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Perspective

One Health Bulletin

Water, sanitation and hygiene from One Health perspective

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1. Introduction

Water, sanitation, and hygiene (WASH) are essential for basic health and wellbeing; however, there is inadequacy in its services and access[1]. Each component of WASH is interdependent and good hygiene cannot be achieved without access to safe water and sanitation[2]. Unsafe WASH is linked to various infectious diseases and is responsible for many non-communicable diseases[3]. It is indeed that safe water and hygienic conditions are necessary not only in health facilities but also in homes and communities for disease prevention and transmission[4].

According to global statistics 2020, around 1 in 4 people lack safe drinking water at home, nearly half the world's population lacks safely managed sanitation, and 494 million people still practice open defecation[2]. In 2016, globally, 3.3% of death and 4.6% of disability-adjusted life years were due to inadequate WASH services. In low and middle-income countries, 60% of deaths are attributed to diarrhoea, of which 35%, 31% and 12% are due to inadequate drinking water, sanitation and hygiene, respectively. However, 9% of deaths due to diarrhoea are attributed to a lack of hygiene in high-income countries[5]. The sources like surface water, unprotected contaminated wells etc. are potential sources for those people without access to improved drinking water[2]. Open defecation without improved sanitation has remained a challenge across many parts of the globe[2]. In addition, building new toilets and creating access to them do not guarantee substantial open defecation reduction, as adopting the new practice requires behaviour change and the local community's acceptance. Further, toilets are not sufficient to reduce disease transmission. Attention must also be paid to toilet (or septic tank) emptying, transport, treatment and reuse/disposal. Otherwise, pathogens end up right back in the environment.

2. Negotiating "WASH for ALL" beyond the general human population

Evidence indicates that 60% of known infectious diseases and up to 75% of new or emerging diseases in the human species come from animals[6,7]. Livestock is a very crucial element of the global food system as 1.3 million people around the globe rely on animal for food[8,9]. However, the management of animal faeces, slaughterhouse cleanliness, and livestock farmers' hand hygiene are not given enough attention. As WASH is interrelated with the food systems[10], sanitation management is crucial to prevent many diseases transmitted via the feco-oral route. Although human sanitation management is given enough attention, there has to be a keen focus on the safe management of animal faeces and hygiene across this interface to prevent many infectious diseases in the human population, such as diseases occurring at early life stages like diarrhoea and stunting[11]. Adequate attention should be paid to management of animal waste, improvement of sanitation and

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hygiene practices while contacting animals such as milking, feeding, birthing, and cleaning of the animal barn. Additionally, WASH-related zoonotic diseases transmission at human-animal and our shared environment should be addressed.

Literature has a dearth of information on how much hygiene is adequate to minimise the spread of disease[2]. A cross-sectional study was done by V. Khadayata and D. Aggarwal on 100 livestock keepers in India, which showed that 72% of all livestock keepers did not know that disease can transmit from animal to human, and about 48% showed a negative attitude toward hygiene[12]. A study by Swai *et al*. in Tanzania found that 92% of smallholder dairy keepers had significantly higher knowledge about zoonotic diseases than traditional livestock keepers[13]. However, even when people know good hygiene behaviour, they lack access to sanitation materials like soap, safe water, and washing facilities, which hinders their positive changes or protection[2].

3. WASH from One Health perspective

The One Health High-Level Expert Panel (OHHLEP) defines "One Health as an integrated, unifying approach that aims to sustainably balance and optimise the health of people, animals and ecosystems. It recognises the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and interdependent. The approach mobilises multiple sectors, disciplines and communities at varying levels of society to work together to foster wellbeing and tackle threats to health and ecosystems, while addressing the collective need for clean water, energy and air, safe and nutritious food, taking action on climate change, and contributing to sustainable development"[8]. The One Health perspective also calls attention to ancient philosophy that places and the environment are closely linked with human and animal health[8]. The One Health approach would allow exploring risks and interdependent priorities for households while considering livestock production and social value for optimal health for humans and animals[14]. The same microbes infect animals and humans within their shared ecosystems; thus, the efforts by just one sector of One Health cannot prevent or eliminate the problem[15].

The problem with zoonoses is that a continuous reservoir of pathogens exists outside humans. Zoonotic pathogens are viral, bacterial, or parasitic and transmitted directly or through food, water or the environment[16]. Considering a hypothetical situation of all human infections were cured and transmission to people stopped, the presence of an animal reservoir would remain a continuous risk to people[17]. Managing the waste disposal of humans and animals is directly linked with environmental contamination. Open defecation and animal faeces contain certain chemicals and zoonotic pathogens that are noxious to humans and the environment. Even in high-income countries, for example, in Canada, mortality was reported due to drinking water contamination by livestock waste[18]. Further, livestock waste could act as a reservoir for many pathogens because pores can carry and transmit the pathogens to groundwater, surface water runoff, deterioration of the earth's biological structure, and catastrophic spills[19].

4. Why we should not neglect "Animal" within the WASH?

Sustainable Development Goal (SDG) 6 aims to ensure the availability and sustainable management of water and sanitation for all. Target 6.1 assesses universal and equitable access to safe and affordable drinking water for all, and target 6.2 assesses adequate and equitable sanitation and hygiene for all and ends open defecation, paying particular attention to the needs of women and girls and those in vulnerable situations[20]. WASH for all includes availability and accessibility of water, sanitation and hygiene facility, and services at schools, households, public places, and healthcare facilities. Currently, water access to animals is least explored and understood. Within WASH, sanitation is targeted towards the human aspect, neglecting animal waste management. Drinking water for all includes water suitability for men, women, girls and boys of all ages, including people living with disabilities, whereas the "all" missed the animals. Hygiene could be indicated to both conditions and practices that help maintain health and prevent the spread of diseases, whereas personal and environmental hygiene practice at human-animal interference is poorly understood. Considering the risk of spillover effect, WASH remained an important component that needs to be explored well, especially in the context of One Health.

Human hygiene practices and guidelines are currently limited to handwashing with water and soap before eating, after eating and using the toilet, contacting animals, and cooking and feeding the child[21]. However, WASH practices are also required at the interface of humans-animals to prevent and control zoonotic disease transmission and neglected tropical diseases. Beyond the scope of hand hygiene, foot hygiene and respiratory hygiene are equally important and need protection while interacting with animals (*i.e.*, soil-based Helminth, Guinea-worm). Sanitation also needs to be addressed in the safe management and disposal of animal faeces, urine, and other waste products.

5. Conclusion

The One Health perspective in WASH require urgent attention to conduct further research and WASH intervention in the human-animal interface to prevent and control zoonotic disease transmission. Further, there is a need to develop tools to assess the WASH status emphasising the missing component as part of the comprehensive risk assessment. The sanitation and hygiene program

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from the One Health perspective is highly recommended for higher human-animal density population areas.

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Authors' contributions

Yasobant S, Patel K, Saxena D conceptualized this article. Tadvi R, Patel K reviewed the guidelines and ensured the data extraction. Yasobant S, Tadvi R analyzed the data. Tadvi R wrote the first draft. Yasobant S, Patel K, Saxena D reviewed and edited the content of the whole paper.

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