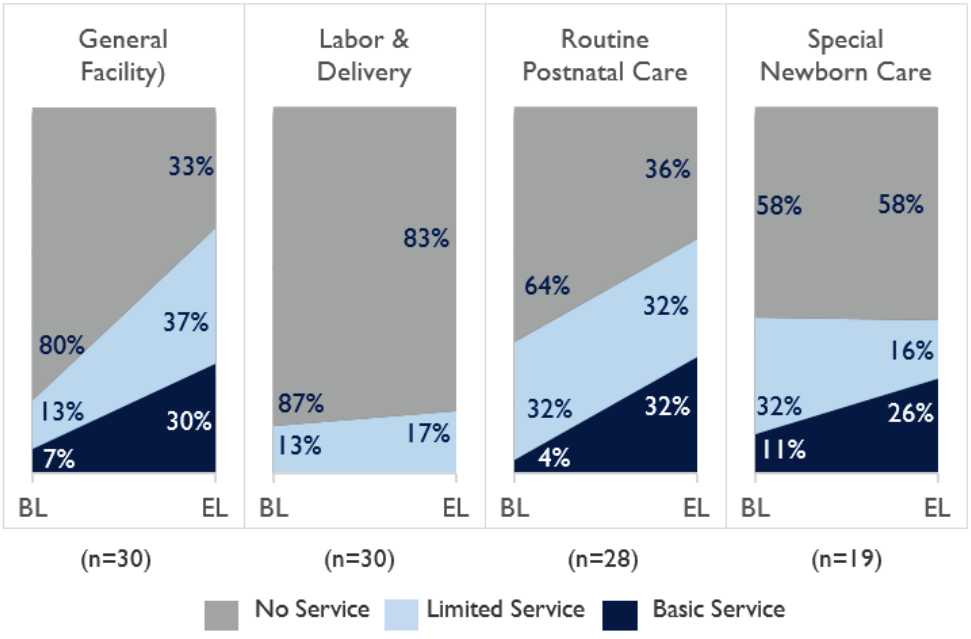
Healthcare Waste Management Services: Figure 5 shows that more HCFs and wards had basic waste management services at endline compared to baseline. This improvement was highlighted in delivery wards, where MCSP provided waste management containers needed to achieve a basic access. However, many PNC and special newborn care wards had lower service at endline.

Figure 5: Change in the Health Care Facility Waste Management Service Level by Ward from Baseline to Endline



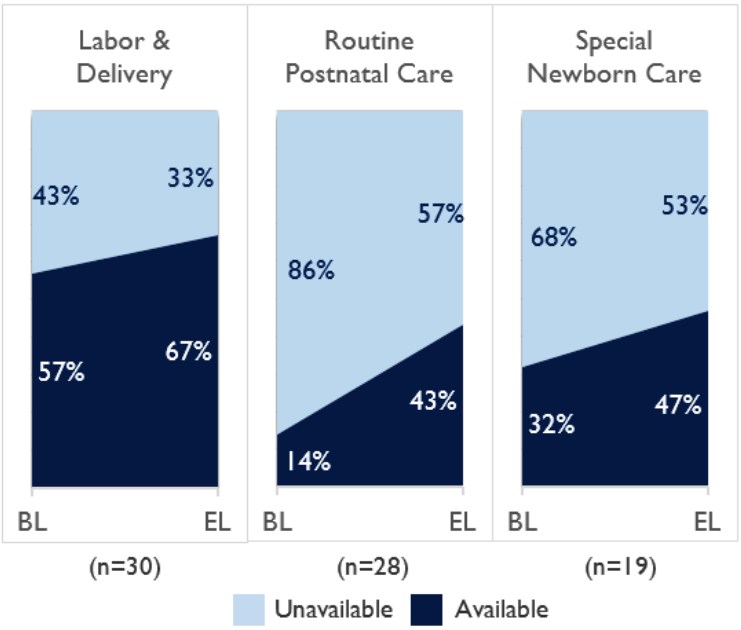
Environmental Cleaning Services: Figure 6 shows improvements in HCFs, PNC and Special Newborn Wards were made. However, no meaningful improvements were made in delivery wards.

Figure 6: Change in the Health Care Facility Environmental Cleaning Service Level by Ward from Baseline to Endline



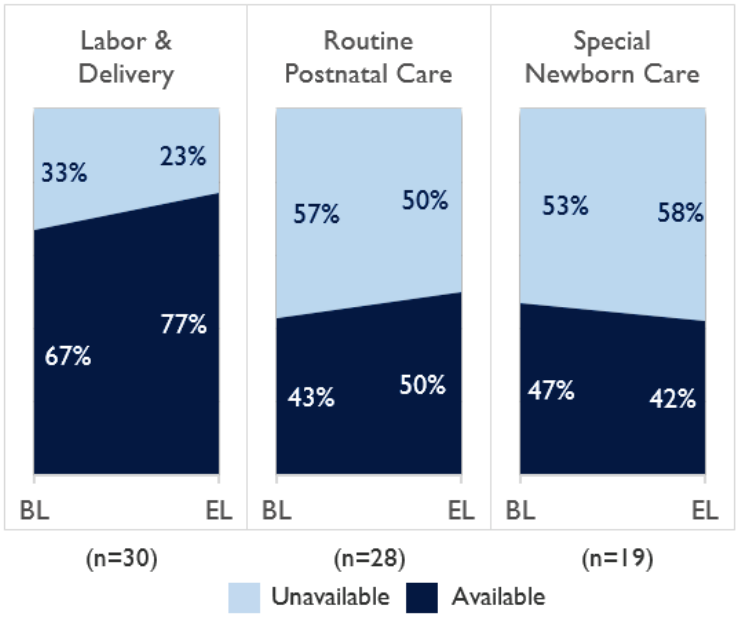
Shower/bathing Facilities: Figure 7 shows that the proportion of delivery, PNC and special newborn care wards with dedicated, functional shower/bathing facilities for expecting or new mothers increased without any financial, construction or rehabilitation support from MCSP.

Figure 7: Change in the Health Care Facility Shower/Bathing Facility Service Level by Ward from Baseline to Endline



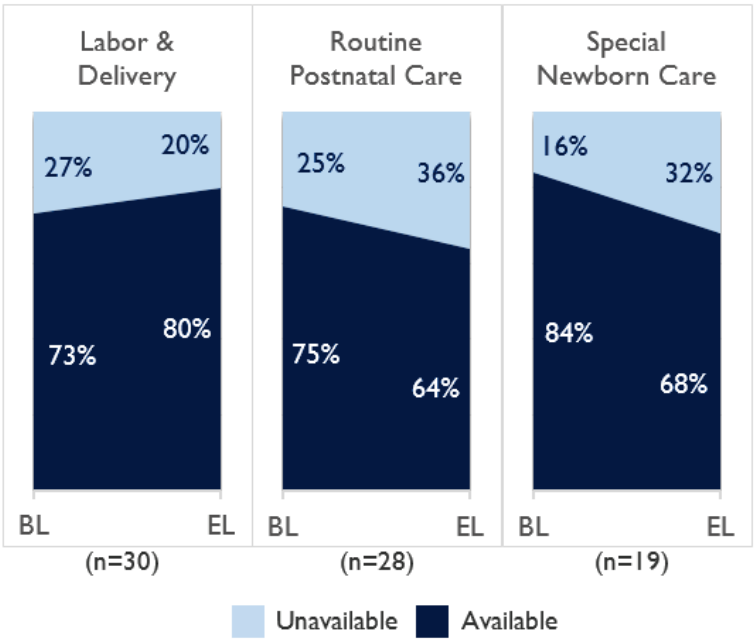
Infection Prevention Measures: HCFs made several improvements related to infection prevention. The proportion of delivery, PNC and special newborn care wards with a stock of sterile gloves available increased slightly, as shown in Table 8. The proportion of PNC and special newborn care wards with a stock of examination gloves available decreased from 26 to 16 in PNC wards and from 15 to 14 in special newborn care wards.

Figure 8: Change in access to sterile gloves (available in ward) by ward from baseline to endline



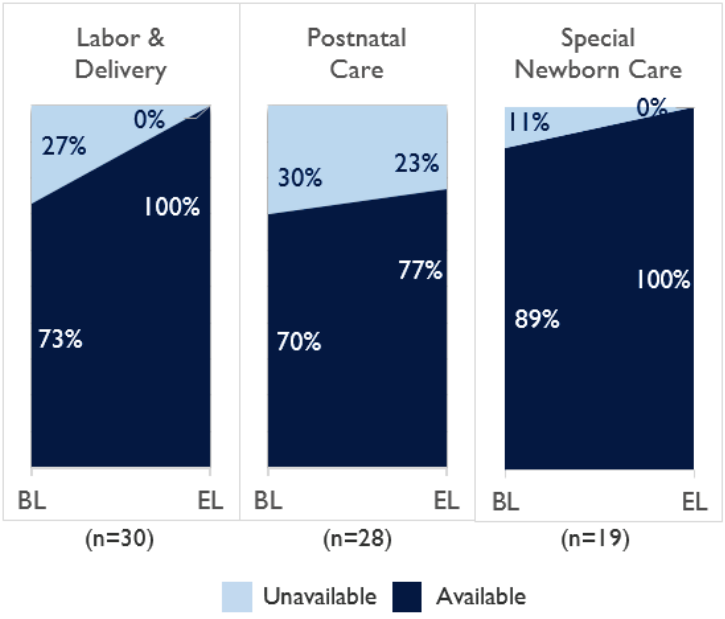
While the availability of chlorhexidine gel for umbilical cord care increased among delivery wards, its availability decreased slightly among postnatal care and special newborn care spaces (see Figure 9). These results suggest that chlorhexidine is being correctly prioritized in labor & delivery rooms during potential supply chain shortages. Alternatively, HCF staff may be centralizing the storage of chlorhexidine within labor & delivery rooms (which was a notation from several MCSP enumerators during data collection).

Figure 9: Change in access to chlorhexidine gel by ward from baseline to endline



MCSP also assessed the material and condition of maternity and neonatal mattresses/covers to ensure that the material was an impermeable, cleanable material devoid of cracks or rips. Although MCSP did not provide any material or financial support for bedding improvements, several wards made improvements between baseline and endline data collection, as showed in Figure 10.

Figure 10: Change in access to impermeable, cleanable bed/mattress covers from baseline to endline

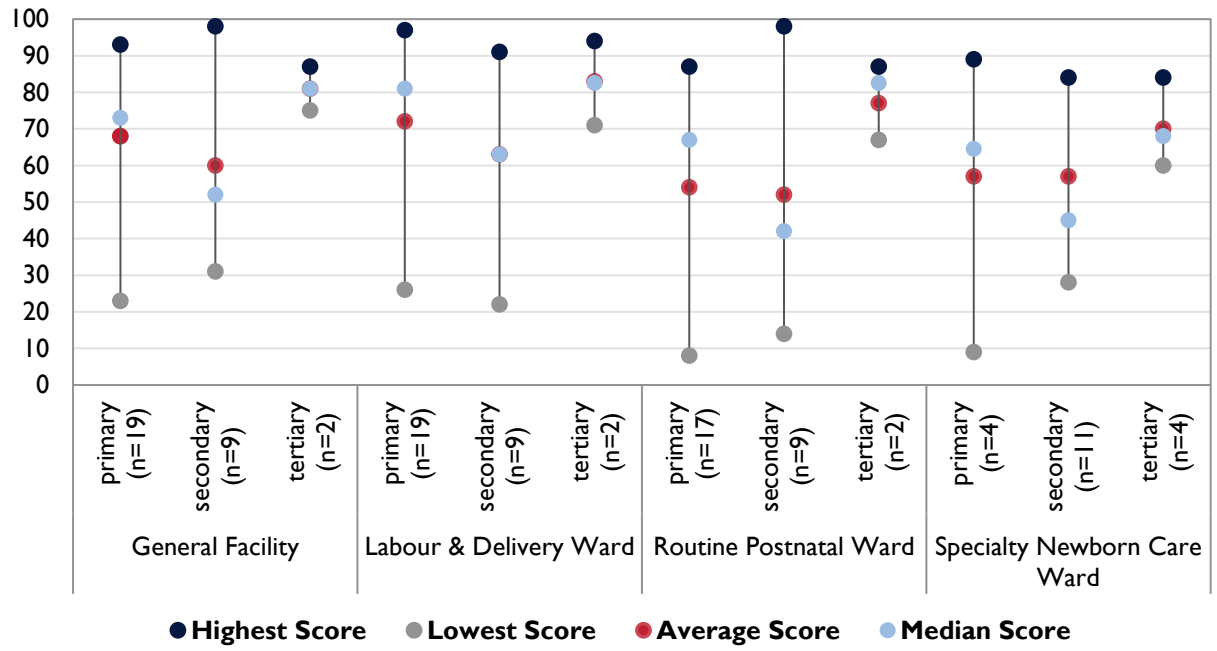


Assessing Health Care Facility "Clean Clinic" Scores

Assessing Variations in Performance among HCF levels:

After 3 months of the pilot implementation period, 47% of HCFs achieved a level of 'Clean Clinic' certification for the general facility/outpatient ward. Over half (57%) of delivery wards earned a certification, while only 36% of postnatal care wards and 42% of special newborn care wards earned a certification. HCF results can be found in Figure 11. While the two tertiary facilities assessed scored consistently well across wards, there was a wide variation in performance across primary and secondary facilities. Surprisingly, secondary facilities did not always outperform primary care facilities. In fact, primary care facilities performed better on average when compared with secondary facilities within outpatient, delivery and postnatal care wards.

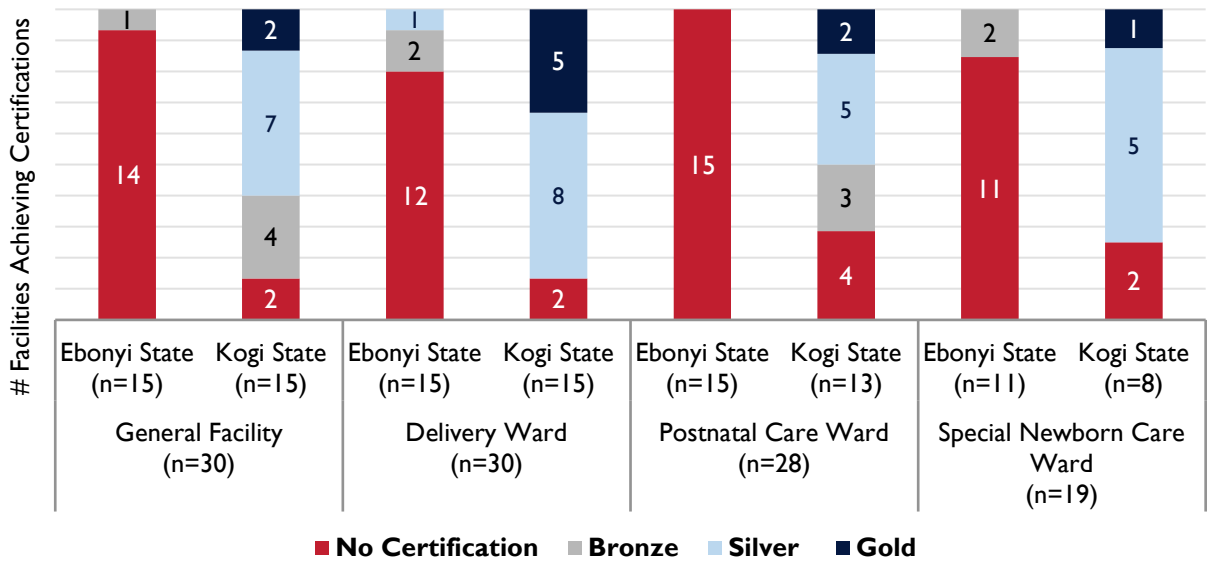
Figure 11: Health care Facility Clean Clinic Scores by Facility Level and Ward after Implementation



State Comparison

HCFs in Kogi State far outperformed facilities in Ebonyi State across all facility levels and ward types, as displayed in Figure 12 below. The majority of outpatient wards (87%), delivery rooms (87%), postnatal care spaces (71%) and special newborn care wards (75%) in Kogi earned a clean clinic certification. Conversely, only 7% of HCFs, 20% of delivery wards, 0% of postnatal care wards and 15% of special newborn care spaces in Ebonyi earned a clean clinic certification. Three HCFs in Ebonyi (two primary care and one secondary facility) scored consistently low across wards.

Figure 12: Clean Clinic Certifications by State and Ward



Special Newborn Care Ward – Assessing Advanced WASH and Infection Prevention Criteria:

In addition to establishing and monitoring basic WASH service and infection prevention standards for postnatal care and special newborn care wards, MCSP collaborated with national and state stakeholders to draft a set of advanced WASH and IPC criteria that recognize the increased healthcare-associated infection vulnerability among at-risk and sick newborns that receive prolonged in-patient care. Although these standards were not incorporated in the "Clean Clinic" certifications of wards and HCFs, the criteria were assessed. A subset of criteria and assessment results are displayed in Table 7 below. A full list of the advanced criteria and applicable wards can be found in here (D- Special Newborn Criteria).

Table 7: Assessment Results from a subset of Advanced WASH and IPC standards for special newborn care

Criteria	Total # wards Assessed	# wards that met criteria	Proportion of wards in Compliance
A standard exists that masks are worn within the wards by all staff when attending to newborn patient	17	9	53%
Alcohol-based hand rubs/handwashing stations are located at the entrance to the sick newborn space, or at the bedside of each patient	17	4	24%
Health workers working in the ward have pocket-sized alcohol-based hand containers on their person at the time of observation	17	3	18%
High level disinfectant is available at the time of survey for disinfecting medical equipment*	13	13	100%
Healthcare workers report that mothers and caregivers are screened upon entrance to the ward and excluded for signs of infection (fever, respiratory infection, diarrhea, and draining skin infection)*	13	8	62%

Criteria	Total # wards Assessed	# wards that met criteria	Proportion of wards in Compliance
Staff report that water reservoirs of evaporative humidifiers in incubators are drained, cleaned, and refilled with sterile water every 24 hours*^	13	6	46%
A protocol exists to ensure cots and incubators are cleaned frequently to remove visible soil (blood, milk, body fluids) and reduce microbial burden	17	14	82%
A protocol exists for changing linens on cots and incubators between patients, and daily or when soiled during patient use	17	6	35%
Disinfectants such as and/or chlorine compounds (or quaternary ammonium) are used to conduct cleaning of surfaces - are present in the ward	17	16	94%

*Criteria did not apply to kangaroo mother care (KMC) wards

^Criteria did not apply to out-born wards

While special newborn care wards performed well against some criteria (e.g. having high level disinfectant for cleaning available within the ward (94% compliance), many did not meet important criteria – such as having a standard operating procedure that staff don masks when attending to newborn patients (53% compliance). The variation in the existence of these standards, and the variation among wards and HCFs, demonstrates the need to formalize an advanced set of standards and orient the healthcare workforce to established standards.

Documentation and Dissemination

Baseline results were presented during the July 2018 design validation workshop. All of the scorecards, training materials and promotional products were provided to SMOH and FMOH representatives. The baseline assessment results were presented at a global Water and Health conference in October 2018. At the end of the Phase III MCSP conducted an endline assessment using the designed scorecards to assess improvements in WASH conditions in HCFs and proxy indicators of hand hygiene and infection prevention compliance among health providers and caregivers. All Phase III training materials, IEC materials, and implementation tools (scorecards) were provided in hard copy and digital form to SMoH and FMoH, along with LGA MoH offices and participating HCF leadership.

Discussion of Phase III Results

Phases I and II of the learning activity demonstrated the need to increase behavior compliance among staff, patients and caregivers and the need to improve on-the-job orientation for healthcare workers. In Phase III, MCSP designed and implemented a set of complimentary activities to improve the *capability, opportunity* and *motivation* of healthcare workers to make and sustain effective WASH and infection prevention improvements.

Although the phase III pilot implementation was a short 3-month period, results demonstrate that HCF staff can make incremental WASH and infection prevention improvements independently of external funding. Within the short 12-week span between baseline and endline assessments, HCFs made improvements in many of the criteria listed within the Clean Clinic Scorecards. For instance, one of the most heavily weighted criteria within delivery rooms was a functional handwashing station with soap. HCF staff clearly began to prioritize the provision of water and soap within each ward following the phase 3 activities (refer to Figure 4). Some HCFs even demonstrated WASH service improvements that were not considered of high importance, such as ensuring dedicated, functional bathing facilities for expecting or new mothers.

Anecdotally, MCSP attributes these rapid improvements to collective implementation of the following Phase III activities: a clean clinic monitoring and certification program (Activity 1), conducting WASH in HCF management trainings (Activity 5), and providing materials and resources for ward-level use after training

(Activity 3). Sharing results from the formative research and baseline assessment with managers at national, state, local, HCF and ward level was particularly helpful. Once managers and staff were presented with specific expectations and results from the facilities and wards they oversee, many incremental improvements were made quite quickly.

The phase III findings highlighted disparities in access to basic WASH services and infection prevention supplies between Kogi and Ebonyi states, with HCFs in Kogi consistently outperforming those in Ebonyi at baseline and endline. MCSP's implementation experience suggests two challenges may have resulted in this disparity. First, while HCF water access did not vary widely between HCFs in each state, ward-level water access and consistency was far lower in Ebonyi state compared to Kogi. Without water some of the basic (and most heavily weighted) criteria are difficult or impossible to achieve, which may explain why Ebonyi HCFs had lower compliance with Clean Clinic criteria. It is also possible that the lack of water discouraged HCF staff in Ebonyi from attempting improvements because

The other observation from MCSP staff was that health system supply chains may be more reliable in Kogi. The data on chlorhexidine access displayed in Table 8 may be an indication of this state-level difference, as Kogi HCFs and wards had better chlorhexidine access compared to Ebonyi.

Table 8: Availability of chlorhexidine gel at baseline and endline, by ward and state

Ward Type	Chlorhexidine available (Y/N)	Ebonyi		Kogi	
		Baseline	Endline	Baseline	Endline
Labor & Delivery	Yes	8	11	14	13
	No	7	4	1	2
Postnatal Care	Yes	8	6	13	12
	No	7	9	0	1
Special Newborn Care	Yes	8	5	8	8
	No	3	6	0	0

While the reported Phase III improvements are important indicators of opportunity and motivation, they are only partial measures of success. MCSP did not have time to rigorously monitor any changes in behavior among staff in participating HCFs - or the degree to which WASH and infection prevention access results were sustained over time. While creating evidence-based interpersonal communications materials (activity 2) and supporting improvements in hygiene and cord care counseling (activity 4) are important for sustained behavior change of staff and caregivers, their impact was could not be sufficiently measured during Phase III.

Conclusion

Remaining Challenges

Despite the promising data from this short pilot implementation period, many challenges remain. Some WASH services assessed saw less progress compared to what was expected. For example, little progress was seen on healthcare waste management within wards, even though MCSP provided the required materials to at least one-ward in each participating HCF. The level of sanitation services barely changed, likely because sanitation facility improvements require significant environmental restructuring (construction) to comply with outlined standards and because the different between limited and basic service requires progress across multiple indicators (privacy, limited mobility access, gender separation, staff/patient separation). Due to the short implementation and monitoring timeline of Phase 3 activities, MCSP was unable to adequately measure whether progress was sustained over any significant period of time.

Additionally, MCSP provided delivery wards with a set of color-coded, labeled health care waste management containers to safely separate general, medical and sharps waste in accordance with JMP standards. Delivery wards therefore had all the materials needed to meet the 'basic service' standard. However, the endline assessment survey shows that while these bins were often place, the waste was not being routinely separated in accordance with the standards. These findings support the findings from Phase II, which point to the challenges associated with establishing and maintaining many standard practices among health care staff, even when supplies are readily available. Multi-modal interventions that target motivational factors are needed in order to make and sustain progress on infection prevention behaviors. Context-specific formative research is also needed to ensure that programs are addressing motivation-related barriers and applying effective drivers for behavior compliance among stakeholders within healthcare environments.

Although there are many simple, low cost improvements that HCF staff can make in short order, attaining and sustaining all the basic WASH and infection prevention standards will likely require targeted external funding for infrastructure, multi-modal behavior change interventions, improvements to supply chain reliability and systematic monitoring and evaluation of staff and HCF performance. It was clear throughout MCSP's work that several HCFs struggled with consistent water access, high patient volumes and sporadic supply chains.

Lessons Learned and Recommendations

Past interventions in Nigeria (and worldwide) have focused primarily on building or rehabilitating water and sanitation infrastructure, training clinicians on how to properly wash hands or providing them with consumable items. Implemented in isolation, these interventions yield unsustainable results because infrastructure breaks down and supplies run out. Even where access to WASH services is improving, staff, patients, caregivers and other stakeholder do not consistently use hygiene and infection prevention supplies. MCSP's multi-phase learning activity in Nigeria highlights the need for future initiatives to design evidence-based, multi-modal behavior-centered interventions to improve and sustain the plethora of habits and routines required to maintain WASH in health care facility standards.

MCSP's learning activity demonstrated the value of sharing detailed data on specific criteria and disaggregating that data by ward with HCF staff. Once equipped with timely, detailed and ward-specific data and clear priorities, participating healthcare facilities found ways to make improvements that were within their power. Future monitoring efforts should include ward-level assessments of WASH services and infection prevention readiness. Any future data collected should be immediately shared with health care facility management and staff to inform immediate action.

The WASH in HCF sub-sector within Nigeria (and worldwide) primarily reports on output and proxy indicators such as availability of services and supplies, while the use and impact of those services and supplies go unmeasured. This learning activity clearly demonstrated the need to begin routine behavioral monitoring in

an effort to assess and reduce infection risk. Stakeholders are also encouraged to begin measuring relevant outcomes of interest, such as changes in surface and hand contamination, infection incidence and perceived quality of care.

Future interventions should not only incorporate training, education and infrastructure improvements, but also motivation-related interventions such as persuasion, accountability, modeling and incentives that create and sustain a culture of hygiene and infection prevention. Some relevant interventions might include performance-based financing, annual HCF certifications, routine behavior audits led by IPC committees, tying job descriptions and evaluations to infection prevention compliance measures, environmental re-structuring to make infrastructure and supplies more conveniently available at points of care. Nigeria's Federal and State Ministries of Health, along with their partners, are encouraged to design programs that incorporate WASH and IPC from a systems perspective with the recognition that behaviors are everlasting concerns in healthcare and require comprehensive interventions to sustain compliance and ensure institutionalization.

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Appendices

Appendix I: Results from the Phase II Delivery Room, Discharge and Post- Discharge Assessment, disaggregated by state

	Ebonyi (n = 3)	Kogi (n = 3)	Source
Standardised Procedures			
IPC	3	2	Needs assessment survey with nurse/midwife in charge
Hand washing	3	2	Needs assessment survey with nurse/midwife in charge
Waste disposal	2	2	Needs assessment survey with nurse/midwife in charge
Sharps disposal	2	3	Needs assessment survey with nurse/midwife in charge
Hospital cleaning budget	2	0	Needs assessment survey with nurse/midwife in charge
Labour and Delivery Infrastructure			
At least one functioning HWF	3	3	Facility walk through
Functioning tap	3	1	Facility walk through
Veronica Bucket	0	2	Facility walk through
Soap present	3	2	Facility walk through
Disposable towel present	0	0	Facility walk through
Hand hygiene posters	0	0	Facility walk through
Cord Care			
CHX available	3	3	Qualitative interview with facility head*
CHX provided for mothers free of charge	3	3	Qualitative interview with facility head*
Nothing used to clean cord prior to clamping	3	2	Needs assessment survey with nurse/midwife in charge
Gloves changed prior to clamping cord	2	2	Qualitative interview with nurse/midwife*
Gloves changed prior to first CHX application	0	1	Qualitative interview with nurse/midwife*
Disposable clamps	3	3	Needs assessment survey with nurse/midwife in charge
Disposable blade	1	1	Needs assessment survey with nurse/midwife in charge
Post-Natal Infrastructure			
At least one HWF	2	1	Facility walk through
Water is currently available	1	0	Facility walk through
Soap present at HWF	2	0	Facility walk through
Discharge			
Standardised discharge procedure	2	2	Needs assessment survey with nurse/midwife in charge

	Ebonyi (n = 3)	Kogi (n = 3)	Source
Mothers advised at discharge to wash hands prior to applying CHX	0	2	Qualitative interview with nurse/midwife*
Mothers advised at discharge exclusively apply CHX	0	1	Qualitative interview with nurse/midwife*
Mothers advised at discharge to ensure cord is not trapped inside baby's diaper	0	2	Qualitative interview with nurse/midwife*
Wash hands before breastfeeding	0	2	Qualitative interview with nurse/midwife*
Home			
Water is stored	13	14	Home walk through
Dedicated HWF	8	12	Home walk through
Soap present at HWF	7	2	Home walk through

*Quantitative results from qualitative interviews should be considered in context. It is possible that indicator was simply not mentioned by the participant.

Appendix II: Phase II Participant Selection Criteria

Only eligible and consenting participants will be considered.

Criteria	Patient (Woman)	Health care worker	Caregiver(s)
Inclusion	• Women in active labour: cervical dilation >3cm (estimated by cervical examination performed by midwife/doctor) • Women admitted to deliver at the facility • Clinical staff present (midwife, nurse or doctor) • Provide consent for the study	• Works – either in a clinical or non-clinical capacity – in labour and delivery and/or post-natal care wards within the facility • Staff responsible for the cleaning or management of maternity or neonatal care areas **(SSIs only)** • Provide consent for the study	• Visiting or caring for a patient enrolled in the study • Provide consent for the study
Exclusion	• Women who present in stage 2 labour: cervical dilation of 10cm (estimated by cervical examination performed by midwife/doctor)[6] • Women with complicated labour, delivery or postnatal care • Separation of mother and neonate after delivery due to complications • Absence of a clinical staff member during stage 2 or stage 3 labour • Women under the age of 18 years not accompanied by her partner or guardian	• Not involved in labour and delivery or post-natal care wards	

[6] The primary rationale for this exclusion is an ethical concern related to whether it is appropriate to consent a women during active labour when she is likely to be in pain and/or distress. Agreement to participate commits the woman to up to 16 hours of observation, both at the health facility and at home, which is a significant undertaking. Any potential perceived coercion or perception that medical care is dependent on participation in the research study is much more likely to occur when the woman is in physical distress during labor.