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# A Case Study on Sanitation Conditions in India

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***Abstract-*** **Water is a precious commodity. Provision of clean drinking water, sanitation and a clean environment are vital to improve health and life span of people. Sanitation is a basic need like food and drinking water. A sanitary toilet within or near home provides privacy and dignity to women. Sanitation and hygienic improvement is very important for the development of society.In this case study discussing all methods,management,conditions etc. for a sanitation conditions in India.**

***Keywords-*** ***Rural Sanitation, Drinking Water, Diseases,*** *Hygiene,* ***Water, Public latrines, Education Campaign***

## I. INTRODUCTION

Water, sanitation and hygiene service are very important to address the poverty, livelihoods and health.Water is a precious commodity. Provision of clean drinking water, sanitation and a clean environment are vital to improve the health and life span of people. Women and girls spend hours fetching water from different sources like Public Stand Post (PSP), Hand Pump (HP), Household Tap (HHT), Open Wells (OW), Agriculture Wells (AW) and Surface Water (SW).

In the 21st century more than half of the global population is expected to live in towns and cities. In some of cites more than quarter a million people are added every year. This poses huge challenge to urban municipal and planning bodies, which are responsible for providing infrastructure and basic services to the urban population.

The growing cities of developing countries are facing crisis between demand and supply of the basic amenities like drinking water and adequate sanitation services and necessary infrastructure. India (where 7.5 % of reported deaths are sanitation and water related) has been grappling with the problem of water and sanitation coverage, especially for the rural areas and poor in urban areas (editorial EPW, Jan 24, 2009). The most cities and towns of India are characterized by over-crowding, congestion, inadequate water supply and sanitation which include disposal of human excreta, waste water, and garbage disposal, which in turn affects the health of urban people.

Water and sanitation have been the subjects of considerable recent attention as a result of the declaration by the United Nations General Assembly that the 1980s were the International Drinking-Water, Supply and Sanitation Decade (IDWSSD) and year 2008 has been declared the International Year of Sanitation. Sanitation offers the opportunity to save the lives of 1.5 million children every year who would otherwise succumb to sanitation related diseases and it protects the health of many more. Sanitation incorporates safe disposal of human waste, waste water management, control of vector of disease, domestic and personal hygiene, food sanitation and lastly but not least housing condition.

The recent definitions of sanitation prominently states that the access to latrine is not the same as adoption of sanitary practices in dealing with human waste, nor are access to a latrine the same as its hygienic use and the adoption of other hygienic practices. Epidemiological investigations have shown that even in the absence of latrine, diarrheal morbidity can be reduced with adoption of improved hygiene behavior (WHO, 1998).

Water and improved sanitation play a major role in the overall well-being of the people, with a significant bearing on the infant mortality, longevity and productivity. Causes of contamination of water are indiscriminate use of chemical fertilizers and chemicals, poor hygienic environment of water sources, improper disposal of sewage and solid waste, pollution from untreated industrial effluents, over-exploitation leading to quality degradation.

Thus, the supply of additional quantity of water by itself does not ensure good health; proper handling of water and prevention of contamination are also equally important. Contagious, infectious and waterborne diseases such as diarrhoea, amoebiasis, typhoid, infectious hepatitis, worm infestations, measles, malaria, tuberculosis, whooping cough, respiratory infections, pneumonia and reproductive tract infections dominate the morbidity pattern and prevalence in India. Recent studies have shown the importance of washing one's hands with soap as it reduces diarrheal disease by 43 per cent. Respiratory problems such as sniffles and coughs were also brought down by 45 per cent when hands were washed five times a day (10th five year plan 2002-2007).

The study of the sanitation facilities available to the households is an important aspect of living facilities and it is closely related to the health and hygiene of the household's members and its surrounding environment (NSSO 69th round report, 2013). In this consideration, the objectives of this paper are to examine the water and sanitation conditions and the effects on diseases prevalence in urban areas of India.

### *1.1 Rural Sanitation in India-*

In the mid nineties, the government of India strongly felt that rural water supply and sanitation are crucial aspects for

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rural development. After consultations with the different stakeholders, the Ministry of Rural Development finally decided to create a separate department at Government of India level. Because of this, the Department of Drinking Water Supply (DDWS) was created with separate institutional arrangements with a focused approach. From then, the government is allocating separate funds and making budgetary provisions to tackle the rural sanitation challenges. At the same time, based on the institutional changes, the state governments have also created separate departments and wings under the Panchayat Raj or Rural Development departments at the state level. States like Andhra Pradesh created separate department to focus on issues related to rural sanitation and safe drinking water.

Based on the above-mentioned institutional changes, the government had taken up a few initiatives to assess the country's situation on sanitation. A baseline survey about rural water supply and sanitation was done by the government to understand the issue. In line with the National Agenda for Governance, it was resolved to provide safe drinking water in accordance with the stipulated norms on a sustainable basis to all habitations by March 200410, which is also the target set in the approach paper for the Tenth Plan.

***1.2 Rural Sanitation coverage in India-***

The rural sanitation coverage in India is gradually improving every year. The census data shows the scenarios from the last three decades. In the year 1981, only 1 per cent of people had rural sanitation facilities. After two decades, in the year 2001, the percentage reached 22 per cent. By the end of the year 2005, the number reached 33 per cent.

According to an estimate, 650 million people in India still defecate in the open every day. If we examine other facts, out of the 48.5 per cent in the year 2007 an estimated 200, 000 tons of fecal matter is deposited in the open every day. If we observe from the public health point of view, totally six lakhs diarrhoea deaths occur in India per year. It means 1000 deaths every day (40 deaths in 60 minutes).

One more fact is children aged below five fall prey to diarrhoeal deaths and surviving children suffer from three to five episodes of diarrhoea every year. According to available information, the rural sanitation facilities still pose a challenge for the government and civil society. The reason is not only low availability of funds, but also other aspects.

***1.3 The National Sample Survey (NSS) Findings on Rural Sanitation Coverage-***

The National Sample Survey Organization (NSSO) released data related to rural sanitation in November 201012. It has mentioned, in its 65th report on housing amenities in India in 2008-09 (up to June 2009), that 65.2 per cent rural households and 11 per cent urban households13 have no latrine facility. This report found that there was a lot of gap between usage and access. There are also many sustainability issues involved in the implementation process.

## II. NATURE AND SCOPE OF RURAL SANITATION

Providing better sanitation facilities is one of the biggest challenges till date. After the millennium era, tackling sanitation and hygiene issues is becoming a key issue in terms of providing sanitation facilities and in creating awareness among the masses for behavioral change. Social ailments like poverty are more than a lack of income or a shortage of material goods. Human poverty, lack of basic capabilities for participating in the standard activities of the communities is aggravated by lack of sanitation.

For urban slum dwellers and rural population, living in areas surrounded by human waste and garbage is creating embarrassment and depriving people of participation, choices and opportunities.

Around 8,00,000 people in India still live by manual scavenging by carrying feces in baskets on their heads, a livelihood that bars their inclusion in mainstream society.
In these pathetic conditions, people are suffering due to lack of basic sanitation amenities. Poor awareness is the main cause for this problem. The sanitation problems in rural and urban areas are different and challenges also vary.

## III. RIGHT TO SANITATION AND COURTS IN INDIA

In independent India, there have been many occasions to highlight the sanitation concept. In the legal context also, there have been some cases in this regard. The apex court has declared sanitation as a part of fundamental right to life under Article 21 of the Constitution of India.

"Article 21 protects the right to life as a fundamental right. Enjoyment of life and its attainment including their right to life with human dignity encompasses within its ambit, the protection and preservation of the environment, ecological balance free from pollution of air and water, sanitation without which life cannot be enjoyed. Any contra acts or actions would cause environmental pollution.
Environmental, ecological, air, water, pollution, etc. should be regarded as amounting to violation of Article 21. Therefore, hygienic environment is an integral facet of right to healthy life and it would be impossible to live with human dignity without a humane and healthy environment."

-Virender Gaur v. State of Haryana, (1995) 2 SCC 577
(Supreme Court of India)

***Constitutional Obligations***

The 73rd and 74th Constitutional Amendment Acts (CAA) are benchmark events in the path of self rule in villages and urban areas. The Constitution gives State governments the authority to address issues related to sanitation (Seventh Schedule, List II, Entry 6)19. Further, Article 243G of the Constitution, read with Eleventh Schedule, Entry 23, provides for the devolution of powers and responsibilities regarding health and sanitation to panchayats. A number of

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panchayat/ panchayat raj laws identify sanitation as one of the responsibilities of panchayats/ gram sabhas. However, the duty is usually framed in narrow terms and the broader issues, such as collection, transportation, treatment and disposal (and reuse), receive little or no attention.

The National Sample Survey is the main source to draw strategies for addressing rural sanitation problems in the country. A project based approach has been initiated by the government with help of national and international civil society and development organisations20. As a result, priorities have been set up to achieve the objective of providing safe drinking water to all rural habitations in India. Based on the objectives given below, a few priorities have been given to habitations. These strategies paved new ways in the sanitation sector in India.

***The priorities are as under:***

I. Highest priority to be given to ensuring that the 'not covered' habitations are provided with sustainable and stipulated supply of drinking water and sanitation facilities.

II. It will be equally important to ensure that all the 'partially covered' habitations having a supply level of less than 10 litres per capita per day (lpcd) and those habitations facing a severe water quality problem are fully covered with safe drinking water facilities on a sustainable basis. Thereafter, other 'partially covered' and 'quality affected' habitations are to be covered.

III. Once drinking water supply facilities are provided to all rural habitations as per the existing data by 2004, the remaining period of the Tenth Plan would be utilized for consolidation purposes. This will involve covering newly emerged habitations and those, which have slipped back to 'partially covered' or 'not covered' status due to a variety of reasons. Simultaneous action is also needed to identify and tackle habitations where water quality problems have emerged recently.

IV. It should be ensured that Scheduled Caste (SC) and Scheduled Tribe (ST) population and other poor and weaker sections are covered fully on a priority basis. A systematic survey of all such identified habitations shall be undertaken. The above priorities show that the government of India considers rural sanitation as a highly prioritized issue in the rural development field. In these findings, a few norms have been framed to assess the vulnerability related to rural sanitation. The main norms are more realistic, as opined by the experts and development organizations. The stipulated norms of supply would be 40 lpcd of safe drinking water within a walking distance of 1.6 kilometre or elevation difference of 100 metres in hilly areas; to be relaxed as per field conditions applicable to arid, semi-arid, and hilly areas21. At least one hand pump/spot-source for every 250 persons is to be provided. Additional water is to be provided under the Desert Development Programme (DDP) areas for cattle, based on the cattle population. The water requirements for cattle need not necessarily be met through piped water supply and could be made through rainwater harvesting structures/spot sources. In the states where 40 lpcd has been achieved in all habitations, the next step is to raise the level of availability to 55 lpcd22. Moreover, the water sanitation and public health are interrelated and inter dependant aspects from the development point of view.

## IV. IMPORTANT ELEMENTS IN RURAL SANITATION

In accordance with the studies and various findings, there are a few most important elements involved in rural sanitation. If these elements are handled properly, many public health problems can be solved. So far, majority of the diseases are spreading due to lack of proper sanitation and availability of protected drinking water sources.

Even though the protected drinking water source is available, if there is no proper sanitation or water handling and better sanitation practices, the problem will be the same. Keeping this in view, the following, most important elements have been identified to address rural sanitation issues in a focused manner. Later these were identified as better sanitation hygiene practices.

They are:

i) Safe handling of drinking water,
ii) Disposal of waste water,
iii) Safe disposal of human excreta, since human excreta is associated with more than 50 per cent of diseases,
iv) Safe solid waste disposal,
v) Home sanitation and food hygiene,
vi) Personal hygiene, particularly, washing one's hand with soap, and
vii) Sanitation in the community.

The above-mentioned best hygiene practices are unavoidable aspects in the process of rural sanitation. So far, due to lack of awareness, rural communities are generally not familiar with the hygiene practices.

## V. RESEARCH AND ACTION RESEARCH ON SANITATION

Many research and action research initiates have been taking up on sanitation at various levels. Many action research activities have taken up by international organizations. The Government of India in collaboration with international organizations like UN, UNDP, UNICEF, Water Aid, Plan International, CARE and multi donor and bilateral institutions like the World Bank, Asian Development Bank, DFID, etc has undetaken various studies on sanitation. There is an interesting action research partnership with Participatory Methodologies Forum of Kenya (PAMFORK) in promoting participation through the use of Participatory Action Research (PAR) methodologies, facilitating multi-stakeholder processes that deepen the understanding of the relationship between Water, Sanitation and Hygiene (WASH). The study emphasized on students' performance, learning in schools, building, and strengthening capacities of stakeholders from the district level to implement WASH related interventions that are evidence based.

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The determination and the relationship between status of water, sanitation and hygiene (WASH) in Schools and Performance of boys and girls has also been discussed.

The concept of rural sanitation was incorporated by the Government of India in the post- independence years in its development and welfare programmes. Along with the rural development activities, rural sanitation initiatives were also started in India. Under the umbrella of "Community Development" programme rural sanitation is being implemented in various locations in the country. A quick glance at the literature shows that it was only after 1990 that the rural sanitation becomes a priority issue in the arena of development. During this millennium, many international organizations, particularly the UN, have put high concentration on rural sanitation. At national and international levels, several studies have been undertaken on various facets of rural sanitation. The researcher also found that there were only few academic studies conducted from universities in India. From the last 50 years, several international development organizations have conducted a number of studies and surveys with an emphasis on rural sanitation.

The researcher focused on a brief review of past studies, looked into the role and impact of the IEC campaigns and media in the process of rural sanitation programmes. The research scholar also utilized the various development journals, fact sheets, newsletters, reading material, and background material, seminar/conference proceedings related to rural sanitation from the national and international perspective. The Government of India and Ministry of Rural Development have developed various types of materials like books, booklets, guidelines, brochures and reports on rural sanitation. Reputed journals like Yojana and Kurukshetra official publications of GoI were also referred for this study.

Information and Communication Technology (ICT) is playing a crucial role in the world. ICTs facilitated this study. Many national and international organizations, along with various governments, are running departmental websites, which are good sources of information duly accessed by the researcher for this study. Updates and data bases that exist were successfully incorporated from a variety of websites. Also, official information through periodic press notes and brochures helped this scholar to utilize the information pertaining to various developmental activities.

## VI. DATA AND METHODOLOGY OF THE STUDY

The research study is empirical. The study has been undertaken based on primary and secondary data. The primary data has been mainly obtained from official records, registers, government orders, pamphlets, brochures, training material and unpublished material. The researcher has conducted interactions, face-to-face discussions with rural stakeholders and held consultations with the officials dealing with this subject at various levels.

Case study of two of the selected villages was done to understand the implementation of the programme. The researcher also conducted formal and informal interviews and followed the technique of participation and non-participation by several officers and beneficiaries. Formal and informal interviews were conducted for the study, which proved to be highly beneficial in collection of factual data, reliable information from the officials and beneficiaries. Information was gathered from the district administrative authorities of Medak and the Panchayat Raj - Rural Water Supply & Sanitation (PR - RWS & S) Department of Government of Andhra Pradesh (GoAP). Interviews, interactions, and discussions gave an insight into the implementation of rural sanitation coupled with an intensive fieldwork for completion of the research.

## VII. RURAL SANITATION COVERAGE & LATEST CENSUS INSIGHTS

On coverage of rural sanitation, the latest census enumeration throws some important findings30, which was officially released on 1st May 2013. Total population of the country is 1.21 billion, which is an increase of 181.96 million persons during the decade 2001-2011. The population of India grew by 17.7 per cent against the previous decade growth of 21.5 per cent. Census 2011 says that 833.5 million persons live in rural areas and 377.1 million persons live in urban areas. Thus, more than 2/3rd of the total population of India lives in rural areas. Density of population is 382 persons per sq.km, as against 325 persons per sq.km in 2001. Child population in the age group 0-6 years in 2011 Census is 164.5 million, as against 163.8 million showing an increase of 0.4 per cent in the last decade.

Sex ratio in Census 2011 is 943 females per 1000 males, as against 933 in 2001 Census31. Population of Scheduled Castes in this Census is 201.4 million, as against 166.6 million in 2001, registering an increase of 20.8 per cent whereas Scheduled Tribes population increased to 104.3 million in 2011 from 84.3 million in 2001. As per Census 2011, number of literates is 763.5 million, as against 560.7 million in 2001.

Interestingly, Planning Commission review puts Sikkim as the first Nirmal Rajya (cent percent open defecation free) with Kerala and Himachal Pradesh attaining similar status in 2012. Haryana has resolved to achieve the target in the next two years, Punjab in the next five years, and the rest of the states in 10 years time32. According to report of the Joint Monitoring Programme (JMP) published by WHO-UNICEF on the global scenario of sanitation, approximately 626 million people are defecating in the open33. GoI presented this data in an official meeting.

The prevailing scenario of sanitation from across the globe. In India, 626 million people resort to open defecation with poor hygiene and sanitation contributing to stunted growth of children34 CRSP's focus from the inception was on subsidies and awareness by promoting sanitation coverage, which got a shot in the arm by CRSP covering more than 550 districts in India. The importance of rural sanitation is not only for privacy and dignity of an individual, but also

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to promote public health. The emphasis on construction of household toilets, though laudable, needs to rework on Information and Education Campaign to usher in changed mindset.

Planning Commission's programme evaluation study shows that 20 per cent of the toilets are being used for storage and other purposes than as toilet35. After getting the feedback on implementation, Government took decision to converge CRSP with other rural development programmes, which is a watershed in the history of rural sanitation.

Convergence helped to tackle public health issues on a holistic basis. National Rural Health Mission's goal for holistic health got a boost due to convergence factor. Introduced first at the school level, it was spread to the community later. School programme had the desired effect as school going children helped households to change attitudes. The awareness is now picking up and the programme needs to organization to further increase the sanitation coverage. Lack of priority on behalf of many States led to inadequate funding for TSC. Contributions towards programme were minimal coupled with no seriousness for such an important issue of sanitation. Personal communication on sanitation at the village level was unsatisfactory and the capacity building at the grassroots level was inadequate resulting in restricted expansion of sanitation coverage. CRSP evaluation methodology got totally restructured and the newly designed approach paved way to achieve visible results. Programme implementation, results achieved and its impact is assessed towards the end. The evaluation criteria are focused more on best practices in sanitation and hygiene in rural area.

## VII. FOCUS ON RURAL WOMEN NEEDS

Low cost latrines were introduced to attract people's participation in improving sanitary facilities at home, habitation or village. In rural sanitation, CRSP ushered a sea change and got focus on women, which was a very forward looking step in the rural sanitation sector. Public latrines have not been successful in the past as rural women faced difficulties in some areas. In many cases individual household latrines were not feasible. Therefore, on a pilot basis, village sanitary complexes exclusively for women were built. During the plan period, nearly 10 per cent of the annual funds were set aside to provide public latrines in selected villages and Panchayats/charitable trusts/NGOs offered to construct and maintain village complexes exclusively for use by women.

## VII. SANITATION AND INDIAN EXPERIENCE

In the new millennium era, the development agenda of a typical democratic country like India has changed.

The Millennium Development Goals (MDG) are emphasizing on the integrated development of the world with basic needs. Though India's sanitation initiatives have speeded up and in the last two decades a few programmes were initiated with a focus on sanitation and duly acknowledged by MDGs. The lobby representing development organisations emphasized on policy formulation to make sanitation as a key element in the process of development based on empirical research and discussions on the experiences of civil society organisations. Initially, in a few states, some civil society organizations, with the support of international development organisations, implemented sanitation programmes on a pilot basis to showcase and replicate in other places.

The main objective of this initiative was to motivate the governments at state and central levels to include the sanitation issue. Till the year 2000, development organisations insisted that governments give a greater focus to the sanitation agenda. This had yielded many positive and negative results and has put sanitation on top of the agenda with policy makers and governments. One problem that arose was that the state and central governments started concentrating on sanitation only.

Governments are allocating budgets for constructing toilets with subsidy. After lapse of many years, there was no much progress even after spending the allocated funds. Providing subsidy to a person to construct a toilet is not the solution for achieving sanitation targets. After a few findings and feedback from the grassroots, it is seen that constructing a toilet physically is not the way out. It turned as a debating point among policy makers and development professionals.

The behaviour of a common person in the country is important when working on the sanitation issue. At this level, many development organisations intervened to make the government think about the awareness generation among the rural masses on sanitation and hygiene. From then, implementing sustainable sanitation campaigns have got the required impetus in rural India and the need for a typical campaign was felt. Sanitation programmes and campaigns, like others, have a distinct phase involving a series of activities. To impact publics, the campaign must address the social, technical, financial, institutional and environmental building blocks of sustainability.

The sanitation success hinges on the software (awareness) and hardware (physical construction of a toilet) parts of the programme and, most importantly, on behavioural change of an individual. There were many efforts to develop a pattern that represents the process of sustainable sanitation as a progression through distinct phases, with activities and a range of options for each from the grassroots level to the national level. To continue the support and getting inputs of several institutional and field partners like NGOs and Community Based Organizations (CBOs) needed to be a collaborative exercise, with trends jointly identified and lessons shared. The highlight of the initiatives taken up on a pilot mode is the checklist of activities to be undertaken during different phases of a sustainable sanitation campaign.

## VIII. EVOLUTION OF RURAL SANITATION

Water supply and sanitation were added to the national agenda during the country's First Five Year Plan (1951-56)14. In 1954, when the first national water supply programme was launched as part of the government's

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health plan, sanitation was mentioned as a part of the section on water supply.
It was only in the early eighties, with the thrust of the International Water and Sanitation decade, that the Government of India (GoI) started fostering alliances with the United Nations (UN) and other external support agencies to focus on improving sanitation in the country.
The above effort crystallized into India's first nationwide programme for sanitation, the Central Rural Sanitation Programme (CRSP), in 198615.

The programme provided 100 percent subsidy for construction of sanitary latrines for Scheduled Castes, Scheduled Tribes and landless laborers and subsidy as per the prevailing rates in the States for the general public. The programme was supply driven, highly organization, and gave emphasis for a single construction model.

Based on the feedback from various agencies, the programme was revised in March 1991 incorporating some changes in the subsidy pattern and also included village sanitation as one component. A comprehensive baseline survey on knowledge, attitudes and practices (KAP) in rural water supply and sanitation was conducted during 1996-97, which showed that 55 percent of those with private latrines were self motivated.
Only 2 percent of the respondents claimed provision of subsidy as the major motivating factor, while 54 percent claimed to have gone in for sanitary latrines due to convenience and privacy17. The study also revealed that 51 percent of the beneficiaries were willing to spend up to Rs. 1000/- to acquire sanitary toilets.

## IX. CONCLUSION

The study of sanitation conditions is very important with the perspective of hygiene and health of human being. In conclusion, this study found that conditions of sanitation in households and surrounding micro-environment in certain states like Sikkim, Mizoram, and Gujarat is very good and its effect is that disease prevalence in these low in these states.

The availability of improved latrine facility to the households has very significance relationship with diseases prevalence in urban areas of India, because it directly related to hygiene and health of human. In the absence of latrine facility person have to go for open defecation and there is always chance to get contact with disease's vector i.e. flies, mosquitoes etc. So, the association between water, sanitation and micro-environmental conditions is very significantly related to diseases prevalence.The results of this paper indicate that improvement of water and sanitation conditions can substantially reduce the rates of diseases prevalence and it can be expected to affect other aspects of human hygiene and health.

## REFERENCES

[1] UNICEF: Supporting government schemes on rural sanitation. (2012, October 1). UNews, 8, 14.
[2] Rural Water Supply and Sanitation. (2008). New Delhi: Ministry of Rural Development.
[3] Sanitation 2008. (2008, January 1). UN Water Factsheet No. 3, 4, 6.
[4] Sanitation Scenario. (n.d.). ODS UN. Retrieved December 26, 2009, from http://daccess-ods.un.org/access.nsf/Get?Open&DS=A/RES/61/192&Lang=E
[5] Dietvorst, C. D. (n.d.). dietvorst | Sanitation Updates. Sanitation Updates | News, Opinions and Resources for Sanitation for All. Retrieved May 12, 2010, from http://sanitationupdates.wordpress.com/author/dietvorst/
[6] Tenth Five Year Plan (2002-2007) on Water and Sanitation. (2007). New Delhi: Planning Commission of India.
[7] Eleventh Five Year Plan - A Document. (2007). New Delhi: Planning Commission of India.
[8] Ecological Sanitation. (2008, April 9). ESA UN. Retrieved February 5, 2010, from http://esa.un.org/iys/docs/1%20fact-sheet_health.pdf
[9] A Review on Water and Sanitation. (2002). New Delhi: Planning Commission of India.
[10] Rural Water Supply and Sanitation Review. (2007). New Delhi: Planning Commission of India.
[11] Household Sanitation in India. (2012). New Delhi: National Sample Survey Organization, The Government of India.
[12] Water Supply and Sanitation. (2012). New Delhi: Planning Commission of India.
[13] 54th National Sample Survey. (1999). New Delhi: NSSO - Ministry of Planning, the Government of India.
[14] United Nations Official Document. (2010, August 3). Welcome to the United Nations: It's Your World. Retrieved September 12, 2010, from http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/64/292
[15] A Primer on Water and Law Policy in India. (2012). New Delhi: Environmental Law Research Society (ELRS).
[16] A Primer on Water and Law Policy in India. (2012). New Delhi: Environmental Law Research Society (ELRS).
[17] Guidelines of Central Rural Sanitation Programme (CRSP). (2001). New Delhi: Ministry of Rural Development, Government of India.
[18] Guidelines of Central Rural Sanitation Programme (CRSP) (pp. 1-10). (2001). Introduction. New Delhi: Ministry of Rural Development, Government of India.
[19] India: Accelerating Sanitation Coverage in Rural India. (2003). Bangkok: World Health Organization - South East Asia Office
[20] Tenth Five Year Plan (2002-2007) on Water and Sanitation. (2008). New Delhi: Planning Commission of India.
[21] Tenth Five Year Plan (2002-2007) on Water and Sanitation. (2008). New Delhi: Planning Commission of India.
[22] Sanitation Contributes to Dignity and Social Development, International Year of Sanitation
[23] (2008). Sanitation is Vital for Human Health. Un Water Factsheet, 4(3), 7. 28. Bharat Nirman Plan Document. (2007). New Delhi: Planning Commission of India.
[24] Ecological Sanitation. (n.d.). ODS UN. Retrieved December 25, 2009, from http://daccess-ods.un.org/access.nsf/Get?Open&DS=A/RES/61/192&Lang=E
[25] United Nations and Sanitation. (2008). New York: United Nations.
[26] Ecological Sanitation. (2008, April 9). ESA UN. Retrieved February 5, 2010, from http://esa.un.org/iys/docs/1%20fact-sheet_health.pdf
[27] ODS UN. (n.d.). Sanitation in Developing Countries. Retrieved December 25, 2012, from http://daccessods.un.org/access.nsf/Get?Open&DS=A/RES/61/192&Lang=E
[28] Rural Water Supply and Sanitation. (2009). New York: UN.
[29] Rural Drinking Water Supply and Sanitation in the Eleventh Plan Period Excerpts. (2009). New Delhi: Planning Commission of India.

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 9 Issue 11, November-2020

[30] Bartlett, S. (2003). Water, sanitation and urban children: the need to go beyond "improved" provision. Environment and urbanization, 57-70.
[31] Chaplin, Susan E. (1999). Cities, sewers and Poverty: India's Politics of Sanitation, Environment and Urbanization.
[32] Cairncross, S. (2003).Sanitation in the Developing World: Current Status and Future Solutions, International Journal of Environmental and Health Research, Vol. 13.
[33] Dobe, M. Sur, A.K., Biswas, B.B. (2011). Sanitation: the hygienic means of promoting health. Indian Journal of Public Health, 49-51.
[34] Davis, J., White, G., Damodaron, S., & Throrsten, R. (2008). Improving access to water supply and sanitation in urban India: microfinance for water and sanitation. Water Science and Technology, 887-891.
[35] Esrey, S., potash, J., Roberts, L., & Shiff, C. (1991). Effects of improved water supply
[36] and sanitation on ascariasis, diarrhea, dracunliasis, hookworm infection, schistomiasis and trachoma. Bulletin of the World Health Organization, 609-621.
[37] Fewtrell, L., Kaufmann, R. B., Enanoria, W., Haller, L., & Calford Jr, j. M. (2005). Water, sanitation, and hygiene interventions to reduce diarrhea in less developed countries: a systematic review and meta analysis. LANCET Infectious Diseases, 42- 52.
[38] Gopal, S., Sarkar, R., & al, e. (2009). Study of water supply & sanitation practices in India using geographic information systems: some design & other considerations in a village setting. Indian journal of Medical Research, 233-241.
[39] Gupta, V., & Pal, M. (2008). Community Sanitation Campaign: A study in Haryana. Economic & Political Weekly, 20-23.
[40] Joardar, S. D. (1998). Carrying capacities and standards as bases towards urban infrastructure planning in India: A case of urban water supply and sanitation. HABITAT INTERNATIONAL, 327-337.