

GROUND WATER QUALITY AND CONTAMINATION BY PIT LATRINES IN DAWAKI WARD OF BAUCHI LGA OF BAUCHI STATE

***BALA, SAGIR MADAKI; *ASHIRU SABIU YUSUF; & **YAHUZA SHEHU**

**Department of General Studie, Federal Polytechnic, Bauchi*

***Department of Leisure and Tourism, Federal Polytechnic, Bauchi.*

ABSTRACT

T*his study is designed to assess the effect of ground water pollution by pit latrines and the health implication of the coliform counts in drinking water of the study area, as well as examine the possible remedies to the problems arising from these environmental hazard and recommend possible solution to the established problem. The study area Dawaki Ward is an integral part of the Bauchi Metropolis; located at the city centre, The sources of water to this area are the pipe borne water and ground water from hand dug wells. Water samples were collected from hand dug wells using systematic sampling technique. The membrane fitter*

Introduction:

Water is absolutely fundamental to life. It is difficult even to have a form of life that might exist without water. From human civilization, people have settled close to water sources, along rivers, lakes, or where water is normally available for drinking and other uses such as irrigation, livestock husbandry etc. However, this does not imply that the availability of water sources is convenient and sufficient in quantity, safe

technique was used with the EMB Agar as the medium of growth for bacteria and the faecal coliform counts were determined. Due to poor supplies, the inhabitants rely heavily on hand dug wells. Pollutants from the domestic wastes disposed indiscriminately coupled with improper physical planning and very close distance of pit latrines to hand dug wells and coupled with bad sanitary condition of the sampling points, faecal materials continue to seep into the hand dug wells thereby polluting the well water or poses threat to the ground water quality.

Keywords: *Contamination, Pit Latrines, Ground Water Quality, Dawaki Ward, Bauchi State.*

and wholesome. The need for water is not only determined by the quantity required for certain purposes but also characterized by the requirement for quality of materials that have dissolved or suspended in it. Also the quality requirement is a function of intended use. (Richard, 2007).

According to Cathrine (1989) pollution of ground water from different sources by wastes as a result of human activities constitute one of the most difficult and complex problem in ground water management. So, implementation deficiencies of existing laws make protection of ground water sources from domestic sanitary system unsafe. The efficient infiltrates the ground and sooner or later percolates to aquifers. Thus, the performance of pitlatrines and soakway depend primary on the ability of the soils and rocks in which pits are excavated to accept and purify the effluents (Cathrine, 1989). The only way of understanding whether domestic sanitation practices (i.e pitlatrines, soak ways, unlined gutters, refuse dumped) are potential ground water (especially shallow ground water) pollution hazard and consequently a health hazard is by monitoring

the environmental effect of the system as well as analysis of the effects.

Water has a great effect on human health both as a means of body hydration, reducing diseases and a medium through which disease-causing agents may be transmitted. The negative impact of water on health is principally derived from the drinking of water containing pathogenic organisms and the use of inadequate volume of water that leads to poor personal hygiene.

The term "Ground water" is referred to the subsurface water that occurs beneath the soil and geological formation that are fully saturated. The subsurface water is divided into deep and shallow water sources. Shallow water sources are abstracted through tube wells or dug wells. Tube wells are mostly used for irrigation purposes while hand-dug wells are widely used domestically (Richard, 2007). In Dawaki Ward of Bauchi Local Government Area where this research was conducted, the State Government attaches great importance to water supply for drinking and other domestic uses, but due to rapid population growth and financial constraints, this objective cannot be attained as such many people in the study area are compelled to rely solely on using hand-dug wells water for drinking and.

Carl, et al, in 1994 proclaimed a statement from WHO report that about 4.2 million children under the age of 5 years have diarrhoea disease largely as a result of poor sanitation and contaminated drinking water. They said further that infectious diseases linked to water are the third leading causes of productive years lost to morbidity and mortality in developing countries.

This statement with sanitary condition of DAWAKI Ward has triggered the interest to the research to investigate and analyse the effect of ground water pollution by pit latrines.

Aim

The aim of this study is to assess the effect of ground water pollution by pit latrine.

Objectives

- i. To examine possibility of pollution of hand dug wells by pit latrines.
- ii. To assess the level of pollution of hand dug wells by pit latrines
- iii. To examine the health implication of this pollution to the general public.
- iv. To recommend possible solutions to the established problem.

SAMPLING TECHNIQUE

Systematic sampling was used to select samples using pre-determined interval in the streets. For example the sample size was 5 wells per street with bad sanitary condition and 2 wells per street with good sanitary condition, and the targeted population was 200 wells and the interval for selecting a sample was 40 and 100 wells respectively, therefore in each section the technique generated 7 samples which were clearly marked or labeled for identification. In total 21 sample of water were generated for analysis.

For questionnaires and sanitary survey same method was used to administer questionnaires to selected individuals. Also in the sanitary survey risk assessment for every interval as specified above, sanitary risk assessment was conducted to ascertain the sanitary situation of the study area during water sampling. Here standard risk scores were allotted e.g

Sanitary risk Scores	Assessment of Risk
>9	Very high

>6,7,8	High
>3,4,5	Moderate
>0,1,2	Low

Source: WEDC lough borough University U.K.

Result and Discussion

Water analysis results from upper section

Sample serial no.	1	2	3	4	5	6	7
Sample label	DS1	DS2	DS3	DS4	DS5	DW1*	DW2*
Distance from pit latrine (m)	6	3.6	4.5	3.0	5.2	25.4	18
Depth of well S(m)	6.3	6.0	7.2	6.4	7.8	7.1	5.8
No of faecal coliform per 100ml	45	20	30	25	18	3	2
Standard guideline for well water	10/100MS	10/100MS	10/100MS	10/100MS	10/100MS	10/100MS	10/100MS
Comment	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable

The result of the well analysis show faecal coliform counts in the upper section of the study area of Dawaki Ward as presented. It shows evidence of faecal pollution.

WHO, (1971) says ideal drinking water should not contain any microorganism known to be pathogenic or should not contain any organism that may be of faecal origin. The absence of coliforms should be considered as fairly reliable indicator that faecal pollution is absent, and their presence should be assumed to be due to faecal pollution.

The lateral distance between the position of pit latrines and the position of the wells does not conformed with at least 10-15m WHO recommendation. Only sample DW1, and DW2 met the standard lateral distance. Also, none of the sampled wells depth is up to 10m deep. With the depths of the wells in this section of the study bacteria can easily find their way into the well and pollute the waters.

Most of the wells surveyed have poor sanitary conditions that could increased the risk of illness ranging from dirty surrounding, stagnant dirty water in the gutters with strong odour, cracked parapet, broken concrete around the wells, open wells without covers etc.

According to Pettyjohn, (1979), individual contaminated sites generally are not large, but once degraded, ground water may remain in an unusable or even hazardous condition for decades or even centuries. Thus, the sanitary situation of the asterisk samples which is fairly good revealed very low faecal coliform counts compared to those samples without asterick have very high coliform counts compared to those samples without asterick have very high coliforms presence indicative of faecally polluted ground water.

Conclusion

The results of the analyses suggests the significance of drinking water monitoring for the case study. The coliform (sanitation activities

indicators) analysis of water samples from the hand dug wells signifies that almost all of the wells are contaminated due to their lateral distance closeness to pit latrines/soak away. However, unlined gutters or drainage systems and refuse dump have equally contributed, as bad sanitary condition is a factor of ground water contamination. The presence of faecal coliform is regarded as definet proof of faecal pollution (Tabbut, 1983). Therefore with these statements this study has conclude that there is a significant link between the incidence of ground water (Hand dug wells) pollution and pit latrines in the study area, DAWAKI Ward of Bauchi Metropolis.

Recommendation

The following recommendations are necessary to prevent water related disease outbreaks,

- i. A law should be created either by the local authority or State Government that permission should be taken before any person can sink well or excavate pit latrines.
- ii. All latrines that are already close to wells should be drained properly and closed or treated.
- iii. There should be proper disposal of faecal materials to avoid contamination by providing proper disposal sites for the inhabitant.
- iv. Boiling and filtering of water from hand dug wells to kill pathogens should be encourage.
- v. There should be improved and sustained pipe borne water supply in Dawaki to reduce dependence on the hand dug wells.

References

- Richard T.W (2007), Environmental Science, Toward Suitable Future (pp.189-198, 466,472).
- Cathrine F.W (1989), Ground Water quality Monitoring in Relation to on site sanitation in Developing Counting Countries. J. Inst. Wat. Environmental Management 3, No. 3.
- Carl, et al, (1994), Towards Environmental Strategies for Cities Policy Consideration for Urban Environmental Management in Developing Countries. Urban Management Program, World Bank.

- Macleod W.H (1971), Pre-Drilling hydrogeological Investigation Phase 1 area V. Deusch, M. (1963), Ground-water contamination and Legal Controls in Michigan U.S Geological Survey Water supply paper 1969.
- Pettyjohn W.A (1979), Ground-water pollution – an unminent disaster, ground water, v.17, No. 1.
- ASUP, (2003), Conference Proceeding, Vol. 1 No. 1 PP. 120 – 127. ASUP Publications, Printed in Nigeria ISSN 0189-6199.
- Sheppard T. Powell, (1964), Quality of Water. In Handbook of Applied Hydrology, ed. Ven Te Chow. Mcgraw Hill book coy., New York, pp 19 0 23.
- Karant K.R (1993) Ground Water Assessment, Development, and Management, MCgraw-Hill Publishing Company Ltd.
- Egbulem B.N (2001), Ground Water Quality Survey (A Case Study of DAWAKI) A paper presented at the 1st National Engineering conference, Bauchi Polytechnic Bauchi. Edo State – Nigeria.
- USEPA, (1990), Ground Water Quality Assessment.
- Andrew T. (2000) Water Quality Monitoring of Open Wells (bacteriological) and Case Study of Ungwan Rimi and Ungwan Kudu, Kaduna. Unpublished HND Project Report. National Water Resources Institute, Kaduna.
- W.H.O (1981), International Standards for Drinking Water Quality, W.H.O Publication Geneva.
- Hutton L.G, (1989), Field Testing of Water in Developing Countries (Journal).
- Feachem R.G (1983), Sanitation and Disease. Health Aspect of Excreta and Waste Water Management.
- Uwaisu A.I (1996), Assessment of Open Well (Bacteriological) In Kaduna Metropolis. Unpublished thesis at National Water ResourcesInstitute Kaduna.
- Tebbut T.H (1983), Important of Water Quality and Health Principles of Water Quality Control. Third edition, Pergamon Press University of Birmingham U.K.
- Rice J.A and Viste D.A (1998), Major Sources of Ground Water Contamination: Assessing the Extent of Point and Non point contamination in a Shallow Aquifer System.
- Adamu Y.M., Mohammed H & Dandago K.I (2006) Readings in Social Science Research. A publication of the Faculty of Social and Management Sciences.
- Asika N. (1991), Research Methodology in the Behavioral Sciences, Lagos: Congman.
21. Taylor B., Sinha G & Ghoshal T. (2006), Research Methodology, A Guide for Researchers in Management & Social Sciences.
23. FEPA, (1991), Guidelines and Standards for Environmental Pollution in Nigeria., 1988 No. 58.