A SYSTEMATIC REVIEW OF WATER, SANITATION AND HYGIENE IN HEALTH CARE FACILITIES AND THEIR IMPACT ON MATERNAL AND NEWBORN MORTALITY: A FOCUS ON PAKISTAN

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A paper presented to the faculty of The University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Master of Public Health in the Department of Maternal and Child Health.

Chapel Hill, N.C.

April 4, 2018

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**ABSTRACT**

Almost one third of global maternal deaths and 39 percent of newborn deaths occur in South Asia. Pakistan has a maternal mortality ratio of 178 deaths per 100,000 live births, and a neonatal mortality rate of 46 deaths per 1000 live births, both exceeding the United Nations targets for maternal and neonatal mortality. Of the direct causes, sepsis is the second most common preventable cause of maternal mortality, and third most common preventable cause of neonatal mortality in Pakistan. Although the connection between water, sanitation and hygiene (WASH), infection prevention and maternal and newborn health has long been recognized, many health facilities in Pakistan are without the WASH interventions necessary to meet the needs of pregnant mothers and newborn children.

This paper discusses the issue with reference to the global, regional and country specific burden of maternal and neonatal mortality and WASH conditions in health facilities. The paper considers the role of WASH interventions in preventing infection, sepsis and related mortality, and lastly, formulates recommendations at the community, health facility and government levels to improve WASH services in health facilities and to decrease rates of infection and maternal and neonatal mortality in Pakistan.

**BACKGROUND**

*Global Burden*

According to the World Health Organization (WHO), approximately 830 women die every day from preventable causes related to pregnancy and childbirth. In 2015, there were 303,000 maternal deaths associated with pregnancy and childbirth(1). Of those maternal deaths, 99 percent occurred in developing countries, where 239 maternal deaths
per 100,000 live births took place compared to 12 per 100,000 live births in developed countries(1).

Globally, newborns face a high risk of dying in their first month of life; a rate of 19 neonatal deaths per 1,000 live births has been estimated. In 2016, 2.6 million children died during the neonatal period, i.e., approximately 7,000 newborn deaths per day. About 1 million died on the first day after birth and nearly 1 million died over the following six days(2). Moreover, children in sub-Saharan Africa or South Asia were nine times more likely to die in the first month than their counterparts in high-income countries. For example, neonatal mortality rates ranged from 46 deaths per 1,000 live births in Pakistan compared to 1 per 1,000 live births in Iceland and Japan(2). As with maternal deaths, these infant deaths were due to complications during and following pregnancy and childbirth; most were preventable or treatable.

The major complications that account for nearly 75 percent of all maternal deaths include hemorrhage, sepsis, pre-eclampsia and eclampsia, complications attendant to delivery and unsafe abortion(1). Most newborn deaths are caused by preterm birth complications, intrapartum related events, such as asphyxia, sepsis or meningitis, congenital abnormalities, pneumonia, diarrhea, and tetanus(3).

Sepsis (maternal and newborn) is the third most common direct cause of mortality, leading to death but also disability for the mother and the newborn(4). WHO defines puerperal sepsis as an infection of the genital tract occurring at any time between the onset of rupture of the membranes or labor and the 42nd day postpartum. In addition to fever, one of the following conditions are present: pelvic pain, abnormal vaginal discharge, abnormal smell/foul odor of discharge and delay in the rate of reduction of the
size of the uterus(5). The bacteria that cause neonatal sepsis are acquired before, during, and after delivery(6). They can be transmitted directly from the mother through her blood, skin or birth canal to the newborn before or during delivery, or from the environment during and after the delivery(6). The latest mortality estimates suggest that sepsis is the underlying cause of 11 percent of maternal deaths, eight percent of early neonatal deaths (0-6 days of age), and 37 percent of late neonatal deaths (7-27 days of age)(7,8). These percentages represent 75,000 maternal deaths per year, most of which occur in low-income countries, and around one million neonatal deaths, more common in the developing world(5,9).

Risk factors for the development of maternal sepsis include home births in unhygienic conditions, low socioeconomic status, poor nutrition, anemia, prolonged labor, multiple pregnancies, and caesarian or complicated deliveries, with caesarian or complicated deliveries being the single most important contributing factor(5,9). For neonatal sepsis, the factors include under-recognition of the condition, delay in seeking care, and lack of access to appropriately-trained health workers and high-quality commodities like appropriate medicine and the equipment required to manage care(9). In situations where quality services are available, distance and the cost of treatment are often barriers to accessing necessary assistance(9).

However, physical and financial access to care are not the only factors limiting the provision of effective treatment for sepsis because the condition, which is found most often in developing countries, is related to health system failures such as infrastructure constraints and noncompliance with established infection prevention protocols and management procedures, including hand hygiene(7,9). In addition, community and
cultural factors in low-income countries – delivery by untrained/traditional birth attendants and delays in seeking care – may also contribute to infections(7).

However, the true burden of maternal and newborn infection and related complications are expressed in terms of broader health determinants(7). For example, for every maternal death due to sepsis, there are many women who suffer serious acute maternal morbidities (SAMM) associated with infections(5). However, measuring the burden of SAMM is difficult, particularly in low-income countries where not all women give birth in a health facility(10).

Regional and Country Specific Burden

Of the maternal deaths that could be prevented, almost one-third occur in South Asia. In Pakistan, for example, the MMR is 178 per 100,000 live births(11). In addition, the highest percentage of newborn deaths (39 percent) occurred in South Asia and more than one million newborn deaths take place every year in the region(3,12,13). Pakistan is responsible for 10 percent of global neonatal deaths, and ranks first in the South Asian region with 46 deaths per 1000 live births(3,13). In light of these outcome measures, it is not surprising that Pakistan did not achieve Millennium Development Goals (MDG) 4 and 5, i.e., reducing infant mortality and improving maternal health(14).

The majority of direct causes related to maternal mortality in the South Asian region were hemorrhage (31 percent), sepsis (14 percent), and hypertension (10 percent)(15). In Pakistan, for example, hemorrhage and sepsis were the top two direct causes of maternal deaths at 27 and 14 percent, respectively, followed by eclampsia (10 percent)(14). Newborn deaths in the region, however, were due to preterm birth
complications, intrapartum-related complications, and infections. According to UNICEF, sepsis accounted for 9 percent of all newborn deaths(12).

In Pakistan in 2015, the major causes of neonatal deaths were prematurity (39 percent), birth asphyxia and trauma (21 percent), and sepsis (17 percent)(2). When all infections are aggregated for that year, i.e., sepsis, meningitis, and tetanus, the percentage of neonatal deaths was 22 percent, equal to 43,412 neonatal deaths(6). This means that a mother has a 1 in 32 chances of losing a baby to sepsis or another infection during her lifetime(6).

**Water, Sanitation and Hygiene in Health Facilities**

“Institutionalization of deliveries in low income countries has now reached a tipping point of 50% and is growing. That this trend will continue to lead to health gains is seriously undermined where healthcare facilities do not have adequate availability and quality of water, sanitation, and hygiene practices”(16). Inadequate water, sanitation and hygiene (WASH) in health care facilities can limit these gains by increasing the risk of infections, including sepsis. Furthermore, poor WASH conditions can deter women from seeking care, compromise patient dignity, and undermine the human right as declared by the United Nations General Assembly to have access to safe water for drinking and hygienic purposes and sanitation facilities.

However, in many developing countries, adequate WASH services in health care facilities are absent. A study that collected data from 54 low income countries found that 38 percent of healthcare facilities do not have an improved water source, 19 percent are without improved sanitation, and 35 percent do not have water and soap for handwashing(17). Another study found that an estimated 50 percent of healthcare
facilities in 26 low and middle-income countries lacked a piped water source on their premises(18). Disparities in the availability of water services exist not only between countries but also between urban and rural healthcare facilities within countries. At the subnational level, differences in service levels were found by managing authorities and facility types(18). For example, hospitals and privately-managed health care facilities were found to have higher coverage with water services than government-managed facilities(18).

Notably, access to piped services or a clean water supply are not enough to establish effective prevention control measures. The lack of adequate infection prevention control measures (IPC) can compromise the quality and effectiveness of care. The prevalence of health care acquired infections in low and middle-income countries is estimated to be 16 percent(18). Poor hand washing practices alone lead to several hundred million infections(18).

Alternatively, safe water, effective sanitation systems and practices, and comprehensive hygiene practices in healthcare facilities can reduce the risk of infection. For example, in a study conducted in southern Nepal, babies delivered by someone who had washed his/her hands thoroughly were 25 percent less likely to die, even if the mother didn’t wash her hands(19). When both mother and attendant washed their hands thoroughly and properly, the risk of neonatal death was lowered by 56 percent(19).

In addition, the lack of effective WASH services has other adverse consequences. For instance, if safe water is not available at the facility, mothers in labor may have to bring their own water to use during the birth(6). This water may come from unsafe sources that can put mothers and their babies at risk of contracting fatal infections(6). The
absence of adequate WASH services can also dissuade women from giving birth at healthcare facilities; this result would undermine efforts to increase the proportion of births attended by skilled providers(6). The lack of services also can play a role in staff retention as water and sanitation services in healthcare facilities can motivate workers to provide better care for mothers and newborns(6).

**Water, Sanitation and Hygiene in Health Facilities in Pakistan**

In Pakistan, health care services are provided through a three-tiered treatment and referral system, with the higher the treatment tier, the more complete the care provided. Primary care facilities include basic health units (BHUs), rural health centers (RHCs), government rural dispensaries (GRDs), mother and child health centers (MCHs), and TB centers. Secondary care facilities include district and tehsil (an administrative sub-division of a district) headquarter hospitals, while tertiary care facilities include teaching hospitals(20).

BHUs serve a population of about 10,000-25,000 and provide a range of primary health care services, including pre- and postnatal care, immunizations, counselling and curative care of communicable and non-communicable diseases, and referral support for major health issues(21). RHCs provide a comprehensive range of primary health care services 24/7 to a population of 50,000-100,000(21), primarily rural residents. They are usually equipped with laboratory and x-ray facilities and 15-20 beds for inpatients(21). GRDs are a remnant of pre-independence and deliver health care in urban settings, and at the bottom of the health pyramid(21). Municipal corporation civil dispensaries are headed by a dispenser, and health department dispensaries are operated by a physician(21). MCHs, located in urban and large rural areas, provide maternal, neonatal and child health
services including reproductive health and family planning(21). District headquarter hospitals cover a population of 1 to 3 million people, have an average of 125-250 beds, and provide promotive, preventative, curative, advanced diagnostic and specialized inpatient services(21). Tehsil headquarter hospitals serve a smaller population of 0.5-1 million people, have an average of 40-60 beds and provide a range of outpatient preventative, clinical and rehabilitative services(21).

*Table 1: Health Facility System in Pakistan(21)*

<table>
<thead>
<tr>
<th>Tier</th>
<th>Facilities</th>
<th>Catchment population</th>
<th>Services</th>
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</thead>
<tbody>
<tr>
<td><strong>Primary</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Basic Health Unit</td>
<td>10,000-25,000</td>
<td>Pre- and post-natal care; Immunizations; Counselling and curative care of communicable and non-communicable diseases; Referral support</td>
</tr>
<tr>
<td></td>
<td>Rural Health Centers</td>
<td>50,000-100,000</td>
<td>Laboratories; X-ray facilities; 15-20 beds</td>
</tr>
<tr>
<td></td>
<td>Government Rural Dispensaries</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>Maternal and Child Health Centers</td>
<td>n/a</td>
<td>Maternal and child health services; Reproductive health services (i.e. family planning)</td>
</tr>
<tr>
<td><strong>Secondary</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tehsil Headquarter Hospitals</td>
<td>05.5-1 million</td>
<td>40-60 beds; Outpatient preventative, clinical and rehabilitative services</td>
</tr>
<tr>
<td></td>
<td>District Headquarter Hospitals</td>
<td>1-3 million</td>
<td>125-250 beds; Promotive, preventative, curative, advanced diagnostic, and</td>
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</table>
While very little national data are available on WASH services at the health facility level in Pakistan, a national health facility assessment, conducted by the Technical Resource Facility between October 2010 and May 2011, evaluated several components of healthcare services at BHUs, RHCs, and district and tehsil headquarter hospitals. Figure 1 shows the range of services that signal a fully functional maternal, newborn and child health BHU, RHC and district and tehsil hospital. The assessment gathered and analyzed information on infection control practices such as hand washing, disinfection, waste separation, and disposal practices.
According to the report, 54 percent of health care providers practiced hand washing, with the Federally Administered Tribal Areas (FATA) having the lowest rates (27 percent) and Baluchistan having the highest (86 percent)(20). Similarly, the national rate for disinfection of service provision areas was 54 percent; FATA again had the lowest rate (18 percent) and Punjab the highest (70 percent)(20). Of the services assessed, practices around waste management and disposal were the poorest at a national rate of 17 and 14 percent, respectively(20).

In addition to this assessment, the Free and Fair Election Network, a nationwide initiative in Pakistan that monitors governance processes, including those in health
facilities, assessed conditions at BHUs, RHCs, GRDs, MCHs, and hospitals throughout the country. About 34 percent of MCHs were found to be without safe drinking water and 26 percent were without latrines (with running water) for patients(22). About 28 percent of BHUs did not have a latrine (with running water) for patients, while about 30 percent of BHUs did not have safe drinking water for patients(23). Only 17 percent of RHCs were without latrines (with running water) and 18 percent did not have safe drinking water for patients(24). Dispensaries were the poorest equipped in terms of water and sanitation services; almost half were without latrines with running water (49 percent) and more than half did not have safe drinking water (54 percent)(25). Hospitals had the best developed infrastructure; only 11 percent were without latrines (with running water) and 16 percent did not have safe drinking water for patients(26).

Another review of primary healthcare facilities across Punjab found that only 40 percent of BHUs and RHCs were considered clean, even though water was available at 96 percent of the facilities(27). Moreover, only 15 percent of BHUs had infection control items that included a sterilizer, and only 54% of the BHUs had a functional sterilizer(27). Another health facility assessment, conducted in Punjab, found that 8 percent of the monitored RHCs had low levels of cleanliness and limited basic hygiene(27). In the absence of a national surveillance system, these studies provide important information on the state of WASH infrastructure and practices in healthcare facilities in Pakistan.

**THE ROLE OF WASH INTERVENTIONS IN PREVENTING INFECTION, SEPSIS AND MATERNAL AND NEONATAL MORTALITY**

Historically, the connection between WASH and maternal and newborn health has been recognized. It is understood that applying infection control procedures that include hand-washing can prevent puerperal fever and maternal deaths(28). While the
importance of this connection continues to be recognized, efforts to improve clinical care in developing countries have focused more on measures to improve maternity care, strengthen health systems, and increase the demand for women to deliver in a health facility than on assessing/improving the physical conditions of those health facilities(28). Current WHO recommendations on postnatal care for mothers and newborns only include one reference to WASH. At the same time, the Standards for Maternal and Neonatal Care do not include any WASH-related provisions(28). Measures to prevent or control infections in healthcare facilities are currently focused on improving diagnosis and treatment. While no single intervention will reduce maternal and neonatal mortality, effective, well-integrated health and WASH interventions can lead to better functioning and increased utilization of health systems and reduced infections within these settings(28).

Many of the studies conducted to demonstrate the effectiveness of WASH interventions have focused on hand-washing techniques and cleanliness as determinants of reduced infections, including sepsis and mortality. In a systematic review by Bhutta et al., it was found that proper hand washing by traditional birth attendants, infant caregivers or both reduced the risk of omphalitis, an infection of the umbilical stump, by 31 percent and neonatal tetanus by 42 percent(29). Furthermore, the same researchers found that applying WHO’s ‘six cleans’ can avert 9,200 maternal deaths and 67,000 neonatal deaths globally(29).
Moreover, applying the Lives Saved Tool (LiST), which estimates the effect of increased coverage of interventions on deaths from one or more causes, or reducing the prevalence of a risk factor, Blencowe et al. determined that clean home and facility births and postnatal care practices reduced neonatal sepsis and neonatal tetanus mortality, as shown in Table 2 below\(^{(31)}\).

**Table 2: LiST estimation of reduction of neonatal sepsis and neonatal tetanus mortality through clean home and facility births and postnatal care practices\(^{(31)}\)**

<table>
<thead>
<tr>
<th>Practice</th>
<th>% reduction in neonatal sepsis</th>
<th>% reduction in neonatal tetanus mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean home birth</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>Clean facility birth</td>
<td>27</td>
<td>38</td>
</tr>
<tr>
<td>Postnatal care at home</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Postnatal care at facility</td>
<td>n/a</td>
<td>n/a</td>
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Throughout South Asia, studies have found similar positive maternal and neonatal mortality outcomes when thorough hand washing was practiced. For example, Simavi, an
organization focused on WASH and sexual and reproductive health rights issues, found that handwashing by birth attendants and mothers decreased neonatal tetanus by 36 percent in Bangladesh(32). Moreover, the authors found that using soap for handwashing reduced the risk of cord infection by 49 percent, especially when no topical cord antisepsis was available, and that the failure to wash hands before cord cutting increased the risk of infection in rural Nepal by 60 percent(32). Seward et al. who used observational data to estimate the effect of hand washing by birth attendants on birth outcomes in Bangladesh, India, and Nepal, found that hand washing was associated with a 54 percent reduction in the odds of postpartum maternal mortality (OR: 0.46, 95% CI: 0.26-0.36), and a 49 percent reduction when adjusted for maternal age, maternal education, parity, number of antenatal care visits, household assets, and study site (OR: 0.51, 95% CI: 0.28-0.93)(33). In another study conducted in southern Nepal, the risk of infection in infants decreased by 31 percent when the birth attendant washed his/her hands, and by 12-29 percent when the mother washed her hands(34). In addition, when soap was used to wash hands before delivery, the risk of infection decreased by nearly half (49 percent)(34). In an analysis conducted in Punjab on the protective effects of hand washing against neonatal tetanus, Bennett et al. found that hand washing was highly protective against neonatal tetanus when practiced properly by the delivery attendant (OR: 0.44, 95% CI: 0.29-0.67)(35,36).

In addition to hand washing, several studies have found that access to improved water and sanitation services can also be effective in decreasing infant and maternal deaths. Using databases from the World Bank, WHO, and UNICEF, one study found that increased access to improved water sources and sanitation is significantly associated with
decreased maternal mortality ratios (OR: 0.58)(32). The same global databases found that water and sanitation were also associated with lowering infant mortality ratios (aRR: 0.85, 95% CI: 0.78-0.93)(32,37). Muldoon et al. reached similar conclusions when examining the association between access to sustainable water and sanitation and lowered maternal mortality ratios (aRR: 0.88, 95% CI: 0.82-0.94)(32,37). Cheng et al. calculated that access to an improved water source additionally decreased the infant mortality rate by 2.12 (95% CI: 1.93-2.29) deaths per 1,000, and by 1.14 (95% 1.05-1.23) when adjusted for other variables(38). Improved sanitation also had the same effect of further decreasing the infant mortality rate by 2.29 (95% CI: 2.12-2.48) deaths per 1,000, and by 1.66 (1.11-1.32) when adjusted(38). In addition, a cross-national analysis of maternal and neonatal mortality in 32 sub-Saharan African found that access to an improved water source decreased maternal mortality by 20 percent and neonatal mortality by 10 percent while access to improved sanitation decreased maternal mortality by 56 percent and neonatal mortality by 27 percent(39).

These studies make clear that proper hand washing and effective cleaning of birthing surfaces during labor and delivery, along with access to improved water and sanitation services, can significantly reduce infections and, more importantly, rates of maternal and neonatal mortality.

**PRINCIPAL CONCLUSIONS**

UNICEF’s analysis of health system bottlenecks in South Asia around the time of birth and while caring for small and sick newborns found constraints in all the health system building blocks in Pakistan, including absence of skilled human resources, poor health service delivery, and insufficient financial resources for newborn specific
interventions and programs(12). This undermines the availability and delivery of high quality health care and contributes to high levels of maternal and neonatal mortality(12).

With the devolution of health and WASH services in Pakistan from the national to provincial and local level, there is a unique opportunity to improve these components at the primary and secondary levels(14). Given the findings of the studies above, it is suggested that implementing the actions set forth below can improve health facility conditions and health system functioning in Pakistan, leading to improved infection control and decreased maternal and newborn mortality.

**RECOMMENDATIONS**

**Community Level**

While poor hygienic conditions in the home, traditional local delivery practices, and previous poor experiences with government health care services lead communities to have low expectations of health facility conditions and quality of care, it has been found that disseminating correct information and community-based mobilization can increase the demand of improved quality of care(40). Motivated and mobilized communities can assist in promoting positive social norms and behaviors that empower families and communities to advocate for high quality WASH services within health care facilities at all levels(12). Education and mobilization can be done by:

1) Engaging women’s and men’s groups(29)

2) Using the mixed media forums, such as social media and radio programs(41)

3) Developing and utilizing monitoring tools such as report cards that provide feedback and rate health facilities(41).
Health Facility Level

1) At present, record keeping of health data in Pakistan is not standardized, and records are of poor quality and/or often missing (42). Furthermore, WASH services are not measured when assessing conditions in health facilities (40). Without comprehensive data, defined through rigorous studies and collected using thorough methods, evidence-based decision making, especially pertaining to maternal and newborn health services, is difficult to implement. When clearly defined and specified, indicators can be a source of robust evidence that contribute to identifying priorities and allocating resources (41–43). As such, a facility based management information system, as suggested by the WHO/UNICEF Joint Monitoring Program, can be developed and implemented at the health facility level to provide the facility manager with information on service outputs and the status of WASH initiatives.

2) Managers of health facilities can seek to engage the community to propose measures that can be taken to improve the quality of services (44). This partnership can lead to defining the measures needed to improve hygiene in the facility and the community (45). Engaging the community, as recommended above, will allow facility staff to counsel clients, especially mothers, on the vital importance of maintaining effective hygiene and infection prevention measures throughout pregnancy, delivery and postpartum (28, 41). The staff of the health facility can use innovative community-based approaches to promote positive hygiene behavior change in/with the communities (28).

3) Health care providers and managers should also have the necessary equipment and training to maintain basic hygiene at the facility (28). If available, managers should require that experience in applying hygienic practices are included in job descriptions.
Managers should also assess the performance of staff with respect to IPC, and reward staff for conducting the proper IPC procedures (28). This, along with intra-facility competitions and peer to peer learning, can encourage staff to follow appropriate guidelines and procedures (46). Supervisors and managers can also adopt and publicly display evidence of good WASH practices, such as the WHO’s ‘six cleans’ for a safe delivery in the health facility. (28,41). Lastly, continuous trainings on WASH practices should be required for all health facility personnel, especially cleaners. These trainings offer facility managers and staff an opportunity to define the roles and responsibilities of each staff member with regard to maintaining a high level of cleanliness in the facility.

**Government Level**

In 2011, Pakistan decided to devolve the responsibility for delivering health services to provincial health departments, and to establish the Ministry of National Health Services, Regulation and Coordination (47). As a result, all services related to maternal and newborn health became the responsibility of provincial and district level authorities. The national Ministry coordinates public health programs, oversees all regulatory bodies in the health sector, coordinates population welfare, enforces drug laws and regulations, coordinates all preventative health programs such as TB, HIV/AIDS, malaria, and hepatitis, and ensures that international commitments such as MDGs and SDGs are achieved (48).

Devolution also touched the administration of WASH activities in the country. In July 2011, the Climate Change Division became responsible for coordinating WASH activities. (49). At present, local government and Public Health Engineering Departments
are in charge of the water and sanitation initiatives, while Provincial Health Departments provide leadership for hygiene promotion (49).

While plans for sanitation, drinking-water and hygiene promotion in health facilities were included in Pakistan’s plans and targets for improved services, which includes improving the reliability and continuity of water supply and ensuring drinking-water quality meets national standards, only limited funds have been allocated to implement and sustain these services, particularly in comparison with defense allocation (49). Furthermore, the government spends more on health care than WASH interventions as they do not see that investments in WASH can prevent illness and lower the cost of curative health care. For instance, while only 0.6 percent of GDP expenditure in 2014-15 (US $15.46 billion of US $257.73 billion) was spent on health services, even less, 0.16 percent of GDP expenditure in 2010-11 (US $3.50 billion of US $219 billion), was invested in all WASH initiatives (49,50). Since health care and WASH are covered by different authorities, the clear connection between the two is not in place.

Moreover, very little funding in the health sector has been invested to strengthen district level facilities and health services such as those offered by RHCs and BHUs (15 percent); most of the funds have been allocated to improving secondary and tertiary levels of care (47,50).

In recognition of the country’s health challenges, Pakistan has drafted a National Health Vision for 2016-2025. This document outlines a ‘vision’ for achieving desired health outcomes (47). Only the section on cross-sectoral linkages speaks of developing a common vision, framework, and platform involving multiple stakeholders across several sectors including sanitation and water (47).
Given this information, the following is recommended to be implemented at the government level:

1) The Government of Pakistan should prepare an enabling environment that promotes increased investment in WASH infrastructure and IPC initiatives at the health facility level(28). This calls for the development of minimum standards and guidelines, indicators, legislation and a monitoring system for WASH and IPC that can identify principal barriers and solutions to effective implementation. It could also foster cross-sectoral collaboration and improved policies, strategies, coordinating mechanisms and financial systems(28).

2) Pakistan has long been dependent on expensive and time-consuming surveys that have been unable to provide up-to-date progress on important issues, particularly at the provincial level(50). This observation calls for the national level of government to strengthen District Health Information Software to ensure the collection of data on indicators that are specific to WASH, including those created by the WHO/UNICEF Joint Monitoring Program(50). The government should also consider collecting gender specific and gender disaggregated data using appropriate tools and methods(51). Once priorities are identified, the government can also develop and implement a sentinel information system, perhaps using digital health technology, to determine the degree to which effective WASH interventions have been implemented and sustained at the health facility level. With improved data collection systems, focused assessments can be conducted to identify practical, scalable solutions for improving WASH interventions in health care facilities(46). Assessments should be both quantitative and qualitative, and conducted regularly on a sample of health facilities and other facilities in the community level. This
approach could help document factors that drive patients to use health facilities; it could also assess patient satisfaction with respect to using the facilities (46).

3) As mentioned earlier, minimal financial resources have been invested on health care and WASH interventions in Pakistan. For example, expenditure for Health Affairs and Services equaled 12,379 million Pakistani rupees for 193 million people while Defense Affairs and Services expenditure equaled 841,442 million Pakistan rupees (52). The government might consider reviewing its financial allocations and consider increasing the amount invested in Health Affairs and Services in general and more specifically to BHUs and RHCs. Additional funds, even small amounts, could be used to finance the provision of essential capital items and commodities, and support the implementation of the training necessary to apply IPC measures at health care facilities (28, 46).

4) Disseminating evidence on the value of investing in WASH, which must be collected regularly, may attract more donor and private sector funding for infrastructure development, training and monitoring (46). When considering engaging donors and the private sector, the government should:

a) implement minimum standards and procedures for WASH interventions, since the development and distribution of operation manuals are prerequisites for effective WASH infrastructure installation, and standardization of WASH technologies are donor and manufacture dependent;

b) advocate for donors to support capacity building of local suppliers to be responsible for ongoing operation and maintenance; and
c) ensure the participation of government officials in activities to enable skill sharing, resource mobilization, and ongoing training(46).

5) The Government of Pakistan should promote cross-sectoral collaboration between the health and WASH sectors. This can be achieved by formalizing a multi-sectoral working group and putting in place a coordination mechanism that allows the health and WASH sectors to set targets and monitor progress jointly(53).

Overall, the Government of Pakistan should review and sharpen its strategies, policies and guidelines to improve maternal and newborn health by enhancing the quality of health care services and recognizing the important role that WASH services play in ensuring the effective functioning of health care provision at all levels(41,44).
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