

# Environmental Health and its Impacts on Mental Health and Health-related Quality of Life in District Bannu: A Cross-Sectional Study

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## Abstract

**Objective:** To determine the effect of environmental health parameters on mental Health in District Bannu.

**Methodology:** A cross-sectional study was conducted in district Bannu from October 2015 to March 2016 by using a Two-stage stratified cluster sampling technique. The total sample size was 548 households. The dependent variable was Mental Health, and independent variables were Environmental health status (water, noise and odor), age, marital status, education, socioeconomic status, occupation and smoking. Proportions were compared by applying the chi-square test. STATA 13.1 was used for analysis.

**Results:** This study consists of 548 household. Adults from 314(33.91 house hold) from urban areas and 612 (66.09) from rural areas, across district. Age was having significant association with physiological wellbeing (P value = 0.07). Females showed significant sleep disturbance due to noise (P Value= 0.008) while in male it was not significant (p Value 0.06). Smell (odor) also has an impact on the participant's residence areas. Male were more affected (P. value 0.01) compared to females (P. value 0.48). Rural and urban both areas showed significant association with water satisfaction (Value 0.006). The mean GHQ score is 21.13 (SD ± 6.7) which shows a severe mental health problem and physiological distress in adult household occupants of district Bannu.

**Conclusion:** The problems occurring to mental health due to environmental factors are more in Pakistan especially in District Bannu compared to other countries. Environmental factors such as water, noise and smell has a greater impact on the mental health of the people living in the District Bannu.

**Key Words:** Mental Health, Environmental Health, Water, Odor, Noise

## Introduction

The term Environmental health used by the World Health Organization encompasses all the factors acting on human health which may or may not have direct or indirect consequences. In a human-friendly environment, mental health grows in a better way leading to an excellent productive life. While in a bad environment the affectivity and productivity is disturbed. When a human being is exposed to psychological stress or any pathological trauma due to chemicals, or radiation, brings more and more sufferings sometime these are more visible while sometimes less felt and minimal looked. Exposures to bad environment bring changes in normal fitness and well-being of the physical and mental Health. So the environment both

individually and collectively is affected.<sup>1</sup>

World Health Organization defined the environmental health services as "services which covers environmental health policies through complete supervision and monitoring with the aim to control all the impacts on human health."<sup>2</sup>

This study focusses on the impacts of environmental health, like water noise and odor. All these three variables have negative impacts on mental health causing damage and loss of productive life. Use of Unsafe water for drinking and bathing purpose can inflict intense dangers to human health.<sup>3</sup> Groundwater also give rise to various infections as they are prone to contaminations from sewage and garbage. Water used for agriculture purpose is also dangerous and off course a big threat to human health.<sup>4</sup> The recent statistics regarding the European commission' (EC)

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states that the overall 20 percent surface water is badly contaminated and polluted globally.<sup>5</sup> So contact with such water brings a strong annoyance, and sometimes may lead to psychiatric hospitalization. Noise has a strong unacceptable sensation to human population. The main effect due to noise is bitterness, unpleasant feeling, and feeling of uneasiness. Most of the people's faces strong internal and external problems due to exposure to noise. Noise badly affects the individual health and brings stress at all level causing serious sleep disturbance. Noise often affects all the human systems but most particularly the cardiovascular system.<sup>6</sup>

The serious complication of noise is panic disorder, like post-traumatic stress disorder (PTSD), certain types of phobias and anxiety are developed.<sup>7</sup> Most of the researchers has worked on involvements of individual health affected from noise in markets, public areas and traffic horns but some researchers have worked on the individuals using ascertain type of Residency in which the sound is echoed. This was done to know its relationship of such noise with mental health.

Most of research studies have revealed that there is a positive relationship between the index of crowding, number of people per room, and psychological distress. Indices of crowding measured in the aggregate such as people per census tract bear little relationship to mental health outcomes.<sup>8</sup> Numerous other substances like mercury, manganese and organic solvents produce neuro psychiatric signs and symptoms which include anxiety, loss of memory and irritability.<sup>9</sup> There is a sense of emotions and lack of control over one's mind. Also there is a feeling of loneliness along with pessimism and fatalism. In some instances, post worrying strain ailment may develop in Human being.

Odor is also a big problem in our society as there is no proper arrangements of sanitation. So the domestic wastes and even the industrial wastes lying improperly is a big threat to human population. These wastes in turns contaminates the water cycle. So brings a threat to humanity.<sup>10</sup>

As environment is regarded as one of the important contributing factor affecting health, this study is aimed to assess the burden on human mental health due to environmental factors. This report may highlight environmental health issues in the province and design a road map for solving them. The main objective of the study was to determine the effect of environmental health on mental health of adult population at district Bannu.

## Materials and Methods

This was a Cross sectional study. It was conducted in district Bannu Khyber Pakhtunkhwa. Study was completed in 6 months from 1st October 2015 till 1<sup>st</sup> March 2016.

The sample size was calculated by using the WHO calculator. The value of Z and the value of standard normal deviation was calculated. Considering the Z value at 1.96 at 95% confidence interval. The value of  $\alpha=0.05$ , the total sample size was 548 (Households). Two-stage stratified cluster sampling was used. The sampling frame consisted of 25 enumeration blocks of city regions and 170 villages of rural areas. The primary sampling units (PSUs) were sampling areas from the sample frame which consisted of 7 PSUs from urban areas and 29 from rural areas; making PSUs of a size of 35 numbers. Secondary sampling units (SSUs) were based on an actual listing of each PSU by trained field staff; 12 households (SSUs) were selected from each urban PSU, making an SSUs (households) of 84 from city region and 16 households (SSUs) were selected from each rural PSU, making an SSUs (households) of 464 from rural areas. This was a final sample size of 548 households.

The data was collected from all adult occupant households regarding environmental health status and mental health status by trained data collectors.

The Inclusion criteria was Adults whose age was 20 or above 20 years (Both male and female) while those who were absent at the time of data collection were excluded. The study was conducted after approval from, ASRB and ethical committee. All the information were recorded in designated Performa. Five hundred and forty-eight households were interviewed, in order to find out the relationship between dependent variable (Mental health) and Independent variable (Environmental health (water, noise and odor) and its impact on mental health). General health questionnaire (GHQ) proforma was used.

Its score range was 0-36. Score < 15 evidence of normal and >15 shows proof of distress. Score >20 suggests serious problems and psychological distress. Ethical approval was taken from ethical committee of KMU. Data entry, cleaning and analysis was done in STATA version 13.1. Descriptive statistics with numbers and frequencies was used to report on frequencies and percentages. Proportion was compared by means of Chi Square tests. The dependent variable was Mental health (1- Yes, 0-No) while Independent variables were environmental health factors (water, noise and odor) age, marital status,

education, socioeconomic status, occupation, smoking status.

## Results

A total of 548 adult occupant households were interviewed regarding environmental health status and mental health status by trained data collectors in District Bannu. All the respondents were interviewed after taking verbal consent and informing them about the purpose of the study.

Table 1 describes the socio-demographic characteristics of adult households. Of a total 548, half were male (50.88%). Majority were from rural areas (66.09%). In males 91.40% while in females, 96.08% were married.

| Gender                       | Frequency | Percentage |
|------------------------------|-----------|------------|
| Male                         | 464       | 50.88      |
| Female                       | 448       | 49.12      |
| <b>Residential Area</b>      |           |            |
| Urban                        | 314       | 33.91      |
| Rural                        | 612       | 66.09      |
| <b>Marital Status Male</b>   |           |            |
| Married                      | 340       | 91.40      |
| Unmarried                    | 28        | 7.53       |
| Separated/Divorced           | 4         | 1.08       |
| <b>Marital status Female</b> |           |            |
| Married                      | 392       | 96.08      |
| Unmarried                    | 12        | 2.94       |
| Separated/Divorced           | 2         | 0.49       |
| Widowed                      | 2         | 0.49       |

Mean age was 41.90 having St Deviation 13.6 while mean monthly income was 18841.71 ± 12771.6 and GHQ was having mean score of 21.13 with 6.7 St Deviation.

| Variable           | Mean     | Standard deviation |
|--------------------|----------|--------------------|
| Age                | 41.9     | 13.6               |
| Years of Education | 10       | 4                  |
| Happiness          | 2.97     | 0.7                |
| Sleep Disturbance  | 2.13     | 2.5                |
| Noise disturbance  | 2.47     | 2.4                |
| Smell Disturbance  | 2.41     | 1.3                |
| GHQ Score          | 21.13    | 6.7                |
| Monthly Income     | 18841.71 | 12771.6            |

Table 3 summarizes associations of Psychological well-being among different age groups.

| Age                | Normal    | Slight disturbed | Physiologically disturbed | P. Value |
|--------------------|-----------|------------------|---------------------------|----------|
| 15-25 years        | 2 (3.45)  | 50 (86.21)       | 6 (10.34)                 | 0.07     |
| 26-35 years        | 10 (4.35) | 172 (74.78)      | 48 (20.87)                |          |
| 36-45 years        | 10 (4.03) | 178 (71.77)      | 60 (24.19)                |          |
| 46-55 years        | 4 (2.25)  | 110 (61.8)       | 64 (35.96)                |          |
| 56-65 years        | 4 (2.99)  | 90 (67.16)       | 40 (29.85)                |          |
| 65 years and above | 2 (3.13)  | 40 (62.5)        | 22 (34.38)                |          |

| variable                                  | Levels |             |            | P value |
|---|--------|-------------|------------|---------|
| Sleep disturbance due to noise in females |        | Normal      | Disturbed  | 0.008   |
|   | Urban  | 126 (94.74) | 7 (5.26)   |         |
|   | Rural  | 210 (85.71) | 35 (14.29) |         |
| Sleep disturbance due to noise in males   |        | Normal      | Disturbed  | 0.06    |
|   | Urban  | 128 (87.67) | 18 (12.33) |         |
|   | Rural  | 263 (92.93) | 20 (7.07)  |         |

The above table shows that sleep disturbance due to noise is not significantly associated with Residence area having P. values of 0.06 and 0.008 while physiological disturb participants in category of 46-55 were more prevalent 64(35.96)

Table 5 shows significant association (P.value 0.01) of smell disturbance with residence area in males. The males were highly disturb in the urban area 31 (23.13) as compare to rural area 35(13.31) while no significant association of smell disturbance with residence area in females.

| Smell disturbance comparison in rural and urban areas in Male    | Not disturbed | Disturbed   | p-value |            |
|--|---------------|-------------|---------|------------|
| Urban  | 103 (76.87)   | 31 (23.13)  | .002    |            |
| Rural  | 228 (86.69)   | 35 (13.31)  |         |            |
| Smell disturbance comparison in rural and urban areas in Females | Not disturbed | Disturbed   | 0.48    |            |
|  | Urban         | 92 (62.88)  |         | 19 (17.12) |
|  | Rural         | 160 (79.60) |         | 41 (20.40) |

Figure 3 shows that there is significant association between residence area and water satisfaction with a P value of 0.006.

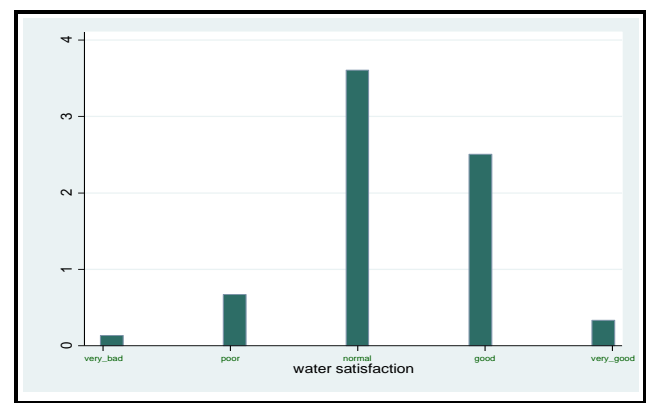


Figure 3: Water satisfaction in rural and urban area of Bannu

## Discussion

This research had two main objectives: the first one was to determine the environmental health status in terms of water, noise and odor of adult population in district Bannu and the second objective of the study was to assess the effect of environmental health status on the mental health of the adult population in district Bannu. The sample collected in this study shows that 548 adult households 314(33.91) from urban areas and 612 (66.09) from rural areas were interviewed in district Bannu. The main reason for including descriptive statistics is to evaluate and show some characteristics of the data at the simplest level. In the study, it was found that the mean age of the participants both male and female was 41.90 with a standard deviation of 13.6 while 18841 was its means monthly income.

Among participants 464 (50.88) were male and 448 (49.12) were female. Age group 36-45 was having significant association with physiological wellbeing of having P value of (0.007) while age group 15-25 showed less association. Females showed significant sleep disturbance due to noise with a P-Value of 0.008 while in male it was not significant with a P-Value of 0.06.

Smell (odor) also has an impact on the participant's residence areas; in this study male were more affected (P. value 0.01) compared to females (P. value 0.48).

Rural and urban both areas showed significant association with water satisfaction. In this study all of 548 households completed the mental health questioner.

The mean GHQ score is 21.13 with St. Deviation of 6.7 which shows a severe mental health problem and physiological distress in adult household occupants of district Bannu. (Score >20 suggests severe problems and psychological distress)

This result is almost similar to that of study done in U.K in which mental health problem is poor but lower than our study.<sup>11</sup>

Residence areas whether urban or rural have an impact on mental health as our finding suggests that mental health problem is associated with residence area which shows a similar result to that of a study done by Halpern in London who highlighted the significance of residence participation in the planning process and in particular in relation to aesthetics where you live.<sup>12</sup>

In my study noise is associated with sleep disturbance having P. value 0.008 which is similar to other studies which shows uncontrollable noise can induce sleeplessness.<sup>12</sup>

**Study Limitation:** As this is a cross-sectional study so causality between the compare variables cannot be developed. To found a temporal relationship, it is more appropriate to do follow up study. The finding of this study cannot be generalized to any other setting.

**Study Strength:** This is one of its first kinds of study to address the Environmental health (water, noise and odor) and its impact on mental health of adult population at district Bannu. Sample size was large enough, which was scientifically calculated. Association was found through Chi square test. Statistical package STATA was used. Proper ethical approval was taken.

## Conclusion

Our study concluded a severe mental health problem and physiological distress in adult house hold occupants of district Bannu (Score >20 suggests severe problems and psychological distress).The results also conform that mental health problem due to environmental factors is more in Pakistan especially in District Bannu as compared to other countries.

**Recommendations:** Since it is broadly understood that environmental factors such as water, noise and smell has a great impact on mental health on general population. Our studies focusses on this issue and revealed an associations between the dependent and independent variables. This study recommends to pay close attention to this issue. The findings showed that a considerable proportion of people in Bannu have GHQ score of 21.13 which shows a severe mental health problem and physiological distress in adult household's occupants of district Bannu. To improve mental health, it is suggested that law enforcement for waste management to reduce smell, and noise control etc. through more public education should be enforced on priority basis.

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