

ANALYSIS OF SELECTED PUBLIC HEALTH SERVICES AND PLANNING MEASURES IN DISTRICT BAJAUR, PAKISTAN

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ABSTRACT

Objective: To assess sanitation and basic hygiene facilities at household level in the selected villages of tehsil Khar, District Bajaur, Pakistan, which is closely linked with the public health.

Background: Globally 2.2 billion people lack access to safe drinking water. More than half of the world's population lacks access to adequate sanitation. Despite this, 673 million people defecate in the open. In Pakistan 22% of people have no facility of sanitation services. In the Khyber Pakhtunkhwa province 89% of households have access to improved water sources, and 85% have accessed to improved sanitation.

Methods: The primary data for this purpose was collected through field survey. A questionnaires survey was carried out to collect information about sanitation system and basic hygiene situation of study area.

Results: Results of the survey shows that majority of the people have no access to well managed system of sanitation and drainage of wastewater. Open defecation is common in the study area. In the last six months, the cholera and malaria (40% and 38% respectively) affected general public of the study area. No proper system found for solid waste management. Poverty and lack of proper planning is found as the main obstacle to healthy hygienic practices.

Conclusion: The study concludes that, the surveyed area has no well managed system of sanitation, wastewater drainage and treatment. The poor sanitation caused various diseases in the study area. Multiple planning measures are suggested in the study to improve the public health situation in the study area.

Key Words: Water, Sanitation, Hygiene, Waterborne diseases, Public health

Introduction

Public health is the art and science of promoting healthy life style among public through disease prevention and sanitation of the environment as well as the creation of social awareness (Winslow and Charles, 1920). Public health is dependent upon adequate and safe water supply and sanitation practice (Hinrichsen and Tacio, 2002). The sanitation is a practice to decrease the public's contact with environmental pollutants and securing them by giving a clean environment for living. It generally comprises hygienically managing human and pets' excreta, waste and wastewater (Wood and Mayling, 1998). Safe sanitation and clean water is a requirement for good health and is a basic need. Lack of safe water supply, poor sanitation and hygiene services causes waterborne diseases. Waterborne diseases cause 3.4 million deaths every year, of which 2.5 million are children (Malhotra *et al.*, 2015). Mismanagement of human excreta causes communicable diseases, i.e. cholera, typhoid and diarrhea, affecting millions (Malhotra *et al.*, 2015). Cholera causes 100,000 human losses per year (Taylor *et al.*, 2015). An enteric virus, including Hepatitis E virus (HEV) persists in degraded environmental conditions, contaminates drinking water sources and may cause health problems (Ahmad, 2010). Accessibility to sanitation facilities is associated with lesser probability of intestinal protozoa infections. Water is polluted by enteric pathogens such as coliform bacteria, *Vibrio* and bacilli causing dysentery (Speich *et al.*, 2015). Since 1980, there is special focus in clean water supply, but the results are not satisfactory because of poor progress in sanitation sector (Hinrichsen and Tacio, 2002). Worldwide, about 2.5 billion people have no facility of reliable sanitation and hygiene services, while one billion do open defecation (UNW-DPAC, 2014). Two million tons of waste and other sewage/day is dumped into the world's waters. Worldwide and especially in developing countries, over 90% of untreated municipal and 70% of industrial wastes are dumped into water bodies, causing water pollution (GoPunjab, 2008; Chauhan, 2014).

The Biological contamination of community's drinking water has remained the cause of waterborne diseases in various cities of Pakistan. It is the consequence of poor sanitation practice and absence of wastewater treatment. In some cases, the drinking water supply pipe lines are contaminated by sewage (Azizullah *et al.*, 2011; Owa, 2014). In Pakistan, 60% of deaths in children of less than five years of age occur due to waterborne diseases (UNICEF, 2014-a). According to a UNICEF report, in Pakistan 22% of people have no facility of toilet. The majority of population among this is the rural areas' population. The sanitary latrines used by public in urban areas is 95% and rural areas is 25% (UNICEF, 2014-b). Most of the diseases in Pakistan, like Hepatitis E, rotavirus diarrhea, typhoid and dysentery are caused by water pollution. Currently, Pakistan is struggling to eliminate the Polio. The major source of polio transmission is drinking water pollution, caused by sewerage

water containing that virus (UNICEF, 2012). In Pakistan, the presence of Hepatitis E Virus (HEV) was reported for the first time in wastewater. It was also reported that it circulates at a quite high frequency in the wastewater (Ahmad, 2010).

In Khyber Pakhtunkhwa, municipal sewage is discharged into rivers, canals and water bodies without proper treatment (Sialet *et al.*, 2006). The results of the Water Quality Monitoring Program by Environmental Protection Agency (EPA), Khyber Pakhtunkhwa (KP) in collaboration with UNICEF shows that only pH and Turbidity of the water was satisfactory and the condition of remaining entire parameters i.e., total coliform, total chlorine residual (Cl₂), total dissolve solids, hardness, alkalinity were unsatisfactory (GoKP, 2010). In the peri-urban Peshawar, the use of sewage-contaminated water for agricultural practices for long time caused the perpendicular movement of heavy metals from contaminated soil in plants. This phenomenon polluted the crop, underground water as well as the accumulation of toxic metals in soil. This may cause phytotoxicity to users (Ullah *et al.*, 2012).

The newly merged district (former FATA) the sanitation situation is unsatisfactory. A study conducted in Mohmand agency reported that, the water pollution was the major cause of diseases like diarrhea, abdominal pain, viral hepatitis, headache and hypertension (Shah *et al.*, 2012). In Bajaur district only 66% of the residents have the facility of safe sanitation. Among this, only 39% of latrines were found as sanitary latrines. The sewerage water of domestic use is generally released untreated into the agriculture fields. In the same area, 53% schools have no latrines facility and 77.5% of the schools do not have any hand washing facility (Hayat Foundation, 2013).

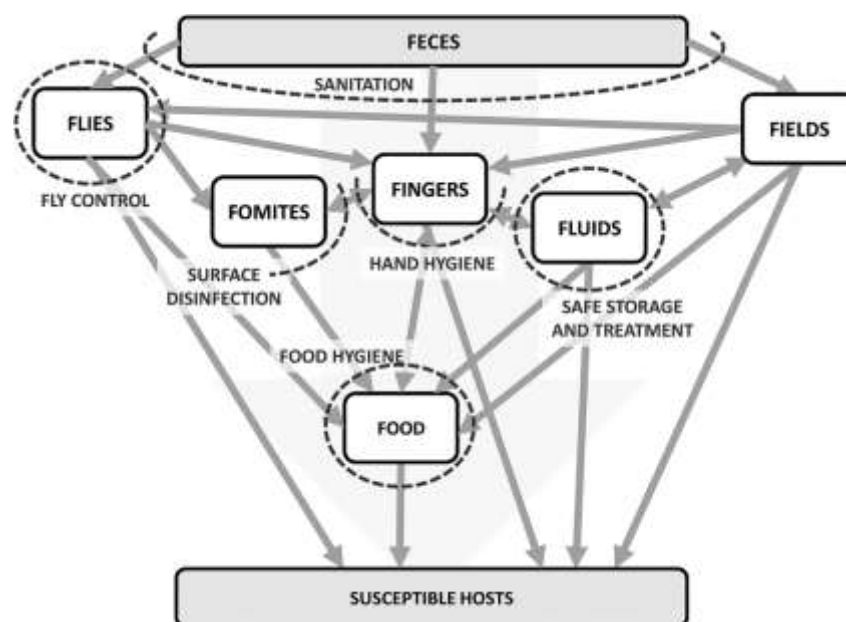


Fig.1. The F-diagram showing the diarrheal disease transmission pathways through environmental reservoirs. Adapted from (Julian, 2016). Potential pathogen transmission channels are indicated by

grey arrows. Interventions on intersecting arrows are represented by dashed lines. The dashed lines denote permeability as a result of insufficient effectiveness (fly control, food hygiene, hand hygiene, sanitation) and/or poor compliance (food hygiene, hand hygiene, safe storage and treatment, and sanitation).

Study Area Description

The District Bajaur is a District of Province Khyber Pakhtunkhwa (KP), Pakistan. The land mass of the District Bajaur lies at $34^{\circ} 58' 52''$ and $34^{\circ} 30' 31''$ North latitudes and $71^{\circ} 10' 17''$ and $71^{\circ} 48' 13''$ East longitudes. The total area of the district is 1,290 square kilometers with mountainous topography. The total population of the district is 1,093,684. The population density is $850/\text{km}^2$. The district is subdivided into seven administrative units (tehsils). The district has extreme climate due to its mountainous topography.

Methods and Materials

The following Primary and Secondary data was collected in order to achieve objectives of the study. This includes:

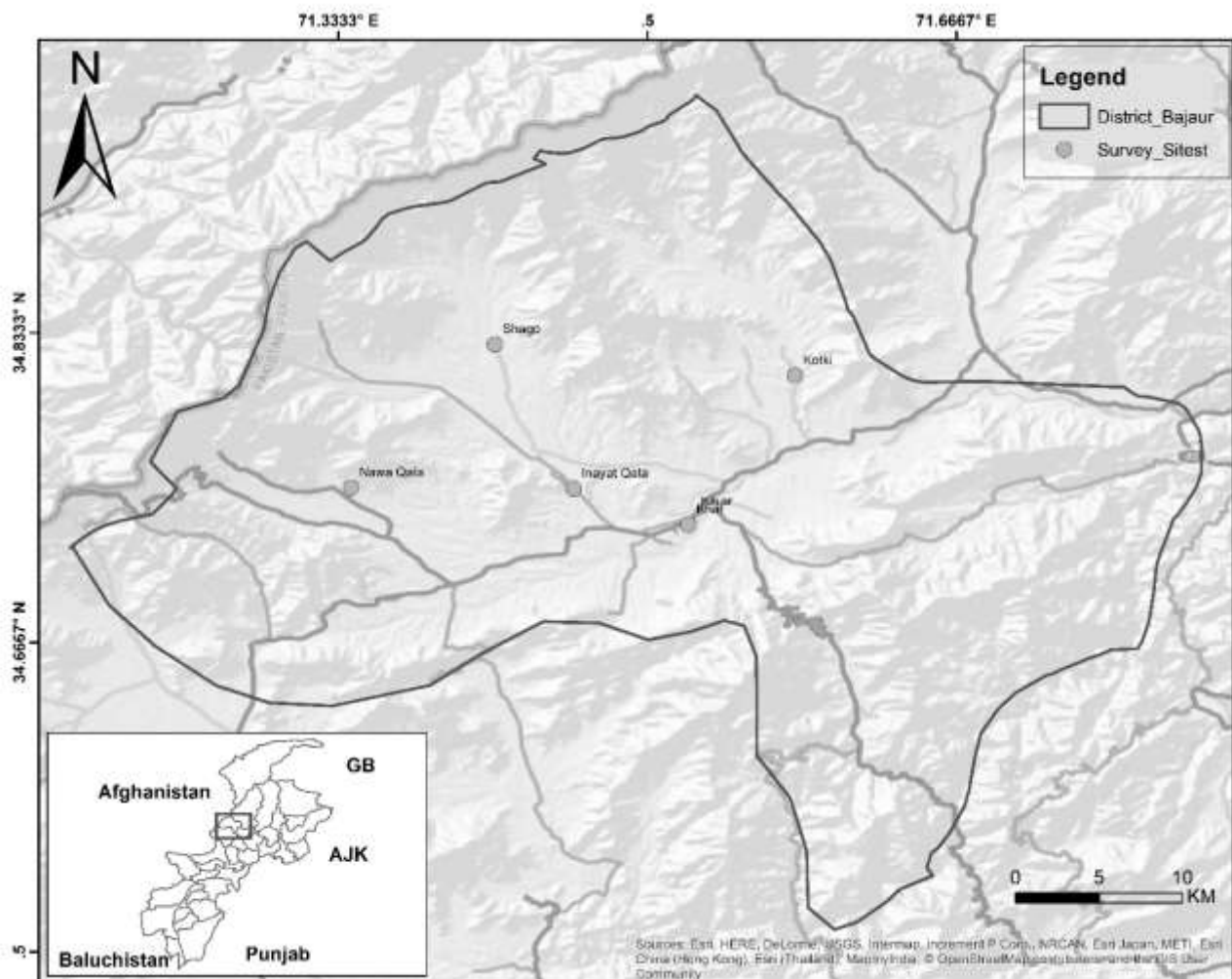


Fig. 2. Study location and sampling points**Primary Data**

In order to achieve primary data, a questionnaires survey was carried out to collect information about sanitation system and basic hygiene situation. The questionnaires were designed to obtain the Information related to Services and Sanitation Situation and the information related to Health and Hygiene of study area.

Sampling and Data Collection

The two-stage sampling procedure was followed. In first stage five villages (Fig. 2) were selected for the study among the total 59 villages of the study area. These included the villages of Khar, InayatQala, NawaQala, Shago and Kotkay. This constitutes 07 % sample size of study area (Table 1). In second stage, 100 households were selected randomly to collect information about sanitation system and basic hygiene situation. The breakup of households per village is underlined below.

Table: 1. Sample size (%) of study area

S. No	Name of Village	Total Population	No. of Houses	No. of Questionnaire	Sample Size (%)
1.	Khar Village	6748	712	50	07
2.	InayatQala	3410	341	25	07
3.	NawaQala	2615	233	15	06
4.	Shago	663	64	05	07
5.	Kotki	239	28	05	17
Total		13675	1378	100	07

Secondary Data

Literature review was done to achieve secondary data for this research study. The data and information were acquired from various sources including library, books, research journals, internet reports, thesis reports (published and unpublished), PHED reports and newspapers reports on the subject issue.

The data acquired was refined and analyzed to obtain summery findings in the light of the aim and objectives of the study. Computer program MS Excel is used for results presentation.

Results

The data and information obtained from the study is presented in graphs for discussion as outlined below:

Services and Sanitation

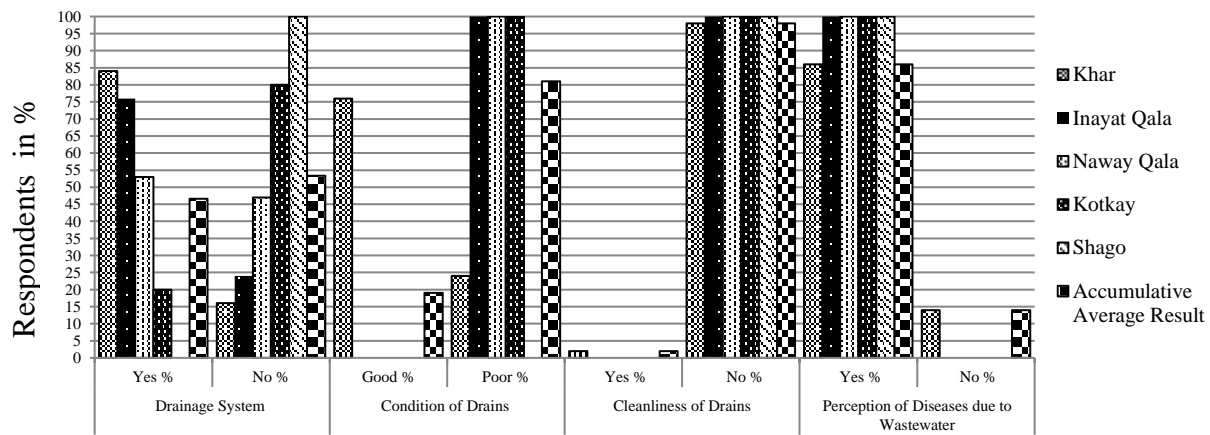


Fig-3. Availability of different sanitation services in the study area

The above mentioned figure shows that, in Inayat Qala 76%, in Nawa Qala 53% and in Kotkay 20% area has cemented drains. In village Shago, no cemented drains are found.

Status of Sanitation

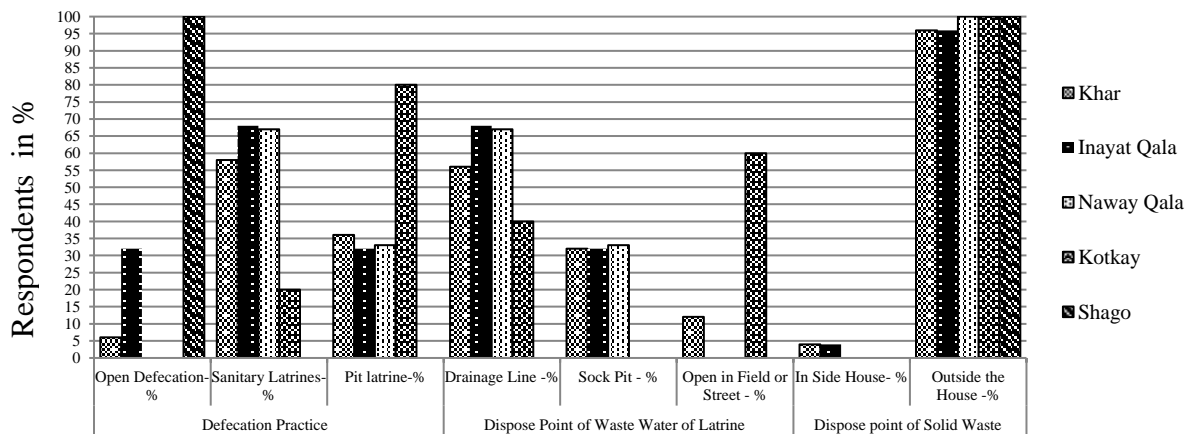


Fig-4. Status of Sanitation Situation

The above graph (Fig – 4) shows that, in majority of the study area, the latrine’s wastewater joins drainage line outside houses or discharged into agriculture fields. The habit of throwing household solid waste outside houses is common in the study area. In Khar 4% and in Inayat Qala, 3% of respondents throw/dispose the solid waste in agricultural field.

Health and Hygiene Situation

Drinking Water Pollution Effects and Drinking Water Sources

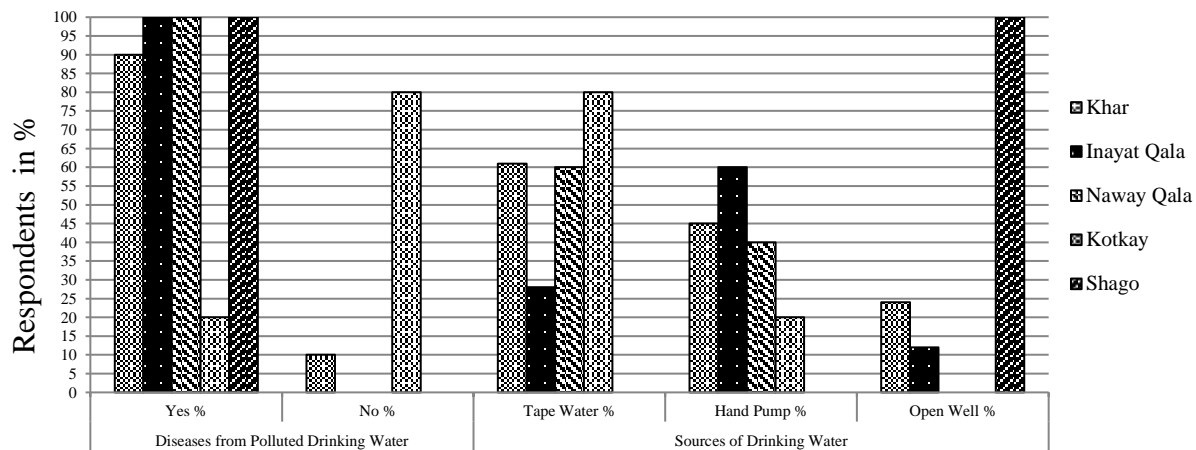


Fig-5. Awareness and Sources of Drinking Water

The above mentioned figure shows that, the highest ratio of using tap water is in Kotkay, which is 80%. In Khar area, 61% and in Nawa Qala 60% public uses tape water. The use of hand pump for drinking water is 60% in Inayat Qala. In Shago 100 % population uses water of open wells near their houses. In Kotkay, recently a private organization has established tape water system therefore, the tube well usage ratio is found high in Kotkay.

Diseases Common in the Study Area

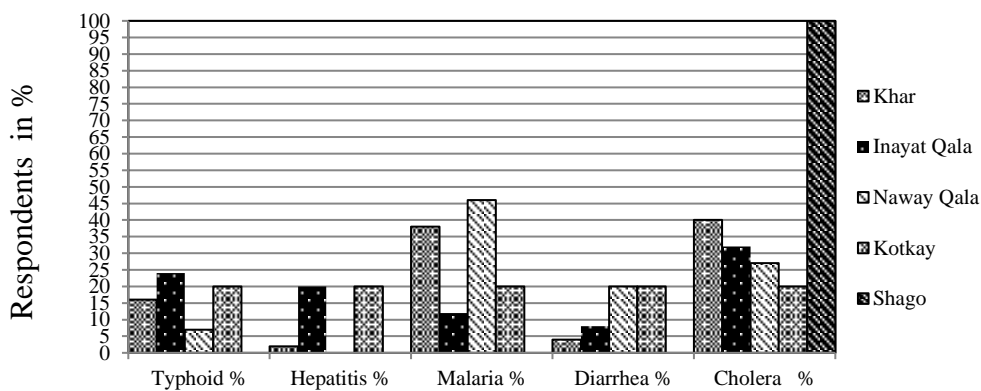


Fig-6. Diseases Common in the Study Area

The above mentioned figure shows that in Khar, the Cholera and Malaria is recorded as 40% and 38% respectively. In Inayat Qala, the Cholera was found as a common disease. In the village Shago, 100% respondents pointed out Cholera as the major waterborne disease.

Personal Hygiene and Healthy Practices

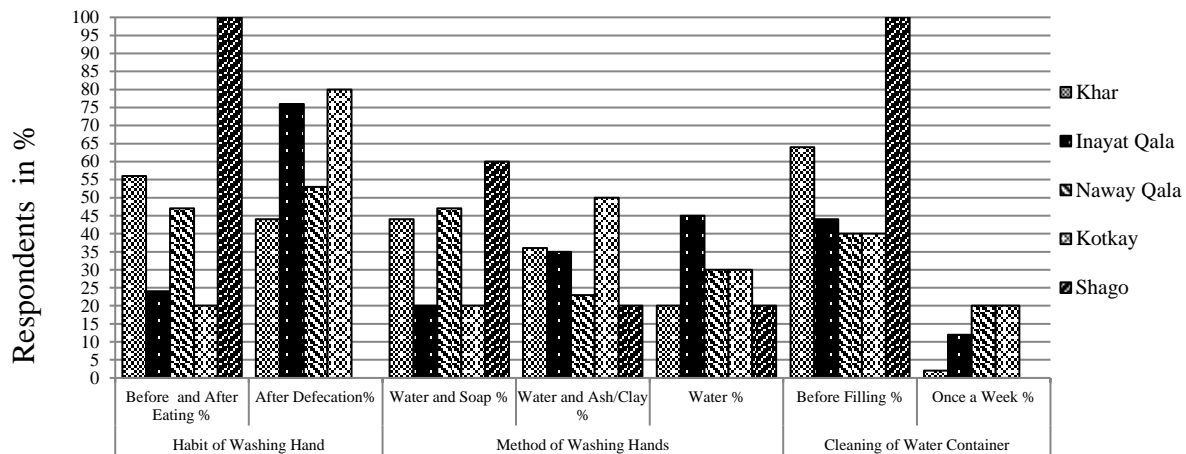


Fig-7. Hands' Hygiene and Healthy Practices

The figure shows that, the hands washing before and after eating food is highest (100%) in the Shago village. Recently an NGO has completed WASH (Water, Sanitation and Hygiene) project in above stated village, hence the ratio of hands washing is satisfactory there. The result for the assessment of hands washing with soap after defecation practice is highest (60%) in Shago. In Kotkay, 50% respondents use ash and clay for washing hands after using toilet/defecation. The use of ash and clay for washing hands is found as unhealthy practice in the study area. The Fig -7 also shows the washing of drinking water containers periodically and found as a suitable healthy practice.

Discussions

The study shows that overall condition of sanitation facilities in the study area is found unsatisfactory as below the WHO standard. However, the residents of the area voluntarily manage the cleaning of drains by themselves.

Defecation, Latrines' Wastewater and Solid Waste Management Practice: The using of sanitary latrines in Khar, which is the tehsil headquarter, is 56% while 31% uses pit latrines for defecation practice. However, in Kotkay, only 20% have sanitary latrine facility while in Shago, 100% population practices open defecation. Majority of public (>80 %) have awareness about the adverse health impacts of using polluted drinking water.

The Cholera remained the major disease in the study area during the last six months. Cholera is caused by contaminated drinking water, contaminated by the bacterium *Vibrio cholera*. Cholera is

transmitted through contaminated drinking water or food. Both children and adults can be infected (WHO, 2004).

Conclusion

The study concludes that, the surveyed area has no well managed system of sanitation, wastewater drainage and treatment. The drains in the study area are found in poor condition. The poor sanitation caused various diseases in the study area. The study revealed that most of the diseases recorded during the last six (06) months are waterborne. The open defecation is also practiced in the study area. In Khar, Inayat Qala and Nawa_Qala $\geq 58\%$ of population has access to sanitary latrine. In village Shago, 100% population practices open defecation. The tape water supplies for drinking in Khar, Inayat Qala and Nawa Qala is $\geq 60\%$. In Shago, 100% drinking water is obtained from open wells. In Kotkay, 80% people use tape water. In the villages of Shago and Kotkay, clay and ash is also used for hand washing.

Suggestions

The public health situation can be improved in the study area through various measures as discussed below:

1. Sanitation

- a. It is suggested that, cemented drains' network may be constructed for effective disposal of sewage and hence to help avoid seepage of the same into groundwater.
- b. Treatment mechanism for wastewater / sewage may be established in the study area. After its treatment, the same wastewater should be disposed to the nearby stream for agricultural use.
- c. Financial assistance may be provided to the community in study area for the installation of sanitary toilets inside their houses.

2. Services

- a. In order to control waterborne diseases, clean drinking water supply in the form of tape water may be provided in the study area.
- b. The use of household based purifiers/disinfectants i.e. chlorination tablets may be helpful in preventing waterborne diseases.

3. Strengthening the Line Departments

- a. The Local Government and Rural Development Directorate should be strengthened enough to ensure regular cleaning and maintenance of the drains in their respective areas.
- b. Solid waste management system may be established in the study area.

4. Public Awareness

- a. Awareness/education (through formal and informal means) for safe domestic hygienic practices i.e. use of safe drinking water, sanitation and cleanliness and regular washing of hands after defecation / use of toilets may be raised for the prevention of waterborne diseases.
- b. Education and awareness programs regarding personal hygiene, spread and communication of waterborne diseases and the related health hazards for the womenfolk may especially be organized to bring marked improvement in the household environment in the study area.

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Conflict of interests

The authors declare that there is no conflict of interests.

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