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Analysis of Health Risks of Sewerage in Dense Parts of Ahmedpur East, Bahawalpur, Pakistan

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Abstract: Open sewerage in developing countries like Pakistan is increasing health risk. Ahmedpur East is a tehsil headquarter and densely populated city in district Bahawalpur facing various kinds of environmental problems including bad conditions of sewerage etc. Therefore the main objectives of this research were to identify the overall sewerage conditions and causing diseases in the city and to formulate some useful policy recommendations in the light of public opinions. Mohalla Sarwar Shah and Mohalla Noor Shah Bukhari were selected as sample sites and primary data had been collected through a structured questionnaire from 50 respondents. Necessary secondary data acquired from Tehsil Municipal Administration (TMA) Ahmedpur East etc. Findings revealed that sewerage conditions of the city badly deteriorated and majority of the respondents has adopted poor drainage methods i.e. open drain to release wastewater because 70% pipelines of the sewerage were broken. The situation is much worse in densely inner parts of the city where about 50% respondents were suffering from harmful waterborne diseases and infectious epidemics i.e. Cholera and Typhoid fever were the significant health hazards. To bring improvement in the sewerage system and make healthy environment useful suggestions and policy recommendations were made.

keywords Increasing Health Risk. Ahmedpur East Ahmedpur East, Bahawalpur, Pakistan

1. INTRODUCTION

In the present era, the rapidly urbanizing world is confronting a wide range of environmental problems, including pollution of water and air, sewerage waste and solid waste, poor sanitation, groundwater contamination etc. It is estimated that 2 million tons of sewerage and other effluents are discharged into the global water sources every day (Khattak, *et al.,* 2011). Management of domestic sewerage and overflow creates various problems in major cities of Benin (Jacques Saizonou *et al.,* 2006). The situation is more troublesome in developing nations, those have also carried the heavy burden of massive populations and poorly administrated natural resources i.e. India, Pakistan, Bangladesh etc. Moreover, these countries also vulnerable to a number of natural hazards including floods, land sliding, drought etc. In countries like Pakistan, ineffective methods of solid waste dump, overflow and leakage of wastewater and poor drainage system greatly suffering the health of inhabitants. Particularly less developed poor areas has a serious threat of many kinds of infectious diseases and hygienic problems. In Pakistan, it is estimated that only 54% population have access to drinking water and 78% have access to basic sanitation (W.H.O., 2012). This problem can be observed in many cities of Pakistan that are rapidly being populous, including Karachi, Lahore, Faisalabad, Sialkot, Bahawalpur etc. The quality of groundwater is being deteriorated in Sialkot city due to untreated release of industrial and urban effluents (Naseem Ullah *et al.,* 2012). Similarly, the majority of the households in Bahawalpur does not have proper access to adequate sanitation system i.e. Hamatiyan a slum settlement in Bahawalpur city facing many health problems (Anwar and Rani, 2012). It is also concluded that groundwater quality in Bahawalpur is deteriorating, particularly in slum areas like Islamic colony where 48%, 55% and 41% residents have diluted, brackish and water with a slight smell respectively (Mohsin *et al.,* 2013). Due to open discharge of wastewater into rivers and water channels, broken pipelines and open dumping of waste material severe sort of problems arising where contamination of groundwater is ahead. In Pakistan, the use of wastewater in agriculture is frequent due to its nutrients and regular availability regardless the harmful effects and health risks of people. The majority of the farmers considered them to be an important resource similar to organic manure and this trend is increasingly gaining fame (Drechsel *et al.,* 2010). It is found that the use of polluted water in Jamber district Kasur (Pakistan) not only degraded the groundwater quality, but also have a serious health risk to the residents of the area (Ashraf *et al.,* 2010). Inadequate disposal of domestic sewerage and human excreta has caused serious problems of health, environment and bio-degradation in major urban areas (Manarvi *et al.,* 2013). Mostly the wastewater is not treated before the disposal except a little proportion of less than 8% in major cities like Islamabad and Karachi (Murtaza *et al.,* 2012). The mixing and leeching down of wastewater into

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groundwater has created this issue that severely threatens the life of poor urban people. Therefore, the quality of groundwater and surface water is deteriorating because of un-treated disposal of wastewater and excessive use of fertilizers and insecticides (Bhatti *et al.,* 2009). In Lahore, the 2nd largest city of Pakistan, more than 28 m^{3}/Sec untreated municipal, industrial and agricultural wastewater was being thrown out into the River Ravi (Saeed and Bahzad, 2006). The entire municipal waste from Lahore city is collected through a network of 14 main drains and discharged into the River Ravi without any treatment (Qureshi *et al.,* 2014). Resultantly, the environmental condition of Ravi is becoming worse by passing time and the river is turning almost a wastewater carrier (Ejaz *et al.,* 2011). Due to this disposal of wastewater without any treatment the residents of surrounding settlements of River Ravi have been facing serious problems and diseases regarding liver, stomach, hepatitis etc. (Babar *et al.,* 2014). So, it is widely noticed in Pakistan that untreated municipal and industrial wastewater and toxic effluents continuously been disposed off into rivers, canals, water channels from nearby industries and settlements and later used in crops and vegetables growing i.e. The whole sewerage and waste material of Bahawalpur city is thrown at River Sutlej through sewers without any treatment. Therefore, the current study focuses on the issue of sewerage and their associated health risks in Ahmedpur East, a well-populated, but poorly administrated tehsil headquarter in district Bahawalpur with following main objectives;

1- To identify the overall sewerage conditions and causing diseases in the city
2- To formulate some useful policy recommendations in the light of public opinions

2. MATERIALS AND METHODS

Study Area: Ahmedpur East is famous historical city distinguished in many respects, particularly about its historical palaces, fort, and mosque. It also captured a special place in the production of mangoes, citrus and dates etc. It is situated between 29° 9' 0" North Latitude and 71° 16' 0" East Longitudes located about 54 km south-west of Bahawalpur city. The population of the city that was 96,415 in 1998 estimated 153,303 individuals in 2013 with a growth rate of 3.14% (Khan, *et al.,* 2013).

Data Collection and Sampling Procedure: Data about sewerage conditions was mainly collected from primary and secondary sources. Primary data had been collected through a structured questionnaire during a field survey in early in January, 2015, whereas necessary secondary data have been gathered from Tehsil Municipal Administration (TMA) Ahmedpur East and few web sources. Two sample sites, namely Mohalla Sarwar Shah and Mohalla Noor Shah Bukhari were selected randomly and questionnaire distributed among 50 residents (25 from each Mohalla). Both the sample sites are densely populated and located inner old part of the city. The streets are quite narrow and unpaved. Mostly the houses are old structured, impaired and badly cracked and very dangerous for living **(Fig.1).**

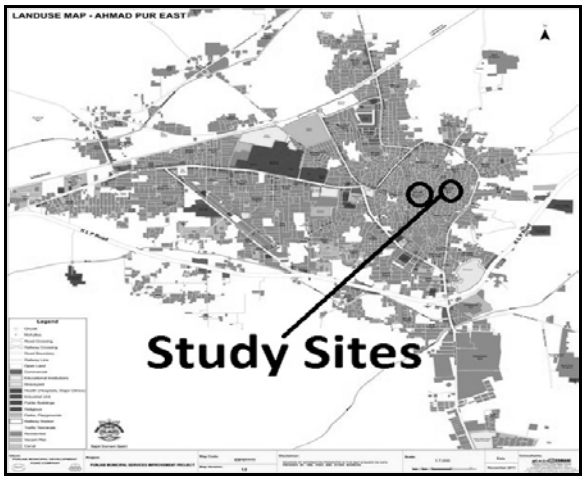

Fig.1: Map of Ahmedpur East City Showing Study Sites Source: (Tehsil Municipal Administration (TMA) Ahmedpur East, 2015)

Data Analysis: The collected data properly manipulated and tabulated before further processing. Descriptive statistics are applied in data analysis with the help of Statistical Package for Social Sciences (SPSS) 16 software. After that it was discussed in necessary detail on the basis of findings.

3. RESULTS AND DISCUSSION

The results and ground observations of the study suggests that the conditions of infrastructure and services were much poor in the city as roads (except few ones) are severely abrupt, sewerage pipes are broken and drains and sewers were overflowing in the streets and nearby roads.

Sewerage Sources and Conditions

It is found that the overall condition of sewerage in Ahmedpur East is not satisfactory and even deteriorating and the majority of respondents was not satisfied with their sewerage sources. According to TMA sources, 3 mega pipelines were installed with only two disposal points (Chungi Pirwah and Shoukat Abad) to hold an enormous volume of wastewater and opened in cultivated lands and further polluting soils and growing crops. Sewerage line covered almost the whole city with links lines in different Mohallas and colonies with varying diameter of, 9", 12" and 18" and the work on new pipelines with a diameter of 24" and 36" was under process while existing lines were being repaired.

About 70% links lines were broken and 30% were partially working**.** Overflowed manholes and drains, filths, broken pipelines can be witnessed in the inner densely populated parts of the city and creating many health risks for the residents, particularly for the children that are more vulnerable to suffering harmful diseases. Sanitary situation is also not much better and become worse in rainy seasons when water of rain mixed with sewage and filled in large undulated holes and ditches found in streets, roads and pathways and movement of the public become extremely difficult.

Main Sources of Sewerage

Due to the absence of proper drainage system the citizens of Ahmedpur East, particularly in old parts of the city rely on open sources of sewage that are dangerous for health. **(Fig.2 and 3)** manifests that 34% residents have an open drain for the release of sewerage and have no proper outlet. About 26% used sewerage pipeline for the release of sewerage but the pipeline of the city is no longer effective to hold a large amount of sewer with breakage in pipes and frequent blockage. 22% respondents have used narrow and deep drains to carry away sewerage and 18% respondents have used their pit drain to dispose wastewater.

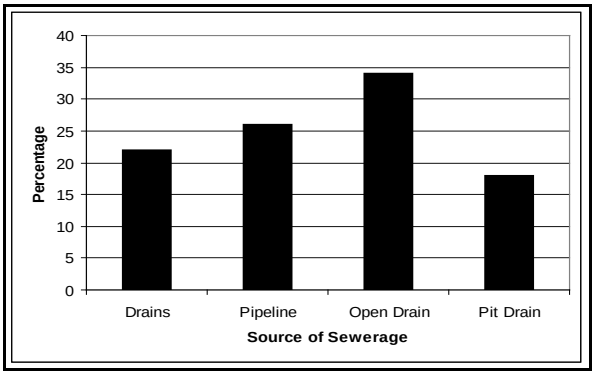

Fig.2: Main Sources of Sewerage
Source: Field Survey (2015)

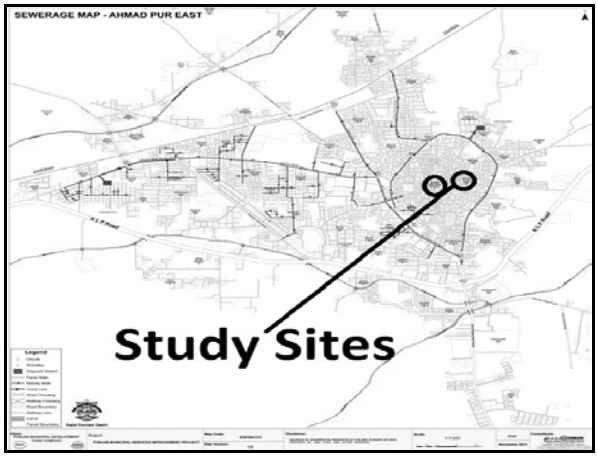

Fig.3: Sewerage Map of Ahmedpur East
Source: (Tehsil Municipal Administration (TMA) Ahmedpur East, 2015)

Kinds of Sewerage Fault

Different kinds of sewerage faults have been realized in study sites that fully or partially represented the sewerage conditions by whole city. (**Fig.4 and 5)** portrays that 36% respondents were facing the problem of improper cleaning of sewerage pipelines, 28% were complaining that their sewerage pipelines are cracked, 20% were responding that the capacity of sewerage pipes is less to hold a large volume of wastewater whereas 16% respondents have no proper outlet to discharge their wastewater.

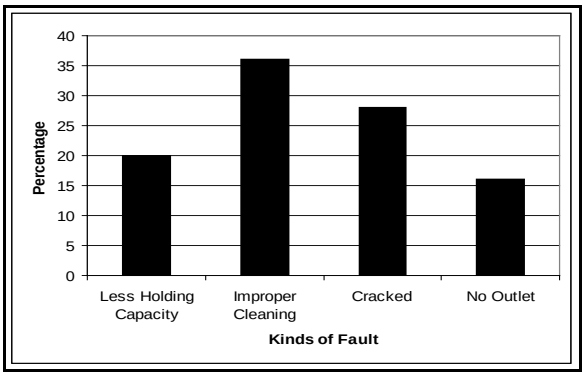

Fig.4: Kinds of Sewerage Fault
Source: Field Survey (2015)

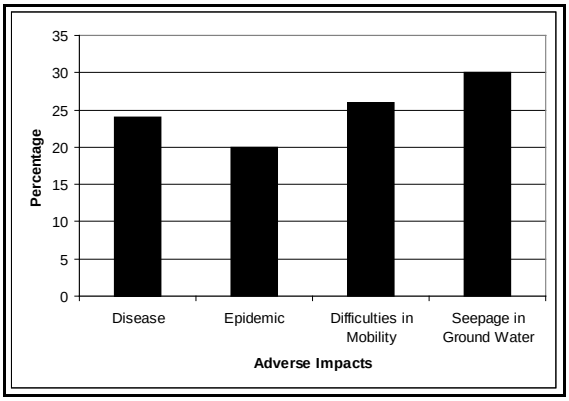

Fig.5: Adverse Impacts of Bad Sewerage Conditions
Source: Field Survey (2015)

Adverse Impacts of Bad Sewerage Conditions

The unwanted or adverse impacts of bad sewerage conditions are manifold ranging fatal diseases to un-healthy environment. **(Fig. 6)** displays these adverse impacts in Ahmedpur East. About 30% respondents answered that the wastewater is now infiltrated and mixed with ground water usually used for drinking and other purposes, 26% were troubled in daily movement due to the wastewater accumulation in streets and pathways. Alarmingly, 24% and 20% (48%) respondents were suffering from harmful waterborne diseases and infectious epidemics broken there and have serious illness and health hazards.

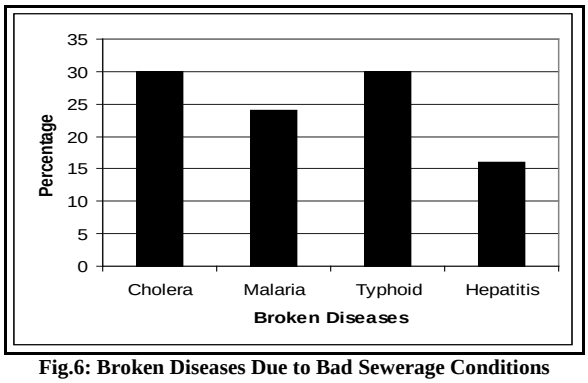

Fig.6: Broken Diseases Due to Bad Sewerage Conditions
Source: Field Survey (2015)

Broken Diseases Due to Bad Sewerage Conditions

There is a long list of diseases caused by the use of contaminated and sewers mixed water worldwide. Among these, Cholera is the most common disease caused by the polluted water and unsafe disposal of sewerage mostly found in poor urban slums (Drechsel *et al.,* 2010). **(Fig.7)** represents the broken diseases in the study sites due to bad sewerage conditions. Cholera and Typhoid fever were the leading health hazards with 30% each share among the residents. Mainly the infants and children were suffered in these fatal diseases. Malaria was the next main disease in 24% patients suffered by the mosquitoes found in wastewater spread in the streets and pathways while 16% respondents were suffered in Hepatitis B.

Broken Epidemics Due to Bad Sewerage Conditions

Despite the harmful diseases wastewater also causes an infectious epidemic that is even more injurious for peoples' health. **(Fig.7)** shows that in study sites 40% respondents were having throat problem due to drinking polluted water, 26% were having the problem of eye soaring a common epidemic in areas with poor sanitation and drainage. About 20% respondents were having skin infection and 14% have different kinds of allergies and were in uncomfortable physical condition.

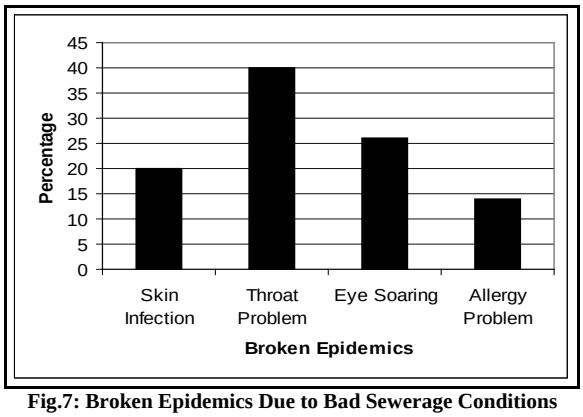

Fig.7: Broken Epidemics Due to Bad Sewerage Conditions
Source: Field Survey (2015)

Policy Recommendation to bring Improvement in Sewerage Conditions

These findings testify that in study sites poor sewerage system, causing various kinds of diseases and infectious epidemics and the majority of the respondents were in miserable condition. It is very critical to take useful steps to cope this issue before occurring any major loss or calamities.

Duties of Citizens to Improve Sewerage Conditions

The role of citizens is very obvious in order to change bad sewerage and drainage conditions and thus can not be overlooked, particularly in the lack of resources and un-sustainable environment. In this regard, the participatory efforts by citizens, NGOs, and local government can substantially improve the scenario of sewerage and sanitation systems. Many examples of this community participation and activist approach existed all over the world and also in Pakistan i.e. the Orangi Pilot Project (OPP) in Karachi (Pakistan) is the major example of and many similar projects have developed the capacity operate this e.g. Anjuman Samaji Behbood (ASB) in Faisalabad, Lodhran Pilot Project (LPP), Lodhran, Muawin in Lahore and the Conservation and Rehabilitation Centre (CRC) in Uch Sharif (UN-HABITAT, 2006).

Therefore the following helpful measures were based on respondents' suggestions to bring improvement in sewerage conditions in the study area;

- Regular cleanliness of pipelines should be exercised.
- Cemented pipes should be utilized to avoid any leakage or breakage of pipes.
- Covered drains should be used to through away the waste water from houses to the main pipeline.
- Regular cleanliness of houses and streets should be maintained by individuals,
- Economical use of water at homes should be adopted.
- Residents should promote self responsible attitude to bring improvement in the sewerage system.
- Due cooperation should be made with TMA regarding sanitary and environmental safety issues.
- Garbage and waste material should be properly disposed.

Responsibilities of TMA/ Concerned Authority to Improved Sewerage Conditions

The above mentioned measures are, no doubt very essential to bring positive change in sewerage conditions. But in this regard, the role of the TMA / concerned authority could be proved radical to bring massive improvement in the existing sewerage problem. Many services like water and wastewater are considered highly capital based therefore district and city government should start projects and schemes in the

urban centers to administer water and wastewater systems properly (Alam, 2007). The allocated funds should be utilized purposefully and with fixed time duration to avoid a lapse. Currently different development projects are undergoing by TMA and the provincial government is also keen to bring improvements of municipal services in medium sized towns and cities throughout Punjab province. As in various other urban areas of the Punjab a sewerage scheme named Improvement and augmentation of urban sewerage is currently running in Ahmedpur East with the estimated cost of 87.000 million PKR (Govt. of Punjab, 2015). When it is asked by the local residents about what should be performed by TMA Ahmedpur East to bring improvement in sewerage system they willfully leads to determine some useful steps;

- Old small diameter pipes should be replaced with enlarged pipes to hold the maximum amount of wastewater.
- TMA should adopt modern machinery and equipments to bring change in the sewerage system,
- Wastewater plant should be installed to treat wastewater before the use in agriculture or final disposal, TMA should deploy more sanitary workers and vacancies should be filled.
- Formulation of new rules on sewerage/waste disposal should be devised by concerned authorities.
- Strict supervision of sewer pipelines and drains should be implemented.

4. CONCLUSION

Ahmedpur East city is currently facing various environmental problems including bad sewerage and drainage conditions. The sewerage conditions of the study sites were badly deteriorated and majority of the respondents have adopted poor drainage methods to release wastewater because almost 70% pipelines of the sewerage were broken. Particularly the situation was much worse in densely inner parts of the city where overwhelming residents were facing various sanitary problems, broken harmful waterborne diseases and infectious epidemics i.e. Cholera, Typhoid fever, contagious allergies etc. To bring improvement in the sewerage system some useful measures were suggested by residents, i.e. Regular cleanliness of pipelines should be exercised, cemented pipes should be utilized to avoid any leakage or breakage, houses and streets should be maintained clean, TMA should adopt modern machinery and equipments to bring change in sewerage system, old small diameter pipes should be replaced with enlarged pipes, wastewater plant should be installed to treat wastewater etc.

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