IF : 4.547 | IC Value 80.26 VOLUME-6, ISSUE-6, JUNE-2017 • ISSN No 2277 - 8160

Original Research Paper Medical Science

A Panoramic view of Water Contamination and Health Quotient of Human life with special reference to India

Dr. B. Ramanath Shenoy MBBS MD, Assistant Professor, Adichunchungiri Institute of Medical Sciences, B. G . Nagar, Nagamangala Taluk, Mandya District.Karnataka.

Dr. Vivek M Balse P.hD, Associate Professor, Pooja Bhagavat Memeorial Mahajana P G centre, K R S Road, Mysore, Karnataka.

KEYWORDS :

Back ground

While there is a hue and cry for the want of water, the greater pressing need remains for the clean water along with sanitation facilities. A blind eye or a half hearted approach may result in a expensive loss of health benefits. There is a clear and imperative need for increased levels of investment in water and sanitation facilities in India. WHO is providing technical assistance to help countries develop their national action plans, and strengthens their health and surveillance systems so that they can prevent and manage health risk. Back in 2002, the World Health Organization (WHO) estimated that water-related diseases could kill as many as 135 million people by 2020.This is triggered due to many different pollutants that can damage rivers, streams, lakes, and oceans. The three most common are soil, nutrients, and bacteria. Rain washes soil into streams and rivers. The soil can kill tiny animals and fish eggs. It can clog the gills of fish and block light, causing plants to die. Nutrients, often from fertilizers, cause problems in lakes, ponds, and reservoirs. Nitrogen and phosphorus make algae grow and can turn water green. Bacteria, often from sewage spills, can pollute fresh or salt water. In addition, inadequate sanitary conditions and inappropriate food-handling may encourage the spread of antimicrobial resistance also as antimicrobial resistant-microbes are found in people, animals, food, and the environment (in water, soil and air). Water pollution is the contamination of water bodies (e.g. lakes, rivers, oceans, aquifers and groundwater). This form of environmental degradation occurs when pollutants are directly or indirectly discharged into water bodies without adequate treatment to remove harmful compounds.

Most water pollution doesn't begin in the water itself. Take the oceans: around 80 percent of ocean pollution enters our seas from the land. Virtually any human activity can have an effect on the quality of our water environment. When farmers fertilize the fields, the chemicals they use are gradually washed by rain into the groundwater or surface waters nearby. Sometimes the causes of water pollution are quite surprising. Chemicals released by smokestacks (chimneys) can enter the atmosphere and then fall back to earth as rain, entering seas, rivers, and lakes and causing water pollution. . Water pollution has many different causes and this is one of the reasons why it is such a difficult problem to solve.

There are several classes of water pollutants. The first are disease-causing agents. These are bacteria, viruses, protozoa and parasitic worms that enter sewage systems and untreated waste. A second category of water pollutants is oxygen-demanding wastes; wastes that can be decomposed by oxygen-requiring bacteria. When large populations of decomposing bacteria are converting these wastes it can deplete oxygen levels in the water.

A few statistics illustrate the scale of the problem that waste water (chemicals washed down drains and discharged from factories) can cause. Around half of all ocean pollution is caused by sewage and waste water. Each year, the world generates perhaps 5–10 billion tons of industrial waste.

How serious is the problem?

Fresh water is only 2.7 per cent out of total water available in nature. The remaining 97.3 per cent is saline water. According to the environmental campaign organization WWF: "Pollution from toxic chemicals threatens life on this planet. Every ocean and every continent, from the tropics to the once-pristine polar regions, is contaminated." Sewage disposal affects people's immediate environments and leads to water-related illnesses such as diarrhea that kills 525,000 children under five each year. (WHO 2017)

1992 World Health Organization study reported that out of India's 3,119 towns and cities, just 209 have partial sewage treatment facilities, and only 8 have full wastewater treatment facilities. Downstream, the river water polluted by the untreated water is used for drinking, bathing, and washing.

The report, based on the data from the ministry of urban development (2013), India census 2011 and Central Pollution Control Board, estimates that 75-80% of water pollution by volume is from domestic sewerage, while untreated sewerage flowing into water bodies including rivers have almost doubled in recent years. The largest source of water pollution in India is untreated sewage. Other sources of pollution include agriculture runoff and unregulated small scale industry. Most rivers, lakes and surface water in India are polluted.

At present, 50 per cent population of the world resides in 250 river basins, where they use river water for different activities including agriculture and industry. In India, dense population is settled near the banks of rivers Ganga, Yamuna, Damodar, Hooghly, Cauvery, Godavari and Chambal.

Global exposure data were estimated In 2012, 502 000 diarrhea deaths were estimated to be caused by inadequate drinking water and 280 000 deaths by inadequate sanitation. The most likely estimate of disease burden from inadequate hand hygiene amounts to 297 000 deaths. In total, 842 000 diarrhea deaths are estimated to be caused by this cluster of risk factors, which amounts to 1.5% of the total disease burden and 58% of diarrhoeal diseases. In children under 5 years old, 361 000 deaths could be prevented, representing 5.5% of deaths in that age group.

This estimate confirms the importance of improving water and sanitation in low- and middle-income settings for the prevention of diarrheal disease burden. It also underscores the need for better data on exposure and risk reductions that can be achieved with provision of reliable piped water, community sewage with treatment and hand hygiene. Apart from diarrheal diseases, the other common disease conditions can be helminthiasis, environmental enteropathy, vector-borne diseases etc. Under nutrition, a major cause of mortality in children under 5 years of age (Black *et al*.2013).

Literature Review

There are good numbers of studies worldwide in order to quantify and fix the seemingly impossible but inevitable problem of water

contamination and its dangerous effect on health. For ex. A study conducted by Han AA et al (2017) where thousands of gallons of industrial chemicals, crude 4-methylcyclohexanemethanol (MCHM) and propylene glycol phenyl ether (Pph), leaked from industrial tanks into the Elk River in Charleston, West Virginia, USA, on January 9, 2014. A considerable number of people were reported to exhibit symptoms of chemical exposure and an estimated 300,000 residents were advised not to use or drink tap water. At the time of the spill, the existing toxicological data of the chemicals were limited for a full evaluation of the health risks, resulting in concern among those in the impacted regions.

In a separate study conducted by Soda EA, *et al* (2015),Using national surveillance data, Legionnaires' disease cases were characterized from the 21 jurisdictions (20 U.S. states and one large metropolitan area) that reported exposure information for ≥90% of 2015 Legionella infections. An assessment of whether cases were health care-associated was completed; definite health care association was defined as hospitalization or long-term care f Legionnaires' disease, a severe pneumonia, is typically acquired through inhalation of aerosolized water containing Legionella bacteria. Legionella can grow in the complex water systems of buildings, including health care facility residence for the entire 10 days preceding symptom onset, A total of 2,809 confirmed Legionnaires' disease cases were reported from the 21 jurisdictions, including 85 (3%) definite and 468 (17%) possible health care-associated cases. Among the 21 jurisdictions, 16 (76%) reported 1-21 definite health care-associated cases per jurisdiction. Among definite health care-associated cases, the majority (75, 88%) occurred in persons aged ≥60 years, and exposures occurred at 72 facilities.

Due to acute shortage of portable water, reuse has not been very uncommon. As reuse of municipal water resource recovery facility (WRRF) effluent becomes vital to augment diminishing fresh drinking water resources, concern exists that conventional barriers may prove deficient, and the up cycling of chemicals of emerging concern (CECs) could prove harmful to human health and aquatic species. The list of identified CECs for potable water reclamation (indirect or direct potable reuse) include a herbicide and its degradants, prescription pharmaceuticals and antibiotics, a female hormone, an artificial sweetener, and chlorinated flame retardants.(Jones SM et al 2016).

A 1995 National Geographic Society report claimed 114 Indian cities were dumping untreated sewage and partially cremated bodies directly into the Ganges river. (National Geographic Society1995)

There is scarce research and programmatic evidence on the effect of poor water, sanitation, and hygiene (WASH) conditions of the physical environment on early child cognitive, sensorimotor, and socioemotional development. Furthermore, many common WASH interventions are not specifically designed to protect babies in the first 3 years of life, when gut health and linear growth are established. When reviewed, it was evident that WASH was responsible for anemia, and child growth, and highlight pathways through which WASH may affect early child development, primarily through inflammation, stunting, and anemia. Environmental enteropathy, a prevalent subclinical condition of the gut, may be a key mediating pathway linking poor hygiene to developmental deficits. Current early child development research and programs lack evidence-based interventions to provide a clean play and infant feeding environment in addition to established priorities of nutrition, stimulation, and child protection. Solutions to this problem will require appropriate behavior change and technologies that are adapted to the social and physical context and conducive to infant play and socialization. (Francis 2014)

There are hardly any studies to estimate the burden of diarrheal diseases from exposure to inadequate water, sanitation and hand hygiene in low- and middle-income settings and provide an overview of the impact on other diseases.

In a study conducted by Bain et al (2014) the global assessment of exposure to faecal contamination through drinking water, highlighted that piped water supplies in the American, European and Western Pacific low- and middle-income regions that show particularly low contamination in urban areas, with <10% of investigated samples faecally contaminated.If assuming that urban piped supplies in those regions carry no increased risk for diarrhea, the total diarrhoea burden from inadequate water sources would have decreased from 502 000 to 497 000 deaths in 2012, with 2800 fewer deaths in the American region, 700 fewer deaths in the European region and 1500 fewer deaths in the Western Pacific region, respectively. The contamination of piped water in those regions may, however, have been underestimated because (i) studies tend to take place in formal urban areas and especially in capital cities, (ii) the assessment reported the per cent of samples containing contamination rather than compliance with WHO guidelines, and (iii) the focus was on water quality at the source and not stored at home or sampled just before consumption.

The estimation of diarrheal disease burden relies on proxies such as access to water and sanitation facilities rather than water quality, water quantity or behaviors associated with these facilities (such as consistent or exclusive use by individuals) which are also a determining factor in characterizing actual exposure. They were selected because of the available exposure information and their best match in the latest findings on risk estimates from the epidemiological literature. Greater precision of estimates is expected with better assessment of these more proximal risks and their population exposures. In addition, in common with a number of other disease burden estimates (Lim *et al*.2012), the estimate is based on risk estimates for morbidity rather than mortality.

Conclusion

Most studies and observations have updated the estimate of the diarrheal disease burden due to inadequate poor water, sanitation, and hygiene. These approaches have argued of disease burden according to exposure specificities which have scope to accommodate further in its magnitude. But all the studies invariably confirm the importance of safe water along with adequate sanitation and hygiene to protect health. Household wastes such as cleansers, beauty products, unused and date expired medicines, auto fluids, paint, and lawn care products must be essentially taken to a hazardous waste collection site. In order to facilitate this, members of the general public must be educated on their role on throwing away excess/ unused household kitchen products like meat fats, cooking oil and personal hygiene products in the garbage can. Management and implementation of water safety plans assume a great importance (Gunnarsdottir *et al*.2012) along with a proactive, comprehensive approach to managing risks throughout the water supply system. Dwelling places sites that accumulate stagnant water—such as sinks, toilets, waste pipes, cleaning tools, face cloths—readily support microbial growth, and can become secondary reservoirs of infection. Drinking water quality remains a significant problem, not only in developing countries but also in developed countries (WHO2007).It is a matter of concern that, although the importance of hygiene through clean water has been emphasized since ancient time the approach and achievement remains unsatisfactory.

References

1. Black RE, Victora CG, Walker SP et al. Maternal and child under nutrition and overweight in low-income and middle-income countries. Lancet 2013
2. Bain R, Cronk R, Bonjour S et al. Assessment of the level of exposure to fecally contaminated drinking water in developing countries. Tropical Medicine and International Health 2014
3. Francis M. Ngure,: Water, sanitation, and hygiene (WASH), environmental enteropathy, nutrition, and early child development: making the links
5. Han AA, Fabyanic EB, Epub In vitro cytotoxicity assessment of a West Virginia chemical spill mixture involving 4-methylcyclohexanemethanol and propylene glycol phenyl ether. 2017
6. Jones SM ,Chowdhary ZK : A taxonomy of chemicals of emerging concern based on observed fate at water resource recovery facilities 2016 .
7. Lim SS, Vos T, Flaxman AD et al. A comparative risk assessment of burden of disease and injury, The Lancet 2012
8. National Geographic Society Water: A Story of Hope. Washington (DC) 1995
9. Soda EA: Health Care-Associated Legionnaires' Disease Surveillance Data from 20 States and Large Metropolitan Area - United States, 2015
10. World Health Organization: Combating waterborne disease at the household level 2007
11. World Health Organization: Diarrheal disease, Fact sheet Number 330, May 2017