

## Socio-economic analysis of the interventions aimed at improving water and sanitation condition of rural community

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### Abstract

Present research has been aimed to assess the socio-economic analysis of the water and sanitation interventions made by the government in rural areas of District Abbottabad, KPK, Pakistan. A cross-sectional study design was employed to collect data from the relevant actors with the help of interviews, questionnaires and focus group discussions. Respondents were satisfied with the cost of the water delivery at home and the quality of water was also appreciable. Majority of the people described the strengthened pardha system (Privacy), as major advantage of the interventions. In terms of economic benefits by the interventions it was quiet good. But still top down approach is used for implementation of water supplies schemes and sanitation interventions by the government which is not satisfactory indicator for maximizing the benefits.

**Keywords:** Water and sanitation, Rural, Interventions, , socio-economic

### 1. Introduction

All over the world public and private organizations are working to increase the proportion of people with water and sanitation facilities by increasing and improving water sanitation interventions (Juliet & Sandy 2005). Safe drinking water and improved sanitation are the basic needs and also support a healthy life and deliver the concept of human development. There are several socioeconomic factors which addressed the obstacles for government sector to have successful water and sanitation interventions. Socioeconomic factors include income, customs, traditions, civilization, sense of community and other such factors (Thomas & Jurg 2002). Worldwide, water supply system (WSS) faced the problems of aging infrastructures and increasing costs of maintenance (Debon, et al., 2009). In 2004, the estimated global burden of diseases was 4% and 1.6 million deaths per year were attributed to unsafe (WSS), including inadequate personal and domestic hygiene (Pruss et al., 2002). While cost-effectiveness analysis is as of choice for resource allocation decisions in the health sector at present cost-benefit analysis remains the form of economic evaluation most useful for allocation of resources between activities by government-financed and within productive sectors (Richard et al., 1999). Forthcoming communities (or schemes) are to be prioritized according to adversity factors; a clear readiness to share the costs of water supply planning and development, and social and poverty factors (Bhattarai, 2005). Cost-benefit analysis is proving an all the time more important tool in the allotment of funds within different sectors including water supply and sanitation (Hutton & Haller, 2004). The human development is defined as “progress towards enabling all human beings to satisfy their essential needs, to achieve reasonable level of comfort, to live lives of meaning and interest, and to share fairly in opportunities for education and health” (Harris et al., 2001). Water is one of the most important natural resources and is the essence of life on earth. The availability of safe water and adequate sanitation is critical not merely for health reasons, but also for economic development (WHO & UNICEF, 2010). For every development there are several approaches and theories which become practices. As water and sanitation sectors are too broad but these are also indicating the development from grass root level. Development in terms of sustainable when it addresses the real solutions for the environmental protection and the future (Fewtrell & Colford, 2005). Rural development is the basis for sustainable development as it is a bottom up approach. It is of focal interest and is widely acclaimed in both the developed and developing countries of world. The lack of water infrastructure for the poor tend them to buy water from water-vendors at high per liter prices, walking long distances and waiting in long queues at public sources, and/or incurring additional costs for storing and boiling water (Khan & Javed 2007). Here the research focuses on socio-economic analysis of water and sanitation intervention in terms of cost benefit analysis which obviously refers to rural development on the basis of economic development. With increasing water scarcity, it is essential to view water allocation and distribution in rural areas from the basin perspective (Fonseca et al., 2010). Traditionally, in the water sector, much of the focus on rural development has been aimed at individual systems or communities. This focus has to change to cope with wider issues of competition for water, particularly for water of good quality (Molden et al. 2001). Looking at water from a basin perspective means that we have to look not only at water supply and demand for all users but also at

institutional issues involved in the provision of services. So the objectives of present research are to study the social and economic impacts of water and sanitation interventions, to study the status of current water and sanitation interventions and to conduct cost and benefit analysis of water and sanitation interventions.

## **2. Material and Methods**

### **2.1 The nature of research (Ontology)**

Water and sanitation intervention are under the rural development. As people are reluctant to adopt the methods for the technology. Being the research study as in ontological approach it is imaginary in terms of people perceptions, thoughts and feelings. It is true that then presence of invisible things are of not too importance. Ontological approach is more focusing on the objective reality rather than subjective. The research study is both objective and subjective reality. As the social and the economic analysis is based on the perceptions and attitude of the people. Beside these the in terms of quantities the cost of the projects will include. The research study cover the both qualitative and quantitative.

### **2.2 Research Design**

A cross-sectional study design was applied to collect the data from the field. This design is best suited to ascertain any problem, an ongoing process, situation, problems, attitude or issue, by taking a cross section of the population. These studies are useful in representing an overall picture of the situation prevailing at that nick of time at which contact is being made with the study community (Babbie 1989: 89). These studies are economical to conduct as only one contact is usually made with the study population and analyses are also easy (Kumar 2008: 95). It is a general notion that cross-sectional studies are unable to catch the changes occurring in the behaviors of the people, but in this case the shortcoming was coped by the fact that responses of the people towards an already completed project were to be recorded and also there was a possibility of making more than one contacts with the same respondents if needed after some length of time.

### **2.3 The study area**

Abbottabad is a city located in the Hazara region/division of Khyber Pakhtunkhwa province, formerly NWFP, of Pakistan. The city is situated in the Orash Valley, 150 km north of Islamabad and 200 km east of Peshawar at an altitude of 4,120 feet (1,260 m). The city is well-known throughout Pakistan for its pleasant weather, high standard educational institutions and military establishments. It remains a major hub for tourism of regions in Khyber Pakhtunkhwa, Gilgit-Baltistan and Azad Kashmir in the summer.

### **2.4 Socio-cultural and economic status of the area**

For the research purpose the selected rural areas of district Abbottabad are village Mir Pur and Banda Pir Khan. The population of the village Mir Pur is about 12000-15000. Banda Pir Khan has population of 5000. Total population in union council Banda Pir Khan is 43900. Banda Pir Khan has an area of 33136 Kanals and 13 Marlas (Patwar Khan) (TMA, 2008). There are different wealth rankings in the both rural areas; Rich, middle class and poor. Majority people based on the agricultures for their livelihoods. Rich class having lands and tenet to look after.

### **2.5 Water supply, sanitation and hygiene of study area**

In terms of water and sanitation there are facilities provided by government in both rural areas. In Mir Pur there are two WSS one is on spring water implemented in 1994-95 by Shamroz Khan Jadoon Ex-MPA (PPP). Second is on tube well also by the same person. In terms of sanitation services cemented streets, drainage system, waste water disposal and vector control are there. In rural area of Banda Pir Khan there are three WSS. One is in Kundian, Kalsa, Upper Kalsa, Maira and Banni.

### **2.6 Important stakeholders and their roles**

The research study is based on qualitative and quantitative data. As the socio economic conditions of the rural area were observed and cross checked by data collection tools like interview schedules, focus group discussion and diary method. The important stakeholders were the people from the community, key informants, Imam Masjid, Nazim, chairman etc. In terms of collecting secondary data the people from different departments like engineers, SDO, doctors, and union council secretary etc.

## 2.7 Selection of Sample

Sample size selected from the population by applying proportionate random sampling technique which has mentioned above.

**Table 2.1** Total and sample house holds

Village	Total HH	Sample HH	% in total
Mir Pur	1000	49	23 %
Banda Pir Khan	3500	173	77 %
<b>Total</b>	4500	22	99 %

In Table 1 there were two villages selected in district Abbottabad, KPK. Total House Holds were 4500 in both villages, as 1000 in Banda Pir Khan & 3500 HH in Mir Pur. Total sample HH were 222, as 49 HH from Banda Pir Khan & 173 from Mir Pur. In terms of percentage the total 99% HH, in which 23 % from Banda Pir Khan & 77% from Mir Pur. The reason for this selection was the samples were selected proportionately with random sampling to make each and every sample representative for the whole population and it has been done on the basis of statistical calculations. The selection of proportionate random sampling from both rural areas as Mir Pur & Banda Pir Khan as in terms of male and female presented in the Table 2.

**Table 2.2** The selection of proportionate random sampling

Gender	Village Banda Pir Khan	Village Mir Pur
Male	42	153
Female	07	20

Further categorization of the samples as in terms of Male and female, total sample was 222 HH as 173 from Mir Pur in which 153 were male and 20 female.

Whereas in Banda Pir Khan total sample HH were 49, in which 42 were male and 7 were female.

## 2.8 Data Collection

For the purpose of data collection the required primary data was collected directly and indirectly from the respondents in the field. Different tools as described below were employed to gather the required data.

## 2.9 Field surveys, participant observation and personal observation

Transact walks of the study villages with the individual of the community and in alone enabled to personally observe the living conditions of the people in study area, occupations of local people, education and awareness level, available facilities like health centers and schools. A systemic walk with the local of the area observed, asked, listened and discussed the resources is very helpful in seeking the problems faced by the people, solutions sought for them, and opportunities available (Chambers, 1992).

## 2.10 Interview Schedule

Interview schedule designed for community aimed to address six major aspects; demographic characters (gender, age, profession, caste) of respondent; water and sanitation facilities in study villages. Questions were asked in local language (Hindko) for the ease of community. Being local the researcher found no difficulty in interacting with the respondents and to minutely observe the behavior and actions of the respondents shown in terms of the gestures. The interview schedules comprised of both open ended and closed ended questions, and the interview conduction was an interactive and continuous process as questions were continuously redesigned throughout the research work so as to incorporate the deficiencies.

### 2.11 Cost Benefit Ratio (Formula used) for water and sanitation interventions

For the purpose of cost benefit analysis to calculate the benefits in terms of quantity was too difficult as it was very important to calculate the benefits for the whole population.

$$CBR = \frac{\sum_{I=t}^n Ct / (1+i)^t}{\sum_{I=t}^n Bt / (1+i)^t}$$

From the above formula there were several variables both dependent and independent. As

‘t’ represented the Time in years. For this purpose a time of 10 years, was taken from the secondary data as the useful life of the project in documents. Interest Rate represented by ‘i’ (Standard interest rate=10% which was given). Cost was represented ‘C’ and it was also given in secondary data of PHED (Public Health and Engineering Department). Benefit represented as ‘B’ and estimated benefits by the government plus estimated by the community as the bases of labor cost per day multiply time saved.

## 3. Results and Discussion

### 3.1 Socio-economic profile of the respondent House holds

In both selected villages areas of District Abbottabad of 195 male respondents 60% were above 50 years of the age and the rest 25% were between 30-50 years and 15% were between 18-30 years. 12 % of the female respondents 7 % were of 30-45 years and 5 % were above 50%. Majority (97%) of the HHs was male headed and very few (3%) were female headed. Education level among the respondents (both male and female) was very low; 45 % of the respondents had no formal education, 30 % were matriculate , 5% were having primary level education and 8 % were Bachelors and rest of 12 % were intermediate education. Majority (60%) of the HH members were young in the age group of 11-30 years. After having this much formal education a child has to contribute in the bread earning activity.

### 3.2 Wealth ranking of the community

For the purpose to assess the economic profile of the both villages as village Mir Pur and Village Banda Pir Khan an income level among different classes mentioned in Table 3.

**Table 3.1** Economic profile of the both villages

Class	Avg. Income/Day (PKR)	Avg. Income/Hr (PKR)
Rich	1584	198
Middle	792	99
Poor	444	56

### 3.3 Water sanitation interventions

In selected rural areas of District Abbottabad as village Mir Pur and Banda Pir Khan the water and sanitation interventions were hand pump, overhead tank, water supply system and tube well. In both villages the following percentages were collected; 13 % hand pumps, 10 % overhead tank, 60 % WSS and 17 % tube well. The availability of drinking water in the both rural areas is not sufficient. Of this total 60% of WSS water availability in village Mir Pur was 37 % and 23 % in village Banda Pir Khan. The required information was based on personal observations, participant observations, interview schedules and secondary data. Beside this the physical status of water interventions was not good enough. On the other hand Sanitation interventions are too less in the both villages. As solid waste management 3%, waste water disposal 20 %, pavement of street 35 %, Flood protected wall 21% and sewerage system 21 %. By this it is clear that in terms of sanitation interventions the leading intervention is pavement of street. The status and availability of sanitation interventions was not satisfactory as to fulfill the

sanitation needs. By the field survey and discussions with the respondents a trend has been shown by the population that people have not enough awareness about the sanitation.

### 3.4 Daily water demand

Water supply system interventions were implemented to fulfill the daily demand of the population. Estimation was calculated on the basis of the settled parameters of PHED, Abbottabad like population at 7 persons per house, 15 gallon per head per day is settled parameter of public health and engineering department. The calculations just made in terms of adding HH and population of the study area. So as a result total daily water demand for village Mir Pur was 262500 gallon/day. By adding the total daily demand of the both villages as Mir Pur was 262500 gallon/day and Banda Pir Khan was 15000 gallon/day, so it was as 277500 gallon/day. The problem of water availability got even worse when came some event like marriage or some other gathering occasions. People had to bring water from the city on tankers by spending some money (PKR 500-1000)

### 3.5 Social impacts of the interventions in community's view

Majority of the people described the strengthened Pardha system, as major advantage of the interventions. As 53% were of favor that due to interventions Pardha system has strengthened. The reason for this response was that these villages were tribal and religious. Before the interventions women used to fetch the water so the Pardha system was not too good. Generally the health conditions of the male members of the area were good but the females and children suffered frequently from diarrhea, flu, and fever. The elderly people claimed the prevalence of diseases as the will of God. When the role of water quality, sanitation and hygiene was discussed in connection with good health, majority (90%) of the people expressed that ground water quality is always good and that the presence of latrines has a very little effect on the health.

### 3.6 Economic Impacts of Interventions

The behavior of the respondents was little bit diverse the reason for this behavior is people just thinks that everything which is implemented by the government is of no worth and benefits. At this stage time consumed as a researcher during interviews was too more to clear the real facts concerned to the interventions benefits. According to the personal observations first they did not like to discuss the any thing which favors the government interventions and benefits of the interventions. But after too much struggle some information has gathered. It was enable to get a clear idea and cross check of required information. Beside this other economic benefits in terms of electricity bill reduced up to 16 % the reason for this before people were used electric motor for water fetching. Income increased 6 %, some of people were permanent employee for the WSS for the purpose of operating and maintenance.

### 3.7 Cost benefit analysis of water and sanitation interventions

Costs of water and sanitation interventions were acquired from concerned departments as secondary data. Water and sanitation interventions were implemented and a huge cost was invested. The given analyses presented here the different from previous economic analyses of water and sanitation by focusing mainly on rural settings. In the developed country settings the health benefits of improving the management of small and very small systems are more important than the costs. (Paul et al., 2009). Cost benefit analysis for water and sanitation interventions has shown in Table 4 with the relation of socio-economic impacts of water intervention as there were socio-economic factors which were contributed as research gaps.

**Table 3.2** Cost benefit analysis for water and sanitation interventions

<b>Intervention</b>	<b>Avg. Cost /Mean PKR</b>	<b>Time (t)=</b>	<b>Interest Rate (i)=</b>	<b>Estimated Benefits PKR</b>	<b>Cost Benefit Ratio</b>
<b>Water</b>	1852020/-	10 Years	10%	902457/-	2.32
<b>Sanitation</b>	88000/-	10 Years	10%	91025/-	0.96

According to CBR (Cost Benefit Ratio) rules for water supply system the project was not feasible because the value calculated was more than 1 while CBR for sanitation interventions was calculated as 0.96 which was remain less than 1. So according to CBR rules the project was feasible because the value calculated was less than 1.

### 3.8 An overview of the discussion in relation to theory

As a whole the research study gets the point where the gaps meet. Government has implemented water and sanitation interventions but ignoring the grass root level realities. According to the theory of development the social transformation as government has implemented water and sanitation intervention as economic development in terms of adequate water quantity and saved time. According to Marx production can be increase by improving techniques and adopting new technology it is true but the theory here proving government strategy false because government still used top down approach for implementation of interventions without knowing the socio-economic factors. The modern technology is good enough but the method and practices were not appropriate to the society. Theory focuses on if exogenous culture will apply on endogenous culture so it will disturb the endogenous setup.

## 4 Conclusions

In terms of water and sanitation worldwide, water supply systems facing problem of infrastructures and increasing maintenance costs. The socio economic condition due to different water and sanitation interventions varies due to area, culture, and the nature of the interventions. As according to the theory of sociological dualism the people are reluctant to adopt the new methods of technology provided by policy makers or government sector. The reasons for this as due to different social groups were playing different roles to influence the community perceptions. About half of the respondents satisfied with the operation & maintenance of water supply system. The social aspects were too clear to explain as time saved by the interventions is a beneficial indicator for development. The current status of the interventions was quiet satisfactory according to personal observation and transit walk. As a cost benefit analysis of the interventions the benefits which has influenced the positive change like time saved, appropriate time utilization for economic activities, money saved by interventions and improved standard of life with adequate health.

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