

POLICY ANALYSIS OF WATER, SANITATION AND HYGIENE (WASH) GUIDELINES

A case study of Munirka village (notified slum) and Bersarai Jhugi-Jhopdi Cluster of South
Delhi

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Introduction

Development is a multifarious word but mostly used in connection with economic development. Economic development itself is commonly measured by the income level and national and structural changes therein. It is also a universally accepted norm to measure improvement in the wellbeing of people of this world.

However, this definition of development has been questioned in the past century, where many economists stated that academicians and policy makers need to look beyond income levels, growth in income to measure development of countries. Sen¹ in 1999 defined development as a means to reduce deprivation and broadening choices. Reduction in deprivation can be achieved by reducing hunger, illiteracy, ill-health and powerlessness and lack to basic infrastructure. Henceforth, United Nations initiated Human Development Index (HDI) which goes beyond income criterion to examine development efforts in various countries. India has steadily, but slowly, improved its HDI from 0.362 in 1980 to 0.609 in 2014². However, its rank is still pretty low at 130, considering the country has the second highest population in the world, soon to be first. The development in the last two decades has resulted in a growing around middle class. Nevertheless, the poor continue to form a significant portion of the country, mainly due to increasing population. The United

¹ Sen, A. (1999). *Development as Freedom*. New York: Oxford University Press

² *Human development reports* (2014). . New York: United Nations Development Programme.

<http://hdr.undp.org/en/data>

Nations, in 2012, 51.1% of the population belongs to multidimensional poverty, to which living standards (basic necessities) and health contribute significantly³.

Over the years, the citizens of the world with access to water, sanitation and hygiene (WASH) has increased. According to World Health Organization, more than 2.5 billion people have gained access to improved water source between 1990 and 2015⁴. However, WHO/UNICEF JMP projects that 605 million people in the world still do not have access to the same even by 2015. Similarly, since 1990, WHO reports that 1.8 billion people have gained access to improved sanitation. But, it is reported 2.4 billion still do not have access for the same. Moreover, according to the same source, 626 million people, only in India, practice open defecation which constitute 90% of the people in South Asia and approximately 59% of the global population practicing open defecation⁵.

According to a report on Indian State and provisioning of drinking water⁶, laws related to water have been introduced and practiced for 3000 years. During the ancient times, the principle of discovery was applied, that is, whoever discovers the resources dominate over it. The same principle is also found in the old Roman law and the Common law of England. It was also prevalent in pre-independent or colonial era. Needless to say, particular sections of society, that is population belonging to lower castes of Hinduism especially the untouchables and minorities belonging to other religions, were at a disadvantage because they were marginalized community and did not have an equal access to land and natural

³ *Human development reports* (2014). . New York: United Nations Development Programme.
<http://hdr.undp.org/en/composite/MPI>

⁴ *Indian state and provisioning of drinking water.*, 2016, from
http://shodhganga.inflibnet.ac.in/bitstream/10603/4070/10/10_chapter%203.pdf

⁵ *Progress on drinking water and sanitation*(2012). . New York: UNICEF.

⁶ *Indian state and provisioning of drinking water.*, 2016, from
http://shodhganga.inflibnet.ac.in/bitstream/10603/4070/10/10_chapter%203.pdf

resources as those belonging to upper castes of Hinduism. When one considers the delivery of public services in post-independent India, it is generally done in three phases. The first phase (1950s and 1960s) constituted of national leaders of the likes of Jawaharlal Nehru who saw the wisdom of investing in heavy industries to address problems such as poverty, illiteracy, malnutrition, and unemployment. Thereafter in 1970s, the approach to address the same problem changed under the leadership of Indira Gandhi. The interpretation of provision of basic service delivery changed to providing universal access to public goods, and introducing welfare policies. In 1990s, when the economy of the country opened up to domestic and foreign private sector, that is, government encouraged deregulation, liberalization and privatization even in industries traditionally considered as public goods.

Like all industries, industry of water and various schemes introduced by the government for its supply, provision and usage by the disadvantaged has also been affected with the above three outlooks of provision of public goods. Since 1954, seven important schemes of government to provide drinking water to the people have been introduced and implemented. The last of which was Jawaharlal Nehru National Urban Renewal Mission (JNNURM, 2005) which concentrated on integrated development of urban infrastructure and services to select 63 cities with emphasis on provision of basic services to the urban poor. On the other hand, India's first nationwide program for rural sanitation, the Central Rural Sanitation Program was launched in 1986. Thereafter, Total Sanitation Scheme was introduced, again to ensure sanitation in rural areas, in 1999. Most of the improvement has been observed after the introduction of Millennium Development Goals, that were set in 2000, where 2 targets of the 7th Goal (Ensuring Environmental Sustainability) were related to improving access to improved water and sanitation as well as targeting improving living standards of urban slum dwellers. Nirmal Gram Puruskar was introduced as an innovative

scheme and gram panchayats have been awarded on a yearly basis since 2005. However, it should be noted only JNNURM is one such mission that provides a comprehensive approach for improving living standards of the people, by providing both water supply and sanitation facilities in an integrated manner. According to Indian Sanitation Portal⁷, the National Sample Survey Office data showed in 2013 that 90% of slum dwellers in India felt water drainage, sewerage and garbage collection and disposal had improved. Moreover, 24% of slums had benefited from welfare schemes such as JNNURM and Rajiv Awas Yojana.

With the advent of 2016, Sustainable Development Goals (SDGs), 17 in all, were enforced by the United Nations (UN). All the countries who had ratified the goals and agreed to strive to achieve them by 2030 are under obligation to introduce policies and programs to the best of their abilities, capabilities, and supporting resources. Goal 6 of SDG includes water and sanitation, that is, ensure availability and sustainable management of water and sanitation for all⁸, pushes the governments of all countries to achieve 100% sanitation and water supply by 2030.

However, planning for these goals is not a simple problem. The ever increasing population of the world has resulted in an ever increasing demand of limited resources on earth, specially water. More than 1.7 billion people live in river basins where depletion through use exceeds natural recharge⁹. This has been observed in the regions of south Asia, central

⁷ JNNURM improved urban quality of life., 2016, from <http://www.indiasanitationportal.org/full-view-page.php?title=MTU0>

⁸ United Nations. (2015). *Sustainable development goals.*, 2016, from <http://www.un.org/sustainabledevelopment/water-and-sanitation/>

⁹ United Nations. *International decade for 'action for life' 2005-2015.*, 2016, from http://www.un.org/waterforlifedecade/water_and_sustainable_development.shtml

and middle-east Asia, north Africa, and some countries of Europe. According to an article published by United Nations Environment Programme, in 2000, only 25% of the total renewable water stock was available in India¹⁰ (Figure 1). Another article by UNEP mentions that water stress indicator (WSI) for all the river basins in India ranges from 0.7 to 1, that is, moderately to heavily exploited ¹¹ (Figure 2). If this trend continues, then two-thirds of the world's population may be living in water-stressed countries by 2025¹². Water is central to the production and preservation of a host of benefits and services for people. These may be for short term survival such as, drinking and cooking requiring approximately 20 litres; medium term maintenance such as, personal washing, washing clothes, growing food, cleaning home, sanitation and waste disposal requiring approximately 50 litres; and lastly, long term survival such as, business and recreation such as agriculture, livestock, gardens ¹³. Blatant disregard in usage of water resources among others, has resulted in a phenomenon widely recognised as Climate Change. The fact that water is at the heart of adaptation to climate change, serving as the crucial link between the climate system, human society and the environment should not be ignored.

Review of Literature

The United Nations, in 2012, has estimated around 23.6% of the population lives under the income level poverty line ¹⁴. Yet, 51.1% of the population belongs to multidimensional poverty, the main three dimensions being education (22.7%), health (32.5%) and living

¹⁰ UNEP. *Excessive withdrawal of renewable resources.*, 2016, from <http://www.unep.org/dewa/vitalwater/article81.html>

¹¹ UNEP. *Water scarcity index.*, 2016, from <http://www.unep.org/dewa/vitalwater/article77.html>

¹² United Nations. *International decade for 'action for life' 2005-2015.*, 2016, from http://www.un.org/waterforlifedecade/water_and_sustainable_development.shtml

¹³ *Water is the foundation of progress.*, 2016, from <http://www.untappedshores.org/why-water/>

¹⁴ *Human development reports* (2014). . New York: United Nations Development Programme. <http://hdr.undp.org/en/composite/MPI>

standards (44.8%)¹⁴. This is a clear indication that the poor continue to be deprived of necessary facilities of clean water supply, sanitation, and health as the basic necessities of life are generally availed by the middle and upper class¹⁴. Following observations were made by the Population Foundation of India in the UN India Water Development Report of 2012. Location is the deciding factor for source and availability of drinking water. It is reported that 50.7 per cent of urban households have access to piped water supply at home but access in non-slum and slum areas is 62.2 and 18.5 per cent respectively. Further, the disparity on the basis of tenure status is more severe and, generally, households of the non-notified slums are totally deprived from piped water supply in a dwelling unit. According to NFHS-III, of the total urban households, 83.2 per cent have access to sanitary facility (either flush or pit) but out of the total slum households only 47.2 per cent have access to sanitary facility while 95.9 per cent of the non-slum population has access to it. Disposal of untreated sewage into the water streams is adversely affecting the health of the slum dwellers as about 24 per cent of the slums are located around the nallahs and 48 per cent of the slums are usually affected by water logging during monsoon¹⁵. In New Delhi, 74% of households in the non-slum areas have access to improved sanitation facilities. In stark contrast, only 24% of households have access to the same in the slum areas¹⁵.

However, 663 million people are yet to obtain the same and almost 2 billion people use water that is faecal contaminated¹⁶. Currently 40% of the world is affected by water scarcity and it is projected to rise in the future due to climate change.

¹⁵ *Water sanitation scenario in urban india*(2012). . New Delhi: Population Foundation of India.

¹⁶ United Nations. (2015). *Sustainable development goals.*, 2016, from <http://www.un.org/sustainabledevelopment/water-and-sanitation/>

According to World Health Organization, sanitation or the lack of it, is not only related to diarrhoea as a symptom of ill-health, but also neglected tropical diseases, acute respiratory infections, and under/malnutrition.

The disease taken into account for measuring deaths and Disability Adjusted Life Years (DALYs) is diarrhoea. This number will undoubtedly rise, if other diseases related to sanitation are also counted. The DALYs/1000 cap/year is the highest for this risk factor at 14 among all the risk factors responsible for environmental burden of disease. DALYs with respect to communicable and water borne diseases¹⁷.

Water and Sanitation Programme is a multi-donor partnership created in 1978 and administered by the World Bank to support poor people in obtaining affordable, safe, and sustainable access to water and sanitation services. The Economics of Sanitation Initiative was launched in 2007 as a response by this programme to address major gaps in evidence among developing countries on the economic aspects of sanitation. This initiative conducted an exercise to study the economic impact of inadequate sanitation in India. It stated that inadequate sanitation (including clean drinking water supply) costs India Rs. 2.44 trillion (U.S.\$ 53.8 billion), which is almost 6% of the country's GDP¹⁸. If this economic impact is broken up and the composition is observed, majority of the impact is due to increased, but completely avoidable/preventable health costs of Rs. 1.7 trillion (U.S.\$ 38.49 billion). Health costs was closely followed by Access time (productive time lost due to inadequate access to sanitation facilities) and drinking water-related impacts.

¹⁷ *Global health observatory data.*, 2016, from http://www.who.int/quantifying_ehimpacts/national/countryprofile/india.pdf?ua=1

¹⁸ *The economic impacts of inadequate sanitation in india* . New Delhi: World Bank.

Lack of access to both adequate sanitation and clean drinking water, and poor hygiene increase disease, contribute to malnutrition, disadvantage women, undermine economic growth, and threaten development, peace and security. According to data released by various UN agencies and compiled by Interaction council, 88% of diarrheal deaths are attributable to poor WASH. Thereafter, nutritional status is compromised by frequent episodes of diarrhea and intestinal worm infestations. Hand-washing is linked to reductions in acute respiratory infections and reduced infant mortality. Problems related to inadequate WASH extend beyond the health sector and shadow over other sectors. For example, in education sector, according to UNDP approximately 443 million school days are lost every year due to water and sanitation related diseases. Existence of WASH related problems in the economy can be observed in the following way, as 5.5 billion productive days per year are lost due to diarrhea and the burden of water collection as reported by Fewtrell et al (2007). In effect, people without access to water supply and sanitation are thus caught in a vicious cycle in which lack of access leads to poverty which in turn prevents people from having the ability to gain access to services. Lack of access to water and sanitation is thus both a cause and an effect of inequity, poverty and underdevelopment ¹⁹.

This becomes evident when Under-5 Mortality Rate (U5MR) is analyzed²⁰. U5MR for urban areas was 51.7 per 1000 live births in 2005 as compared to 82.0 per 1000 live births in rural areas. The U5MR increases drastically to 121.3 per 1000 live births for the poorest 20% living in urban areas. In the same way, in 2005, 39.9% of children aged 5 years or

¹⁹ Interaction Council. *Water, sanitation and hygiene: Foundations for development.*, 2016, from <http://interactioncouncil.org/water-sanitation-and-hygiene-foundations-development>

²⁰ World Health Organization. *Urban health profile.*, 2016, from http://www.who.int/kobe_centre/measuring/urbanheart/india.pdf?ua=1&ua=1

younger suffered from chronic malnutrition in urban areas, as compared to 50.7% in rural areas. However, this percentage of under 5 years of age children increased to 56% when only poorest 20% living in urban areas was considered. The facts for drinking water supply will show the same phenomenon. In 2005, 50.7% of the urban population had access to drinking water in their households, however, only 16.6% of the poorest 20% living in urban areas had access to the same. This drinking water will be fetched from nearby shared public taps or accessed from open canals in the city by the women of the households. This will end up wasting time which could have been more productively spent otherwise. With rapid urbanization, this proportion of population will only increase and India will continue to suffer from double burden of disease, both communicable and non-communicable diseases²¹.

Even with advances in the field of medicine, children are frequently afflicted and may even die from preventable water and sanitation related diseases, such as, diarrhea, chikungunya, fluorosis, cholera, guinea worm diseases, intestinal worms, typhoid, malaria, trachoma, schistomiasis, arsenicosis, and HIV/AIDS. Increasing floods in between dry periods represent ideal conditions for spreading disease²². Cholera had almost disappeared globally by the mid-1950s, but it reappeared and spread throughout the world during the last few decades. More than 1,00,000 cholera cases were declared in India between 1950 and 1960. Other cases were restricted to other south and south east Asian countries and China. However, post 1960, cholera spread throughout the world. Between 1990 and 2004, more than 1,00,000 cases were declared in countries from continents other than Asia also, such

²¹ World Health Organization. *Urban health profile.*, 2016, from http://www.who.int/kobe_centre/measuring/urbanheart/india.pdf?ua=1&ua=1

²² UNICEF. *Common water and sanitation related diseases.*, 2016, from http://www.unicef.org/wash/index_wes_related.html

as, Brazil, South Africa and more than 10,000 cases in India, China, amongst others²³

(Figure 3). The World Health Organization (WHO) fears that a rapidly changing climate, combined with declining socio-economic conditions in the poorest part of the population, will contribute to an increasing spread of this disease amongst other related to water and sanitation. Needless to say, debilitating diseases as those mentioned above, contribute significantly to the ever increasing cost of out of pocket health expenditure. Families pay almost 10% of their monthly household income on treatment of Chikungunya, which is a vector borne disease emerging neglected tropical disease, amounting to approximately US \$84²⁴. Another example for high out of pocket expenditure due to water and sanitation related diseases could be that of cholera. In a study by Polous et al (2011), it was observed that patient costs of illness as a percentage of average monthly income were 21% and 4% for hospitalized and non-hospitalized cases (respectively) in Kolkata (average monthly income= USD \$84)²⁵. The study also reported that households with cholera patients tended to be more disadvantaged than households without cholera. In India, almost five lakh deaths every year may be attributed to water, sanitation and hygiene as risk factor²⁶. However, the greater concern is the potential loss to the economy of the country²⁷.

²³ UNEP. *The spread of cholera 1950-2004.*, 2016, from <http://www.unep.org/dewa/vitalwater/article197.html>

²⁴ Gopala, S.S., Das, A. (2009). Household economic impact of an emerging disease in terms of catastrophic out-of-pocket health care expenditure and loss of productivity: Investigation of an outbreak of chikungunya in orissa, india. *Journal of Vector Borne Disease*, 46, 57

²⁵ Poulos C, Riewpaiboon A FAU - Stewart, J F., Stewart JF FAU - Clemens, J., Clemens J FAU - Guh, S., Guh S FAU - Agtini, M., Agtini M FAU - Sur, D., et al. *Costs of illness due to endemic cholera*

²⁶ *Global health observatory data.*, 2016, from http://www.who.int/quantifying_ehimpacts/national/countryprofile/india.pdf?ua=1

²⁷ *The economic impacts of inadequate sanitation in india* . New Delhi: World Bank.

Rationale for the study

Most of the programmes and policies have focused on improving the sanitation facilities in the rural areas where the shortage of clean drinking water supply and sanitation facilities is more stark as compared to the urban areas. Moreover, the comparatively lower population density in rural areas and more land area available, it is relatively easier to implement large scale projects, such as, establishing water supply system, sewerage system, waste water treatment plants, etc. Urban areas are more densely populated, which has been a cause of concern lately with the rapid unsupervised urbanization that has taken place in the last two decades. Therefore, the pre-colonial times established infrastructure for water supply and sewerage is not able to support the rapid increase in urban population and significant portion of the population does not have access to the same.

The weaker sections of the society, that is, the poor living in the slums and moreover, women and children bear the brunt of this lack of basic infrastructure²⁸.

Therefore, a need for re-examining and critically analyzing India's policies with regards to their adherence to Water supply, Sanitation and Hygiene Guidelines for the urban areas as certified by United Nations was felt in order to provide recommendations so as to achieve 100% sanitation and water supply by 2030. Moreover, case studies were also conducted in Jhugi-Jhopdi clusters of New Delhi to target the poorest 20% of the population of the city. These non-notified slums far exceed the notified slums in number. As a happenstance, these clusters are, many a times, not the target of the government for any project implementations as they are on public land.

²⁸ World Health Organization. *Urban health profile.*, 2016, from http://www.who.int/kobe_centre/measuring/urbanheart/india.pdf?ua=1&ua=1

Objectives

Major objectives:

- a. Examine policies, of Government of India, that contain Water supply, Sanitation and Hygiene guidelines;
- b. Critically analyze for presence of discrepancies/similarities, if any, of WASH guidelines in the policies; and
- c. Recommend changes in the existing guidelines to remove discrepancies.

Other/minor objectives:

- a. Case study of Effective and efficient implementation of the guidelines in a notified slum and JJ cluster of New Delhi.

Methodology

Study type:

The capstone project involves case study dealing with effective and efficient implementation of WASH guidelines on the ground level. It will also address discrepancies in views among the public regarding WASH and the views of the government.

Study setting:

South Delhi has been chosen as the setting of the case study. 1 JJ cluster and 1 notified slum are the study population. These were chosen in accordance with the NGO the author collaborated with for information gathering and data collection.

Sample size:

Keeping in mind the scope of the project and time availability, it was deemed appropriate to study one slum and one JJ cluster. The slum chosen had

approximately 150 households. One-third of the total households would be randomly selected to collect data. The JJ cluster consisted of 30 households. Due to the small number as well as openness in the area, it was deemed appropriate to collect data from all the households in the JJ cluster. Therefore, a total sample size of 80 households was decided for conducting the data collection exercise. The results cannot necessarily be used for generalizability.

Sample selection procedures:

Data was collected from all the households of the JJ cluster. 50 households were chosen from the notified slum. The demographic indicator according to religion specially for slum population was not available as this population are very dynamic and volatile. Therefore, the households were chosen through simple random sampling technique.

Data collection techniques:

Data collected will be of two types:

- Quantitative in the form of a questionnaire with close ended questions
- Qualitative in the form of a questionnaire comprising of open ended questions and participant observation

Analysis plan and expected outcome

The 2 main policies, that is, National Water Policy and National Sanitation Policy, were selected because WASH is a responsibility of Ministry of Urban Development, Ministry of Housing and Poverty Alleviation and Ministry of Rural Development. Implementation of WASH is considered a responsibility of the first two above mentioned ministries in urban areas and of the third in the rural areas. For purview of this project, the policies especially pertaining to urban areas were selected. Certain parameters were selected from the two

policies that best reflect WASH guidelines and help achieve SDG 6. After which, search for other policies containing WASH guidelines was conducted. Similarities and discrepancies in these parameters will be noted. Moreover, discrepancies in the guidelines and the implementation/execution of the guidelines will be analyzed on the basis of the primary data collected. Recommendations will be provided according to the findings.

Severe overlap and/or overlook of key elements of WASH guidelines is expected due to fragmented nature of the implementation of guidelines. Lack of provision of integrated solutions between different sectors responsible for implementation of WASH guidelines is expected. Execution of WASH guidelines will not be in conformity with the provision in the policies.

Policies of Government of India

UN established in 2007 that every human being had a human right to drinking water and sanitation. This right has neither been explicitly recognized in the Constitution of India or other legislation nor by its government. It has, however, been upheld by the Supreme Court of India. Regardless, the Central Government has not been able to reflectively introduce a WASH policy that successfully considers the same as a right and provide clear guidelines for all the national level actors involved in order to achieve the SDG 6.²⁹

The national and state level actors involved in provision of drinking water supply, sanitation and hygiene are as follows:

a. Urban Areas:

i. Ministry of Urban Development

²⁹ *Investing in water and sanitation: Increasing access, reducing inequalities; global analysis and assessment of drinking water and sanitation* (2014). . Geneva: World Health Organization.

- ii. Ministry of Housing and Poverty Alleviation
- b. Rural Areas:
 - i. Ministry of Rural Development (under Department of Drinking Water and Sanitation)
- c. For hygiene practices:
 - i. Ministry of Health and Family Welfare

Different policies outline WASH guidelines as they are managed by different national and state institutions. However, National Water Policy (NWP, 2012) was devised for the country without appropriately distinguishing between rural and urban areas. On the other hand, National Urban Sanitation Policy (NUSP, 2007) was devised keeping urban areas in context. Moreover, water and sanitation are state subjects hence, the analysis has been done keeping the National Capital Territory of Delhi (NCT of Delhi) in context.

Following similarities were noted after analysis of National Water Policy³⁰ and National Urban Sanitation Policy³¹:

1. Enforcement Agency: The department of water and department of sanitation were combined to form Department of drinking water and sanitation under M/o of Rural Development. The Delhi Jal Board, the Urban local body that manages 90% of water and sanitation system in NCT of Delhi, was constituted in 1998. The responsibility of supply of drinking water, provision of sanitation facilities as well as disposal of sewage was transferred from Delhi Water Supply and Sewage Disposal undertaking to Delhi Jal Board. Along with the state of Delhi, it also supplies water and collects sewage in bulk from New Delhi Municipal Corporation

³⁰ *National water policy*(2012). . New Delhi: Ministry of Rural Development.

³¹ *National urban sanitation policy*(2007). . New Delhi: Ministry of Urban Development.

and Delhi Cantonment along with nearby rural villages (approximately 200 in number).

2. In both the policies, emphasis was paid to the need of project planning and implementation being governed by an integrated perspective considering local, regional, state and national context.
3. Both policies deemed safe water for both drinking and sanitation as a pre-emptive need.
4. Both the policies gave special consideration to equitable distribution of water as a resource as well as access to sanitation facility, that is, there was a call for duty towards the under-privileged and disadvantaged sections living in the slums (notified and non-notified) and JJ clusters.
5. Awareness generation and behavior change were considered crucial for both the policies. It was deemed necessary to encourage water conservation practices (NWP) and installation and usage of available sanitation facilities (NUSP).

Following discrepancies were noted after analysis of National Water Policy and National Urban Sanitation Policy:

1. Good governance through informed decision making, that is, the importance of information systems was only recognized and considered a principle in NWP (2012).
2. Climate change as a contributory factor for decision making was considered a priority only for water management projects as climate change directly impacts availability of water which is a life sustaining resource. It was not explicitly

mentioned as a priority in NUSP despite the fact that water is an essential requirement for adequately functioning sanitation facilities. Moreover, both inadequate sanitation along with inefficient drainage leads to many water-borne diseases.

3. NUSP concentrates on waste management of only human excreta, including, its safe confinement.

Following policies have been chosen for further comparison:

1. National Health Policy³², 2015: Ministry of Health and Family Welfare is very much invested in Preventive and Promotive Health Practices to reduce the burden of different diseases, communicable and non-communicable. An integral part of such a concern is the communities' hygiene practices, especially while cooking food and after defecation.
2. National Policy on Environment and Health³³: Open defecation and sewerage systems that are not connected to waste treatment plants, both contribute about 75% to 80% to water pollution. This directly affects the surface water which is the main source of drinking water. It also indirectly affects the nutritional quality of the agricultural crops when the untreated waste water inadvertently seeps into the agricultural soil/land.
3. Swacch Bharat Mission, 2014³⁴: In the absence of a new or more evolved Urban Sanitation Policy, this mission has also been chosen to analyze the extent of

³² *National health policy*(2015). . New Delhi: Ministry of Health & Family Welfare.

³³ *National policy on environment & health*(2013). . New Delhi: Ministry of Environment

³⁴ *Swacch bharat mission*(2014). . New Delhi: Ministry of Rural Development.

comprehensive approach that may be utilized for implementation of WASH guidelines.

4. National Policy on Empowerment of Women, 2016 draft³⁵: The housemakers/primary care takers of the house and family are the women (mothers) in the household. The aim of accessible tap water in every household and sanitation facility is a form of empowerment for women.

Policy Analysis

National Health Policy

The policy aims to attain highest possible level of good health and well-being through preventive and promotive health care orientation in all developmental policies. The policy recognized the need to improve the social and economic environment to improve the health of the people.

Following similarities were noted after analyzing WASH guidelines between NHP and NWP & NUSP:

1. NHP (2015) aims to reduce inequity in access to facilities for the poor and the disadvantaged such as the women and children. It recognizes the connection of good health of the people with the economy of the country.
2. It has also noted that it is vital to ensure community participation, more so amongst the needy, in order to successfully improve health of the community and reduce the health status gap between the rich and the poor.

³⁵ *National policy for the empowerment of women*(2016). . New Delhi: Ministry of Women & Child Development.

3. NHP placed importance on partnerships with the community, not-for-profit organizations and commercial sectors and especially, evidence based decision making, in order to successfully achieve goals and objectives for programs.
4. NHP has also emphasized and is looking to implement coordinated policy initiatives so that a comprehensive approach is followed to address the various root causes of the problem, that stem from sectors/industries other than just health care provision.

Following discrepancies were noted after analyzing WASH guidelines between NHP and NWP & NUSP:

1. NHP named some specific actors that could be responsible for implementation of a comprehensive and concerted action, such as, education sector, nutrition sector, water and sanitation, etc. Unlike NHP, NWP & NUSP failed to suggest and/or provide a detailed list of governmental and non-governmental stakeholders that can be involved in devising a comprehensive action for implementing WASH guidelines.
2. NHP recommends task forces for preventive and promotive health initiative. It recognizes the fact that for preventive health care initiatives especially, the task forces need to be represented by different sectors to ensure successful implementation of multilevel cross sectoral initiatives. This is important, as a major constituent of this initiative can be focused on maintaining clean surroundings and environment, that is, adequate sanitation and hygiene

practices in order to vulnerable groups of the population from contracting preventable communicable diseases.

3. There is no explicit mention of menstrual hygiene, which constitutes a significant part of a girl/woman's life during a major part of her life, that is, reproductive age group. It only emphasizes on maternal health in detail.

National Policy on Environment and Health:

The policy focuses on different forms of pollution and its effect on health of the general public. This was also re-focused to consider contribution to climate change and its impact on health.

Following similarities were noted after analyzing WASH guidelines between National Policy on Environment and Health and NWP & NUSP:

1. Like NWP & NUSP, it places importance on adequate water and sanitation facilities. However, the motivation for the same is to reduce contribution to water pollution by volume.
2. The policy urges the government and agencies to concentrate on slum dwellers as the environment surrounding such people is the most questionable in quality. This is similar to the 2 main policies, where the emphasis has also been laid on the needy. However, this policy explicitly tries to limit the geographic area in the urban settings for improving water supply and sanitation facilities to the slum areas.
3. Like NUSP, this policy calls all the institutions for action against climate change. It recognizes the important linkage between climate change and its

impact on water and sanitation, and health. It also notes the impact of unregulated or excessive water use on climate change ultimately concluding it to be a vicious circle with no end.

Following discrepancies were noted after analyzing WASH guidelines between National Policy on Environment and Health and NWP & NUSP:

1. Unlike NUSP, it succeeds in highlighting the issue of improper drainage facilities and crumbling pre-independence infrastructure that is unable to bear the extra load due to rapid and unorganized urbanization and population growth.
2. It emphasizes solely on public-private partnerships for successful implementation of projects for improving situation regarding implementation of WASH guidelines. It ignored the necessity of community's participation in order to successfully implement the projects as well as their ownership by the community to ensure its sustainability.
3. Most importantly, it emphasizes on the fact that incinerators may not be the best option available for degrading municipal solid waste as the pollutants in the solid waste that would have contributed to land pollution would just end up being converted into vapor and consequently contribute to air pollution.

Swacch Bharat Mission

The NUSP was released in 2007 and consequently, does not reflect the plan for achieving the SDG 6. Therefore, in absence of a new policy for sanitation or WASH in totality, SBM that started in 2014 was also analyzed. It may be observed that many of its features are only upgradations of the salient features of NUSP. It has

been divided into several components, the most important being, individual household toilets, community sharing toilets, public toilets, solid waste management, IEC and public awareness and capacity building.

Following similarities were noted after analyzing WASH guidelines between SBM and NWP & NUSP:

1. Like NWP emphasizes on sensitization of the citizens for water conservation, SBM emphasizes greatly on behavior change and enhancing public awareness for usage of sanitation facilities. Although, it does not detail types of approaches that may be used for such a change. A format of IEC was provided.
2. Like NWP & NUSP, SBM also emphasizes on both community involvement and public-private partnership models, but their application will vary with construction of different types of toilets, that is, flush toilet, pit toilet, or toilets with an attached small unit of sewage treatment.

Following discrepancies were noted after analyzing WASH guidelines between SBM and NWP & NUSP:

1. Unlike NWP & NUSP, SBM concentrates on reaching people across all socio-economic sections and not only the underprivileged. Reaching out to the slum dwellers is more implicit rather than explicitly expected.
2. SBM recognizes that strategies for promoting establishment and usage of household, community sharing and public toilets will be different.

3. SBM has included solid waste management into sanitation, that not only involves human excreta, but also municipal solid waste from the kitchen, etc. This is contrary to NUSP, whose objective involves management of only human excreta or sewage facilities.
4. SBM explicitly calls for capacity building of officers involved in this mission to facilitate evidence based decision, unlike NWP & NUSP.
5. A plan has been introduced to form an Information System to facilitate monitoring the progress of the mission. NUSP also introduced a plan, that is, JNNURM, however, there is no explicit plan for establishing information systems.

National Policy on Empowerment of Women

The government recognizes women's importance access to drinking water and sanitation and women's health as well as their involvement in decision making for water, sanitation and waste management projects.

Following similarities were noted after analyzing WASH guidelines between the policy and NWP & NUSP:

1. The policy recognizes the importance of women's access to safe water and sanitation and its contribution to their own health and the family. In a nutshell, it targets the disadvantaged section of the society similar to NWP & NUSP.

2. The policy recognizes decision making power of women in WASH projects, that is, involving the affected stakeholders, similar to NWP & NUSP call for community participation for the projects.

Following discrepancies were noted after analyzing WASH guidelines between the policy and NWP & NUSP:

1. The policy recognizes importance of menstrual hygiene and provision of facilities for the same, unlike NUSP.
2. However, the importance of menstrual hygiene and facilities for the same is only accorded to being available in school for adolescent girls to reduce absence. It does not encompass women in the reproductive age group beyond 18 years of age as those in need of adequate facilities, probably, at home.
3. The policy observed recognizes the women's hold in water conservation practices that can be done at the household/community level, unlike NWP.

Case Study

JJ Cluster (Bersarai cluster)

Thirty households forming the JJ cluster were analyzed for the implementation of mandatory WASH guidelines. All the households had migrated from rural areas of Bihar, Uttar Pradesh, Jharkhand, etc. to New Delhi where they all had a common occupation of daily wage worker/laborer. Average age of the respondent (women) was twenty-six years. The average size of the family was also approximately four. Maximum households (18 in number) belonged to Hindu religion. 12 households practiced islam ([Figure 4](#)). Eighty percent off the households were literate, that is, could read and write.

When asked about source of drinking water, everyone claimed to be collecting water from a nearby public outlet which also provided bathing and sanitation facilities (communal outlets) at a user charge of five rupees per person. The water was not available to them throughout the day. The women also needed to wait in line for ten to twenty minutes to fill the water for use during the day in buckets, perry cans and bottles. [Figure 4](#) displays the current situation on usage of sanitation facilities. Women and children from only 9 households used the communal facilities ([Figure 5](#)). From the other 21 households, only women used to avail the facilities and not the children. None of the men from the 30 households used to avail the communal facilities for bathing and defecation. The rest of the household members would access bathing and sanitary facilities from nearby open canal. When asked for a reason, some women claimed “*kabahu kabahu hum logon ke paas atana paisa naahi hota ki sarvajanik shauchalya ya snan ghar kay istemal kar li*”, that is, sometimes we don’t have the money to spend on communal facilities or “*le naliya ke paas karna jyada asan hot hay aur tab tav aura san jab saavere savere jaldi ma thekedaar ke lage jay ka pad jaat hai*”, that is, the canal is nearby and we have to get ready in the morning to report to the thekedar. When dug deeper, it became apparent majority (16 out of 21) of the households from where women used to avail facilities belonged to Hindu religion ([Figure 6](#)). However, when seen in totality, only 50% of the respondents from the hindu households were availing the facilities as compared to 62% of the muslim households who availed the facilities.

60% of the respondents’ households used only water for washing hands. 70% of the women would dry their hands, after washing, with the clothes they were wearing at that moment. With respect to menstrual hygiene, all women were using makeshift cloths as sanitary napkins and washing them for reuse. None of the respondents could recollect any

feco-orally transmitted diseases that may have affected their family members or themselves in the past three months. Moreover, they were also not aware of prevalence and incidence of non-communicable diseases in their community. They did report higher ambient air temperatures in New Delhi as compared to their hometowns. [Figure 7](#) displays 20 women stated that a clean and healthy house environment was characterized by drinking clean water, which is obtained by boiling the water only. Other important factors were absence of mosquitoes and flies (8 respondents) and stagnant water (2 respondents). Equal number of respondents from hindu and muslim households reported availability of drinking clean water. [Figure 8](#) shows that only respondents from hindu households reported contribution of absence of mosquitoes, flies and stagnant water is important to maintaining a clean and healthy environment. 26% of women (8 in number) also attributed it to absence of flies and mosquitoes. None of the respondents were aware of rain water harvesting practices. 36% of the women were not aware of where to complain for faulty water supply and sanitary facilities.

The UNTOLD STORY

During the data collection exercise, there was a woman named Sarla* (name changed), who was silent and did not approach the interviewers willingly for any conversation. When finally approached for permission to ask questions from the questionnaires, the first thing she asked was if we can get her a job as a housemaid. When asked for a specific reason why she needed another job when she was employed as a daily wage worker, she responded saying the work as well as the pay is irregular. When they do not get regular work, they prefer going back to their hometowns. Due to this irregular movement in and out of the city, the children's education suffers. The NGO cooperating with the data collection, Tarkeebein, had connections with a school which had enrolled children from this JJ cluster for educating them. However, due to regular absenteeism because of travelling between New Delhi and the hometowns, the school had decided to make the enrollment criteria conditional on regularly attending the school. This, Sarla felt, was impossible in itself as she could not leave the children in the city and go home herself. Moreover, she also mentioned the police in the area kept harassing and threatening them so that they either evict the public area (under a flyover) they have occupied or pay the police some money as bribe. Their thekedar was of no help in this matter. She mentioned if she can get a permanent job as a housemaid, then probably they can move into a better home in a slum. Moreover, her children will get a regular education.

Munirka slum

Fifty households out of one hundred and fifty present in Munirka slum were analysed for the implementation of mandatory WASH guidelines. Mean age of the respondents was thirty-four years. The sample size was almost equally represented by hindu (24 respondents) and muslim (23 respondents) households ([Figure 9](#)). The rest 3 were represented by other religions. [Figure 10](#) displayed that a majority of the women (76%) or respondents were working as maids in other households. The rest (24%) were housewives. No respondent was working as a daily wage worker. About 46% of the respondents were matriculate where as another 48% had at least passed primary ([Figure 11](#)).

Everyone had access to a direct or indirect source of water in the house. 56% had 2 sources for water, that is, both pump and tanker. Whereas, 40% availed water source through tanker ([Figure 12](#)). The water was not available to them throughout the day. The water was available in the form of fresh water supplied by the government through tankers and ground water through motor that transferred it to a tank. The women (belonging to muslim and other religions only as shown in [Figure 13](#)) needed to wait in line for less than 10 minutes to fill the water, if using the communal hand pump, for use during the day in buckets. Sanitary facilities were available for all households to use. [Figure 14](#) shows that 40% of the households had their own private facility, 75% of which were present in hindu households. 60% of the households were sharing the facilities with another household, 60% of which were available in muslim households. Everybody, that is, men, women and children used latrines for defecation. When asked about difficulties with respect to sharing sanitation facilities with other households, some commented “*ki batayein, agar dusri ghar mein aadmi log jaada ho pari, toh sharam aati hai*”, that is, they feel shy using the facilities during day time if the household they share the facilities with have more men.

All the respondents used to wash hands with soap and water, and thereafter, use either a kitchen towel to dry their hands or the clothes they were wearing at the moment. [Figure 15](#) shows that 44% of the respondents affirmed incidence of feco-orally transmitted diseases amongst their family members in the past three months, out of which 59% were reported from hindu households. It may be considered an important observation considering the fact that hindu and muslim households were almost equally represented in the sample size. 22 respondents were not sure whether these incidents had reduced over the years ([Figure 16](#)). However, out of the 13 households who did report a decrease in feco-orally contaminated diseases, almost 7 respondents positively correlate it to presence of hygienic environment

(Figure 17). Figure 18 shows 40% of the households reported that attributes of a clean and healthy environment were absence of mosquitoes, flies, out of which 75% respondents belonged to hindu households. 30% of the households reported absence of stagnant water as the most important attribute for a clean and healthy environment, the majority of which, that is, 66% belonged to muslim households. Other attributes mentioned were availability of clean drinking water, no waste scattered in the house and availability of latrine in the house. Regarding menstrual hygiene, all women had converted to using commonly available sanitary napkins available in the market in the last five to ten years. 76% of the women believe the ambient air temperature has increased over the years which resorted to them buying air coolers, more than 90% of which were either matriculate pass or primary pass by education (Figure 19). Moreover, everyone also reported that there is a rise in non-communicable diseases in the community where prevalence of all the options, that is, asthma, diabetes, cardiovascular diseases have increased (Figure 20).

Conclusion

All policies have called for integrated services involving all necessary stakeholders, including the community and other not-for profit organizations. They have endeavored to draw focus on the disadvantaged population so as to ensure upliftment of the society and reduce gap in health status between the rich and the poor, especially through awareness generation and behavior change. Climate change was the focus of a few policies such as, NUSP and National Policy of Environment and Health. Notably, NHP suggests formation of task forces adequately represented by important stakeholders. However, it fails to draw light on either menstrual hygiene or sanitation, delegating the latter to SBM. Policy of Environment & Health succeeded in highlighting the issue of crumbling pre-independence infrastructure for water supply and sanitation and how only 31% of total sewage is properly

treated in the urban areas and discharged due to ever increasing load on the facilities with rapid urbanization. Finally, SBM called for 360 degree of the problems related to WASH starting from building new infrastructure to behavior change.

Despite all this, at the ground level, the water supply and sanitation facilities have been provided in a completely fragmented manner, despite efforts and encouragement by the government by introducing schemes such as JNNURM, etc. All the ministries listed above in the policy analysis section need to work in an integrated manner in order to achieve SDG 6. Their efforts should also concentrate on behavior change communication for improving usage of the sanitary facilities. In order to accomplish this, a comprehensive WASH policy that intertwines the work of all stake holders needs to be formulated and enforced by the government.

It is also imperative to take into consideration the migrant population, which is mainly ignored as they form their settlements on public land. As the literacy rate amongst the migrants and awareness regarding communicable and non-communicable diseases are positively associated, it seems paramount to address issues at a larger scale, which are beyond the scope of only WASH such as education and employment, in order to observe a significant change in the mindset of these people and ensure women empowerment.

Educating the migrant population on preventable communicable diseases such as diarrhea, malaria, etc. and introduction of innovative solutions for preventing the same in this group would reduce the burden of out of pocket expenditure. One also observed positive association between muslim households in slums and availability of shared type sanitation facilities, which directs us to observe the disproportion of public goods that may be existing at a larger scale amongst different religious groups.

According to the report submitted to UN-Water by Population Foundation of India³⁶, 29.8% of households amongst urban poor in New Delhi has access to piped water supply at home where as 63.3% of the households accessed water through public tap or hand pump. It seems that the areas studied for this project seemed to lie under the latter group. This can also be compared to Urban Non-Poor households, a massive 82.3% of which had access to piped water supply at home. With respect to sanitary facility (flush/pit), the report mentions that 65.6% of Urban Poor households used one such facility as compared to the Urban Non-Poor households, in which 98.6% used a sanitary facility. Due to the irregular nature of the migrant population's (from the JJ cluster) usage of sanitary facilities, it was deemed appropriate to allocate them to the group of Urban Poor who did not use sanitary facilities, whereas the sample collected from the slum could be accorded to the 65.6% who did use the facilities.

Migrant and slum population cannot be ignored, with increasing urbanization and slum size, with climate change scenario coming into picture and rise in non-communicable diseases. It is important not to ignore services provision to the slum population for non-communicable diseases. Awareness generation for the same amongst migrant population is a more imperative issue that needs to be addressed and a simultaneous access to services would be beneficial in building and maintaining trust in the health system.

Recommendations

1. Consideration of access to water and sanitation as a basic human right.

³⁶ *Water sanitation scenario in urban india*(2012). . New Delhi: Population Foundation of India.

2. Formulation of WASH policy for the country that can guide the government post-2019, that is, after completion of SBM
3. Encouraging and incorporating menstrual hygiene as an important aspect of hygiene practices not only in education/schools but also post-school
4. Waste management of various products used for menstrual hygiene needs to be considered an integral part of sanitation and municipal solid waste.
5. Climate change is a reality and should be integrated in the policies.
6. There has been discussion about behavior change and public awareness for constructing toilets. There has been no discussion on usage of such facilities which has already been displayed to be deficient in evaluation studies. A demand based approach needs to be utilized for the same.
7. Despite direct instructions of forming an Information system for construction of toilets, there has been no action for the same. Instead, an information system that integrates at least water and sanitation facilities should be formulated.
8. Awareness generation regarding WASH guidelines and innovative solutions for preventing and/or treatment of diseases from unhygienic practices in migrant population are imperative.
9. Improving awareness and service provision for non-communicable diseases and climate change in migrant and slum population should be considered.

Appendix

Figure 1

The percentage of the total renewable water stock at the beginning of the year 2000 in the world

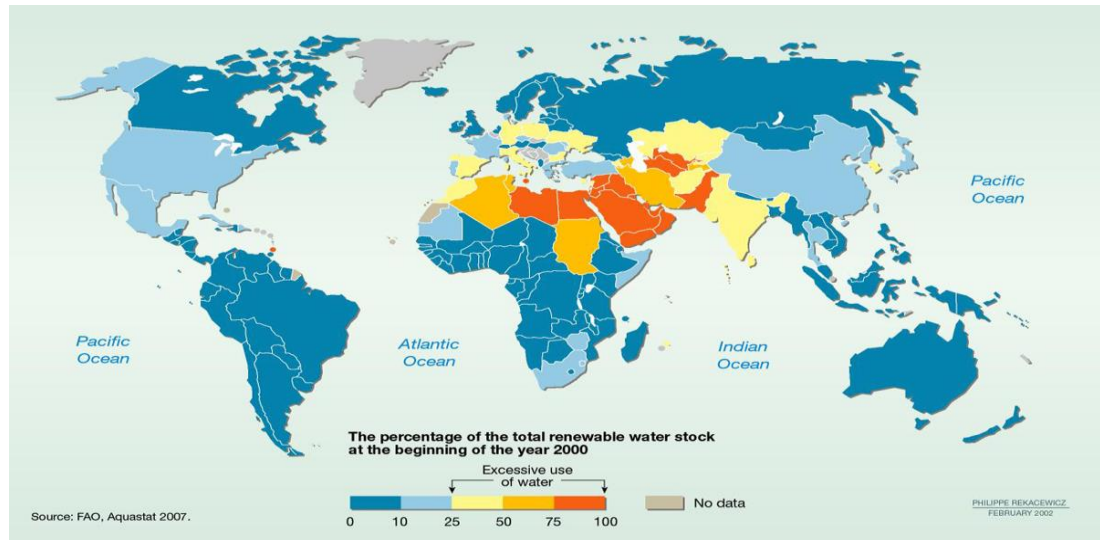


Figure 2

Water stress indicator (WSI) in major river basins of the world

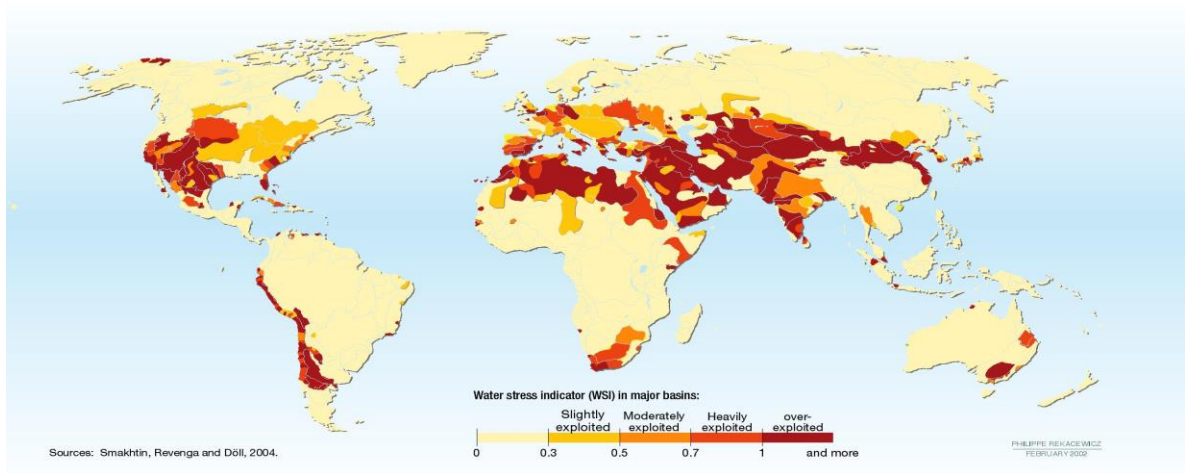


Figure 3

Map of the world reporting on the Spread of Cholera between 1950 to 2004

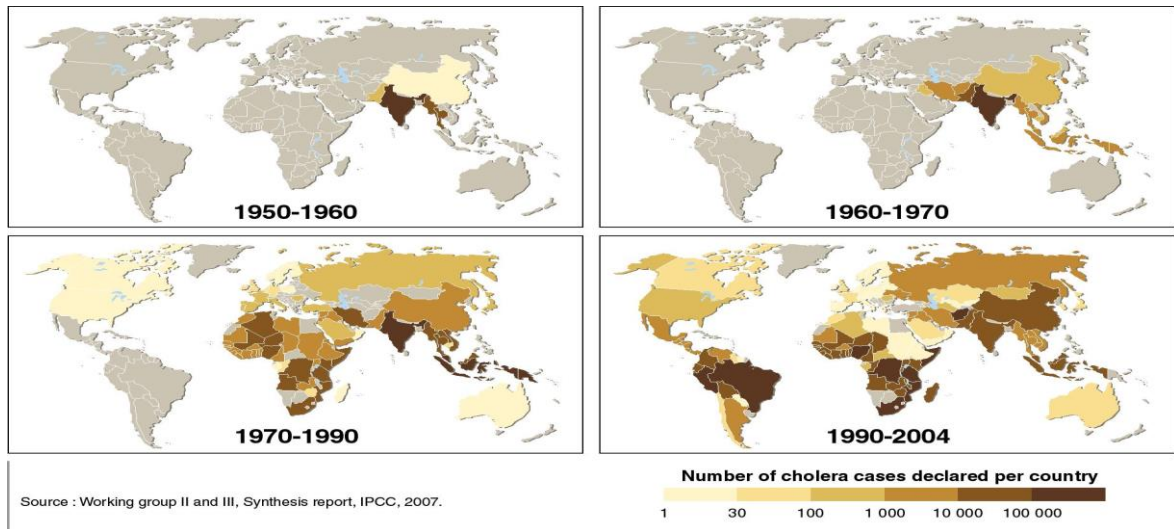


Figure 4

Distribution of respondents from the JJ cluster on the basis of religion

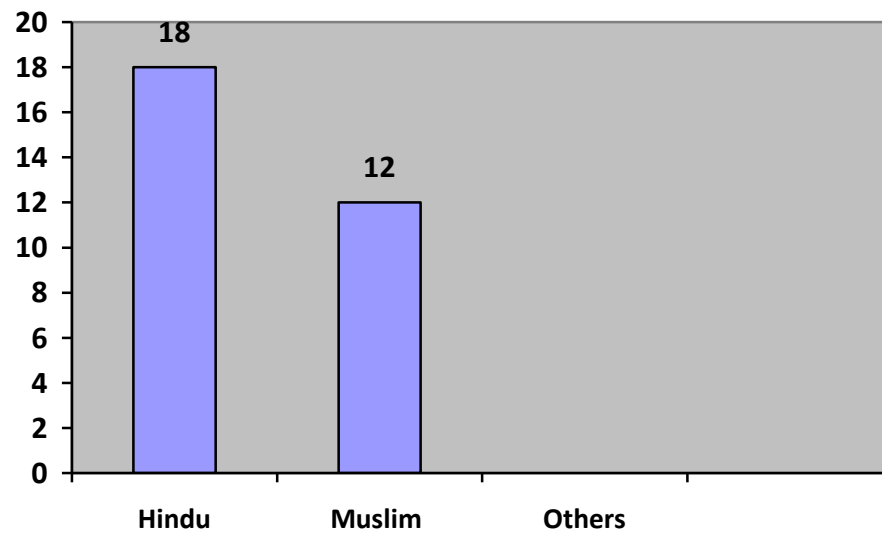


Figure 5
Distribution of household members with respect to their usage of latrines (JJ Cluster)

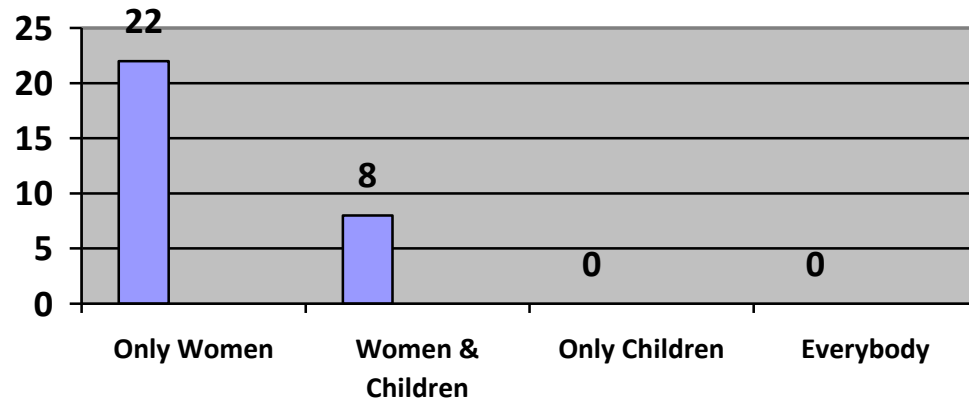


Figure 6
Distribution of respondents who mentioned only women as the answer using the latrines on the basis of religion (JJ Cluster)

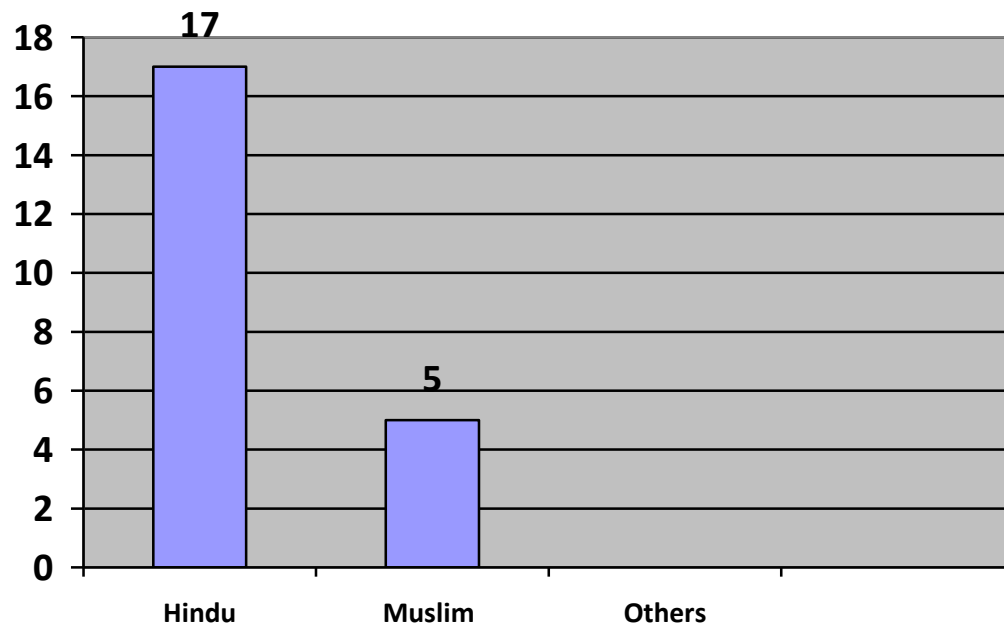


Figure 7

Attributes of a clean and healthy house environment as reported by the respondents of the JJ cluster

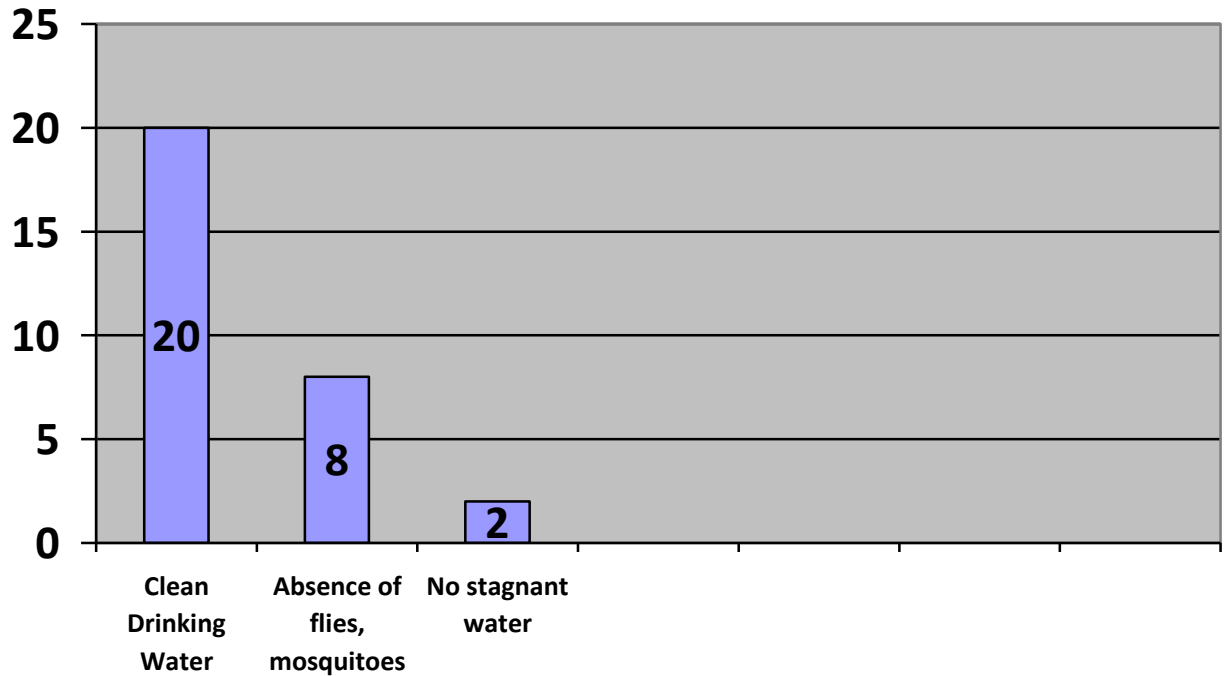


Figure 8

Distribution of responses of clean and healthy environment on the basis of religion

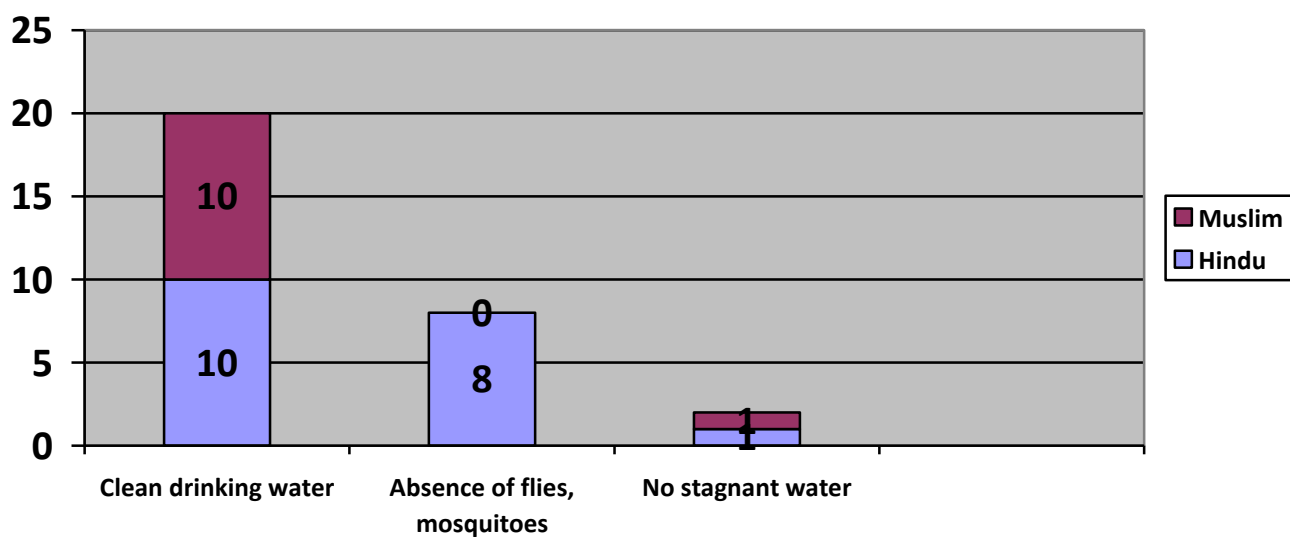


Figure 11
Distribution of respondents from the Slum on the basis of religion

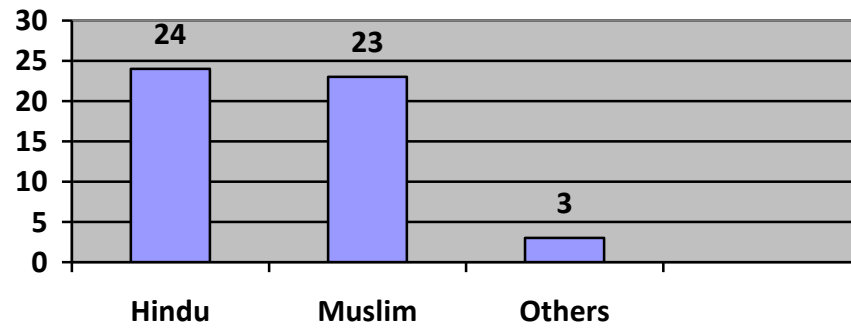


Figure 10
Distribution of the respondents on the basis of occupation (Slum)

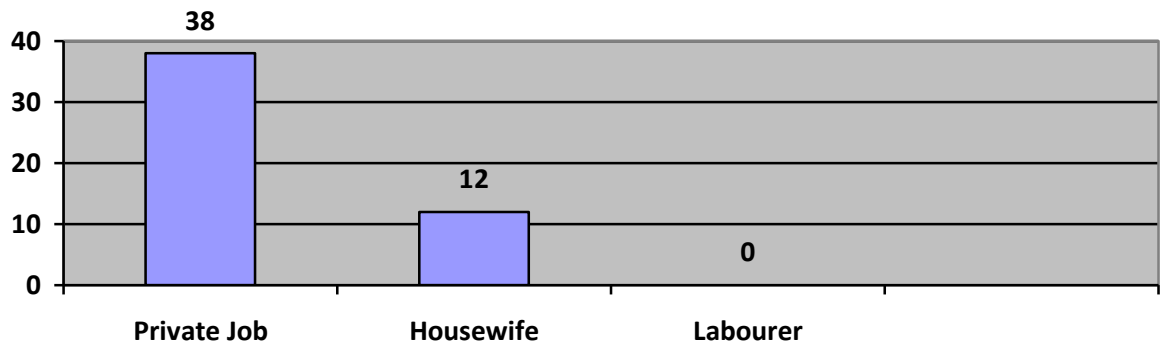


Figure 11
Distribution of the respondents on the basis of their highest educational qualifications (Slum)

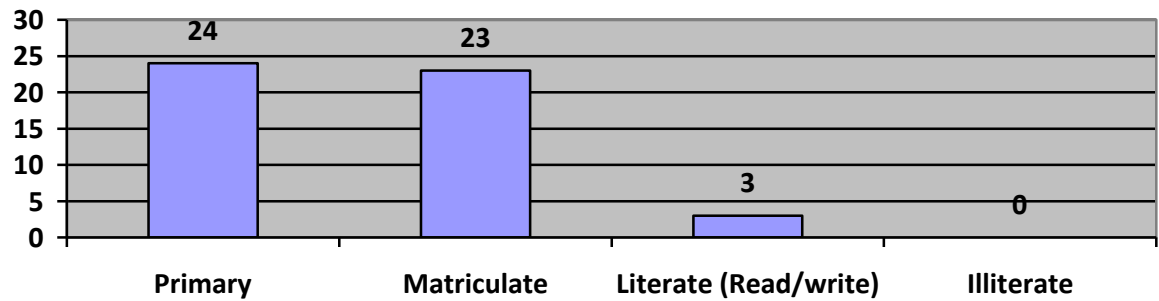


Figure 12
Main Source of drinking water for the respondents (Slum)

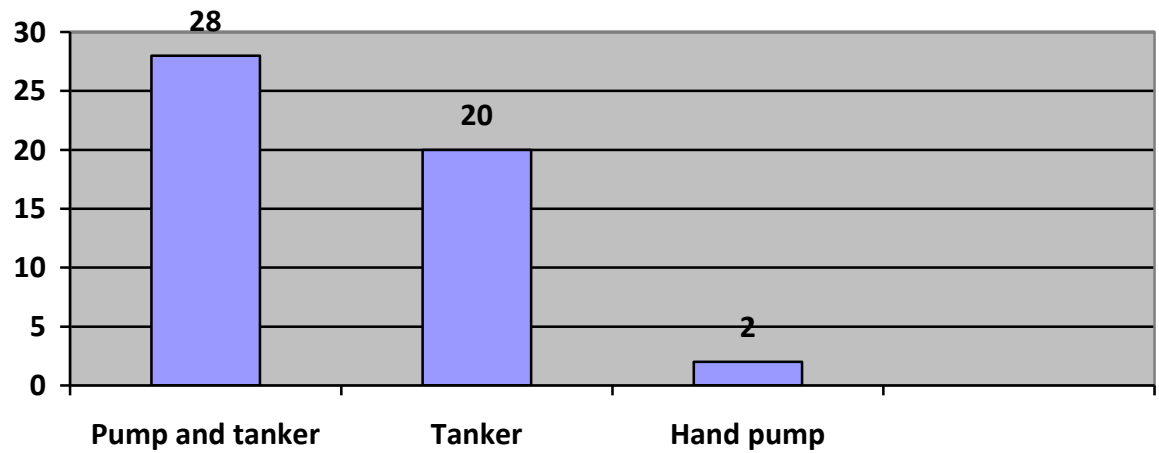


Figure 13
Distribution of main source of drinking water on the basis of religion (Slum)

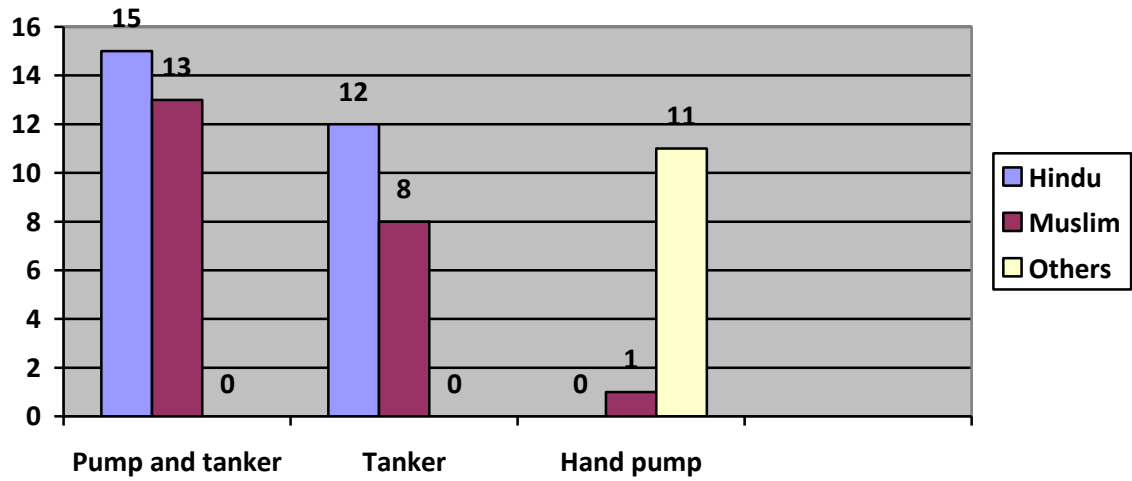


Figure 14
Distribution of types of sanitation facilities on the basis of religion (Slum)

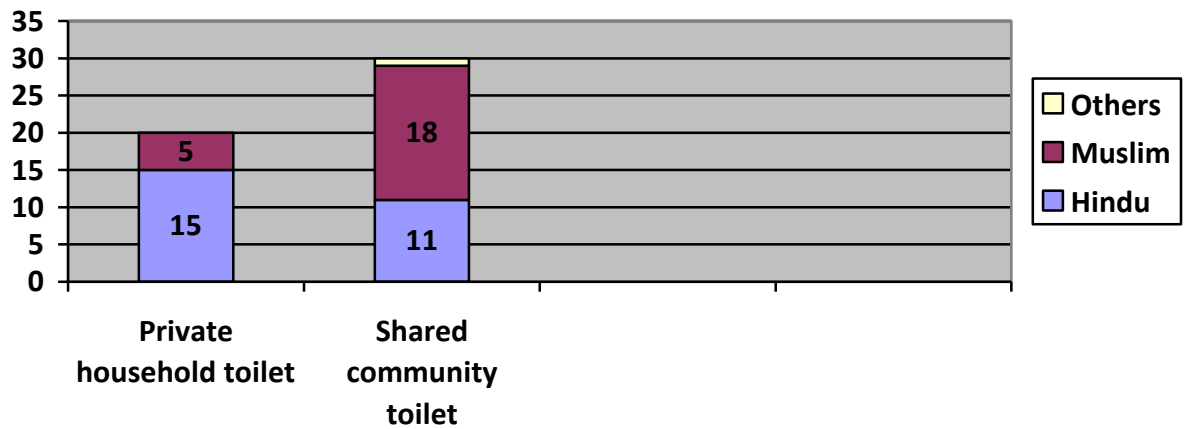


Figure 15

Number of respondents whose household members suffered from feco-orally transmitted disease in last 3 months (Slum)

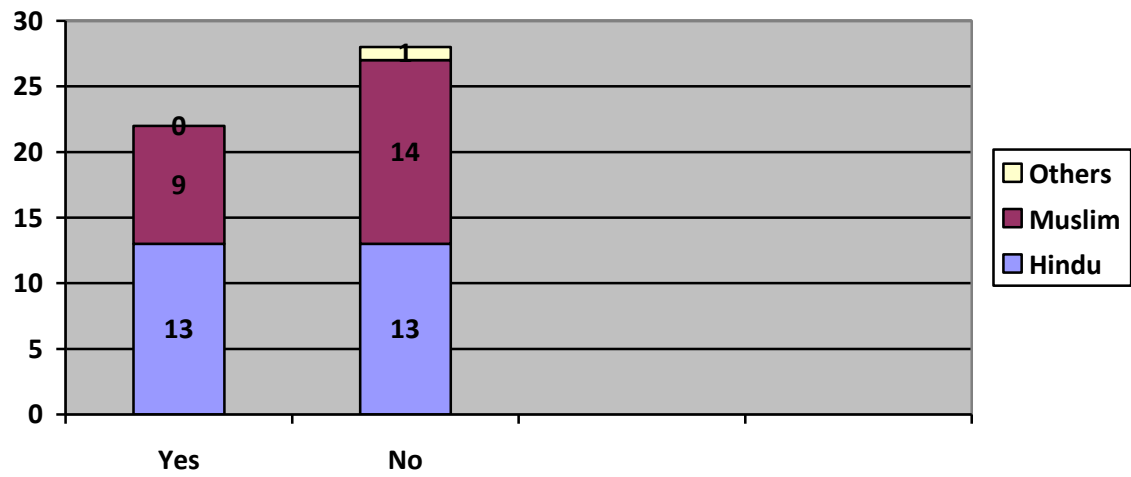


Figure 16

Distribution of respondents who have observed a decrease n feco-orally contaminated diseases (Slum)

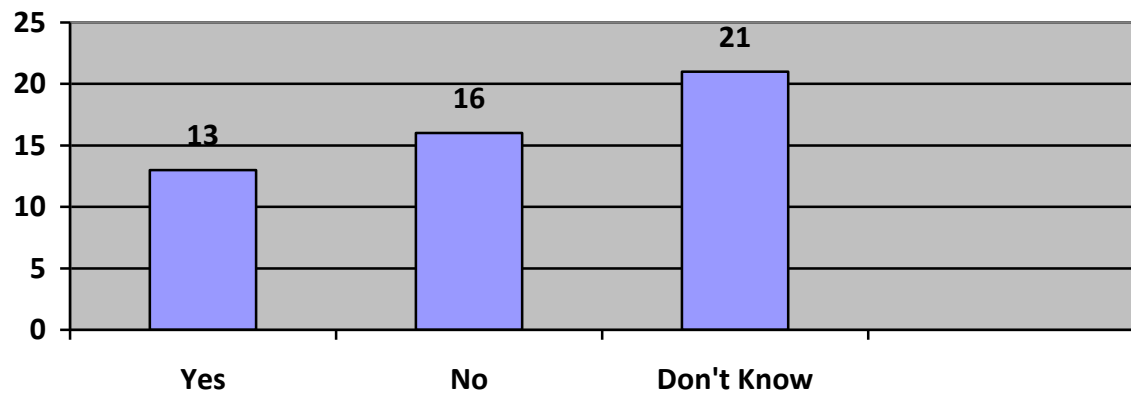


Figure 17

Distribution of respondents who believe the decrease in feco-orally contaminated diseases is due to overall hygienic practices of the family (Slum)

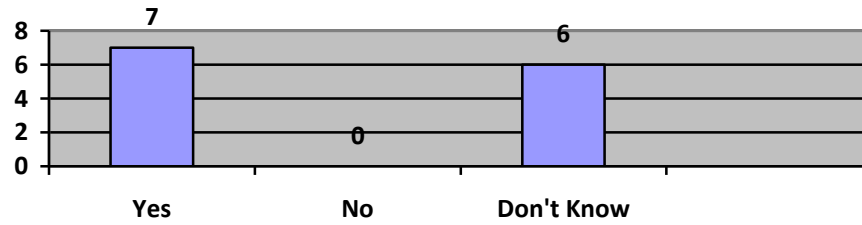


Figure 18

Distribution of respondents to various attributes of a clean healthy environment on the basis of religion (Slum)

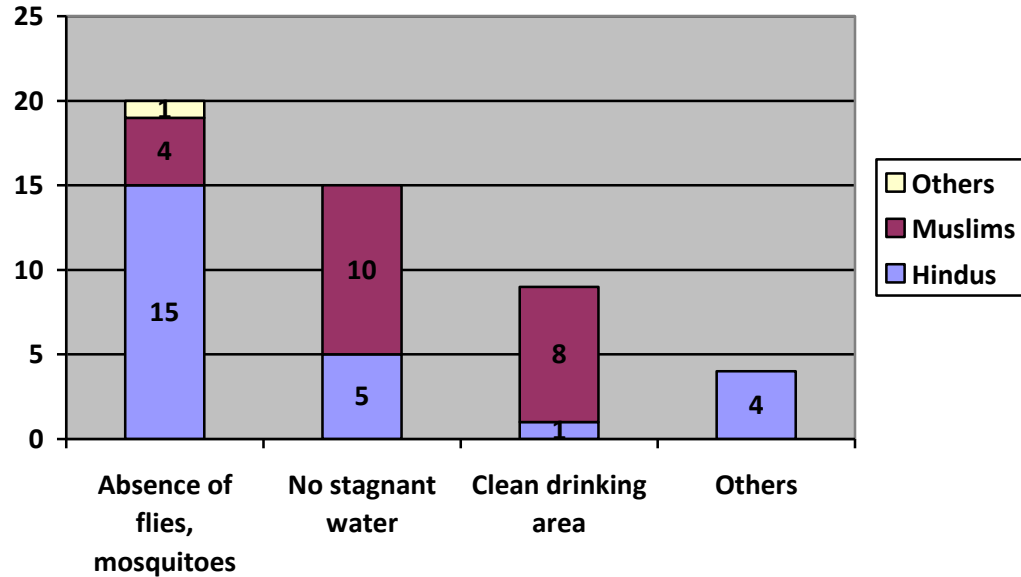


Figure 19
Distribution of respondents who observe there has been a rise in ambient air temperature on the basis of their education (Slum)

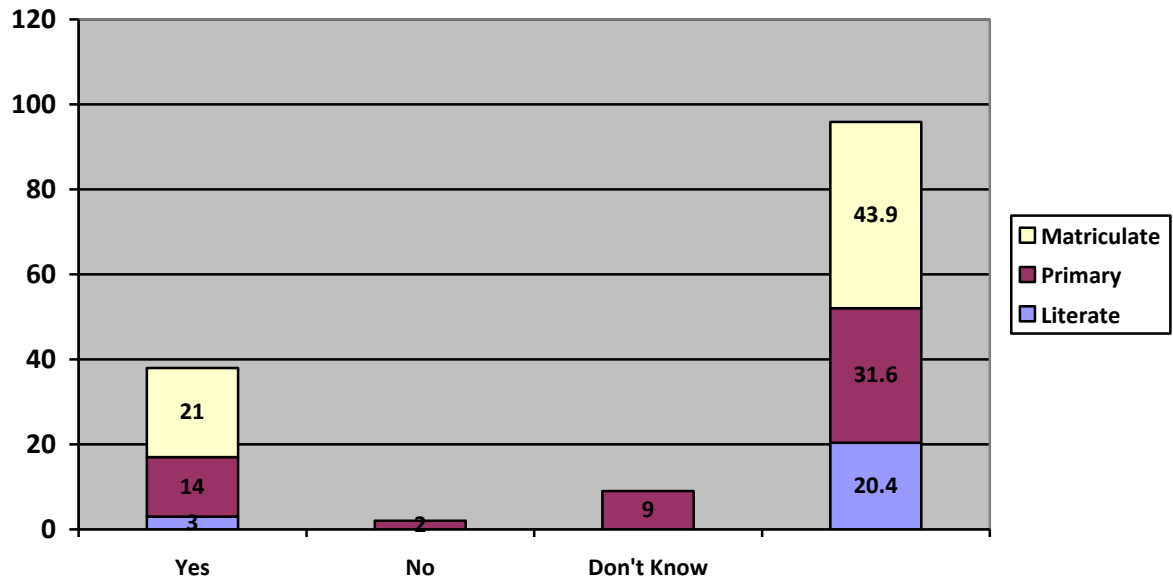
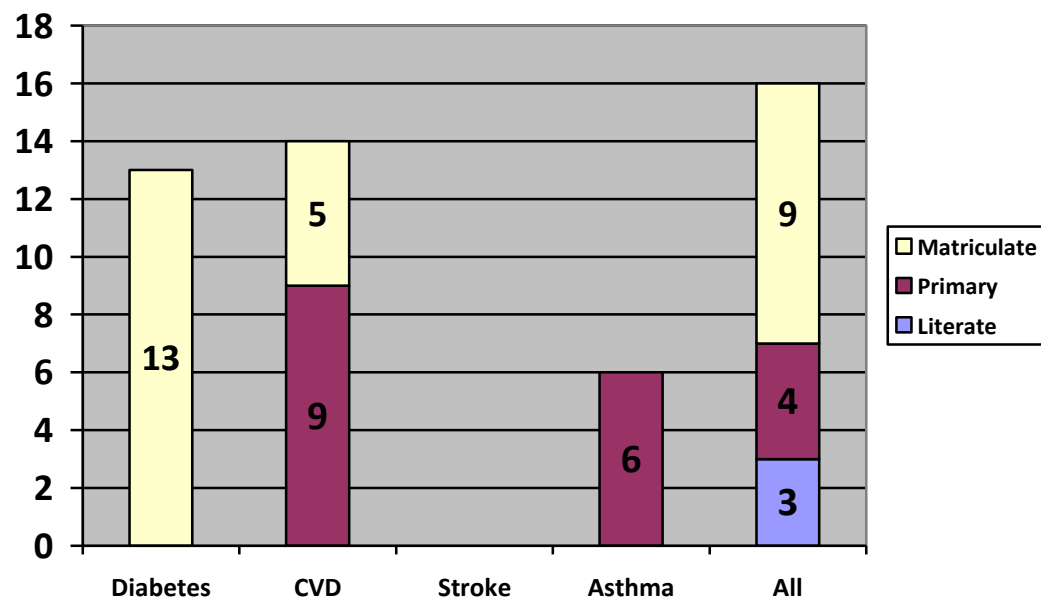


Figure 20
Distribution of respondents on awareness of prevalence of non-communicable diseases on the basis of religion (Slum)



References

1. *The economic impacts of inadequate sanitation in india* . New Delhi: World Bank.
2. *Global health observatory data.*, 2016, from http://www.who.int/quantifying_ehimpacts/national/countryprofile/india.pdf?ua=1
3. Gopala, S.S., Das, A. (2009). Household economic impact of an emerging disease in terms of catastrophic out-of-pocket health care expenditure and loss of productivity: Investigation of an outbreak of chikungunya in orissa, india. *Journal of Vector Borne Disease*, 46, 57.
4. *Human development reports* (2014). . New York: United Nations Development Programme.
5. *Human development reports*(2014). . New York: United Nations Development Programme.
6. *Indian state and provisioning of drinking water.*, 2016, from http://shodhganga.inflibnet.ac.in/bitstream/10603/4070/10/10_chapter%203.pdf
7. Interaction Council. *Water, sanitation and hygiene: Foundations for development.*, 2016, from <http://interactioncouncil.org/water-sanitation-and-hygiene-foundations-development>
8. *Investing in water and sanitation: Increasing access, reducing inequalities; global analysis and assessment of drinking water and sanitation* (2014). . Geneva: World Health Organization.
9. *JNNURM improved urban quality of life.*, 2016, from <http://www.indiasanitationportal.org/full-view-page.php?title=MTU0>
10. *National health policy*(2015). . New Delhi: Ministry of Health & Family Welfare.
11. *National policy for the empowerment of women*(2016). . New Delhi: Ministry of Women & Child Development.
12. *National policy on environment & health*(2013). . New Delhi: Ministry of Environment.
13. *National urban sanitation policy*(2007). . New Delhi: Ministry of Urban Development.
14. *National water policy*(2012). . New Delhi: Ministry of Rural Development.

15. Poulos C, Riewpaiboon A FAU - Stewart,J F., Stewart JF FAU - Clemens,J., Clemens J FAU - Guh,S., Guh S FAU - Agtini,M., Agtini M FAU - Sur,D., et al. *Costs of illness due to endemic cholera*.
16. *Progress on drinking water and sanitation*(2012). . New York: UNICEF.
17. Sen, A. (1999). *Development as Freedom*. New York: Oxford University Press.
18. *Swacch bharat mission*(2014). . New Delhi: Ministry of Rural Development.
19. UNEP. *Excessive withdrawal of renewable resources.*, 2016, from <http://www.unep.org/dewa/vitalwater/article81.html>
20. UNEP. *The spread of cholera 1950-2004.*, 2016, from <http://www.unep.org/dewa/vitalwater/article197.html>
21. UNEP. *Water scarcity index.*, 2016, from <http://www.unep.org/dewa/vitalwater/article77.html>
22. UNICEF. *Common water and sanitation related diseases.*, 2016, from http://www.unicef.org/wash/index_wes_related.html
23. United Nations. *International decade for 'action for life' 2005-2015.*, 2016, from http://www.un.org/waterforlifedecade/water_and_sustainable_development.shtml
24. United Nations. (2015). *Sustainable development goals.*, 2016, from <http://www.un.org/sustainabledevelopment/water-and-sanitation/>
25. *Water is the foundation of progress.*, 2016, from <http://www.untappedshores.org/why-water/>
26. *Water sanitation hygiene: Fast facts.*, 2016, from http://www.who.int/water_sanitation_health/monitoring/jmp2012/fast_facts/en/
27. *Water sanitation scenario in urban india*(2012). . New Delhi: Population Fund of India.
28. *Water supply and sanitation*. New Delhi: Delhi Government.
29. World Health Organization. *Global health observatory data.*, 2016, from <http://www.who.int/gho/en/>
30. World Health Organization. *Urban health profile.*, 2016, from http://www.who.int/kobe_centre/measuring/urbanheart/india.pdf?ua=1&ua=1