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ASSESSMENT OF SANITARY CONDITION OF WATER, SANITATION AND HYGIENE (WASH) BOREHOLES IN DASS TOWN, BAUCHI STATE

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Abstract

Sanitary Inspection is a visualsurvey of risk factors that may predispose boreholes to faecal and other related contamination and is considered a low-cost tool for risk assessments in the water supply industry. Compliance with standards in the execution of many projects in Nigeria remains a nightmare with many key factors in the projects not considered..This paper seeks to assess the sanitary condition of WASH Boreholes in Dass Town, Bauchi state. 41 sample sizes determined by the Yaro Yamane formula were studied from the population of 46 functional boreholes of the study area, where a standard checklist was used to obtain data. In the results, it was found that 90% of the sampled installed boreholes don't have a soak-away pit and weren not in a fence, and 83% have ponded waste water that can ingress or percolate into the aquifer and compromise the safety of the water. Moreover,98% of the installed boreholes sampled have no record of

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periodic chlorination or water quality testing. Discontinued disinfection of borehole waters render them vulnerable to contamination and infestation (Earthwigs). Therefore, it is recommended that strict compliance with standards should be ensured in borehole installation sand to brings into consideration neglected features such as soak-away pit, drainage, apron, fence, etc.

Introduction

Background of the Study

According to Global Platform (2011), WASH refers to the provision of safe water for drinking, washing, and domestic activities, the safe removal of waste (toilets and waste disposal) and health promotion activities to encourage protective healthy behavioural practices amongst the affected population. The effort put in place by the Water, Sanitation, and Hygiene (WASH) programme to making thousands of people access to potable drinking water is on the increase. But there is still fear associated with the presence of pathogenic and toxic chemicals/elements, which can represent a serious public health threat (Park, 2009).

One of the U.S Geological Surveys (USGs) studies indicates that 27% of shallow urban boreholes tested contain Methyl Tertiary Butyl Ether (MTBE) (William and Mary, 2008); U.S.Environmental Protection Agency (EPA) estimated that every day 4.5 trillion litres of contaminated water seeps into the ground in the United State from septic tanks, cesspool, municipal and industrial landfills and waste disposal sites and surface improvement agricultural fields (William and Mary, 2006). The quality of groundwater depends on various types of biological and chemical constituents and their concentration, which are mostly derived from the geological structure of the particular region and the pollution fate of substances in soil (Park, 2009).

Many years before 2007, the implementation of WASH activities was un-guided by compromised standards (Liberia/WASH, 2010), with the main implementer being the public sector at the same time technology options were equally limited, whereas hygiene issues were at their lowest ebb (WASH, 2010). In Nigeria, politics, corruption, culture, and ethnicity becomes unavoidable challenges in the implementation of projects or programmes majorly in the areas of borehole siting, installation (Use of substandard materials), and maintenance (HP/WatSan, 2003 and UNICEF, 2020). Compliance with standards in the execution of many projects

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in Nigeria remains a nightmare with many key factors are not considered in the projects. WASH Boreholes installations suffered the same fate at the hands of executors who failed to fix some of the sanitary features expected in the project installations such as fence, drainage and soak-away pits (WHO, 2018).

Inadequate enforcement of guidelines (Standards) governing groundwater exploration in Nigeria is making community boreholes meant to serve the growing population often dug and installed inappropriately (Junaid and Agina, 2014). According toWHO Factsheet (2013) and UNICEF (2008) a borehole must be 30M away from any souce of contamination, must not be downstream from sources of contaminations, should be ≤500M to end users, must have drainage, soakaway pit, fence, apron and also be disinfected and tested periodically.

High-density population, poor housing arrangement (Lay-out), and indiscriminate digging of pit latrines which remain the major contributing factors to groundwater contamination are said to be common in Dass town (Nyanganji *et al, 2011*). Most boreholes in Bauchi state lacks sanitary features and activities of residents that are detrimental to the quality of water usually carried out very close to the boreholes (Field Reconnaissance, 2019).

This paper assessed the sanitary status of WASH Boreholes in Dass town in comparison to World Health Organization (WHO) standards with emphasis on the boreholes locations to determine the proximity of boreholes to sources of contamination, end users and physical sanitary features of the boreholes, siting; upstream/downstream and also determine safeguard status of borehole water. This will provide governments, NGOs, communities (WASH Committees), and other stakeholders with the gap that exists in the implementation of WASH programs and policies.

Methods

Dass town is characterized by low-lying and high-altitude rocks that are mostly flanked by moving mountainous exposure and composed of ancient crystalline basement complex rocks that are known for their permeability (Hyeladi *et al*, 2012). During the rainy season, there is slightly decreased in daily temperature with an increased in relative humidity of about 94% in August when rainfall is at its peak with an average rainfall of 372-430mm (Hameed, 2008). Dass Town has a population of 45,465 people as projected froma 2010 census (Nyanganji et al, 2011), and has a total number of 46 functional sunk WASH Boreholes which are the research population (WASH Office Dass LGA, 2022)

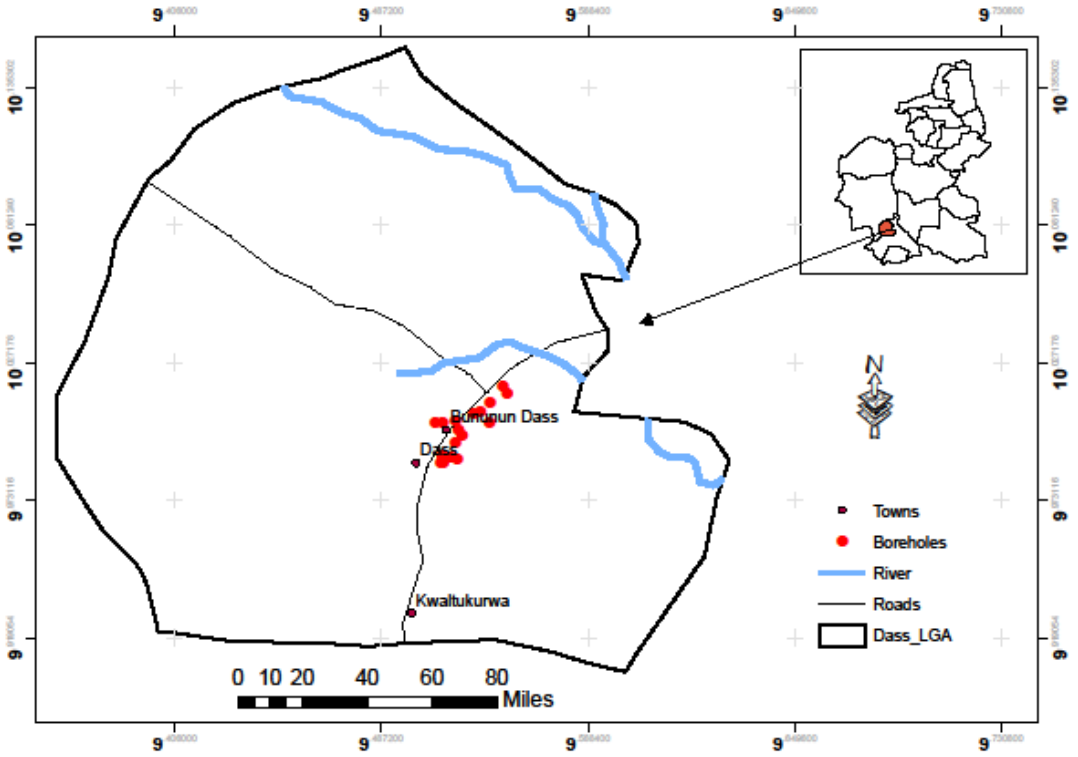


Fig.1. Showing the Map of the Study Area and the locations of the Sampled Boreholes

A Stratified sampling method (Hamed, 2016) was adopted and used to categorise the study area into three that are based on administrative purposes viz: Bununu Central Ward, Bununu East Ward (Indoor), and Bundot Ward (Indoor). The total number of WASH boreholes identified was 58 in the study area; 46 were functional and 12 abortive (5 in Bununu Central, 6 in Bununu East,and 1in Bundot). However, the boreholes were 25 in Bununu Central, 17 in Bununu East, and 16 in Bundot (WASH Office Dass LGA, 2022)

Using the Yaro Yamane formula (1973) for sample size determination, 41 sampled boreholes were selected from the 46 functional boreholes. A simple random sampling method (Riddhima, 2019) was used to select boreholes from the stratified study area and in line with the study population (Functional boreholes), the sample size was determined; 44% of boreholes were selected from Bununu Central, 24% boreholes from Bununu East and 32% boreholes from Bundot.Standard checklists developed by WHO on borehole sanitary surveys were adopted (WHO,2006 and WASHCluster, 2012) and used to assess the compliance level of the installed WASH boreholes in the study area. The checklist has three

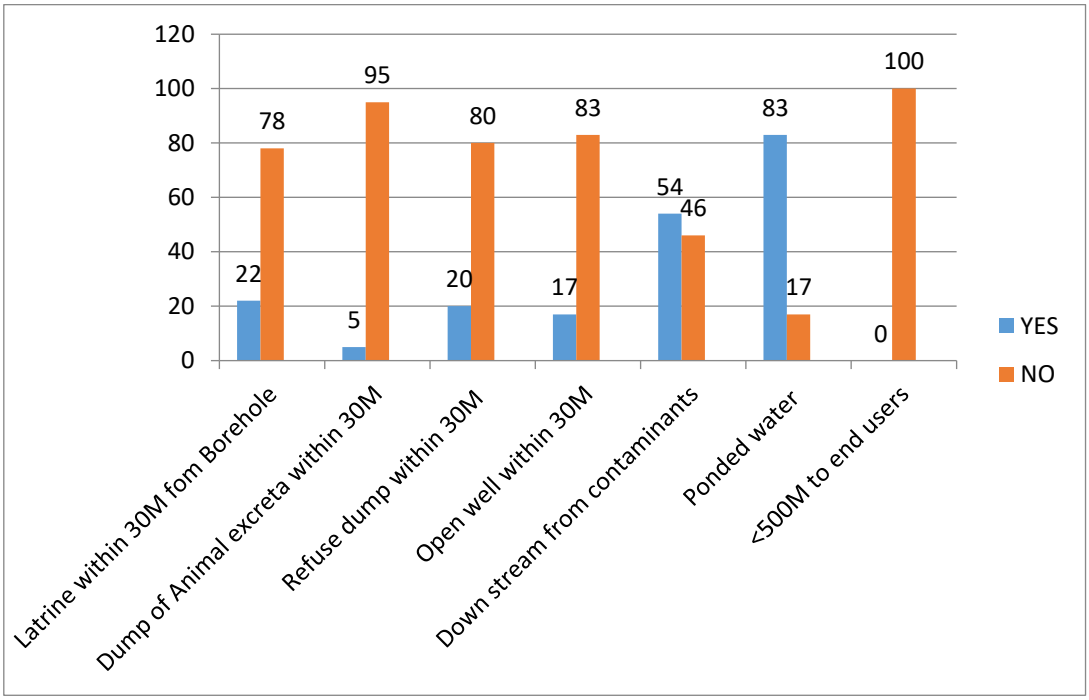
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main research questions: (i) What are the locations of the boreholes? (ii) What are the sanitary features of the boreholes? (iii) What are the quality assurance and safeguards of the borehole water?

GPS Camera was used for the mapping of the study area and photo-shoot of the sanitary condition of the boreholes meant for presentation and documentation purposes. Descriptive statistics; percentages, mean, and charts were used to analyze the data obtained and which were all presented in bar chart sand tables.

Results and Discussion

Table 1: Location of Boreholes



The result obtained from the checklist as indicated on table 1 above shows that most boreholes sunk by WASH in Dass Town have a good distance from the sources of contamination prescribed by WHO (UNICEF, 2018). Thus, 78% were 30m away from latrines, 95% were excluded from animal excreta and 80% were away from refuse dump and almost all the boreholes (100%) were installed close to the end users hence providing them the opportunity to safe time to attend to other productive activities such as school, market, farm, etc (WASHNORM, 2019).

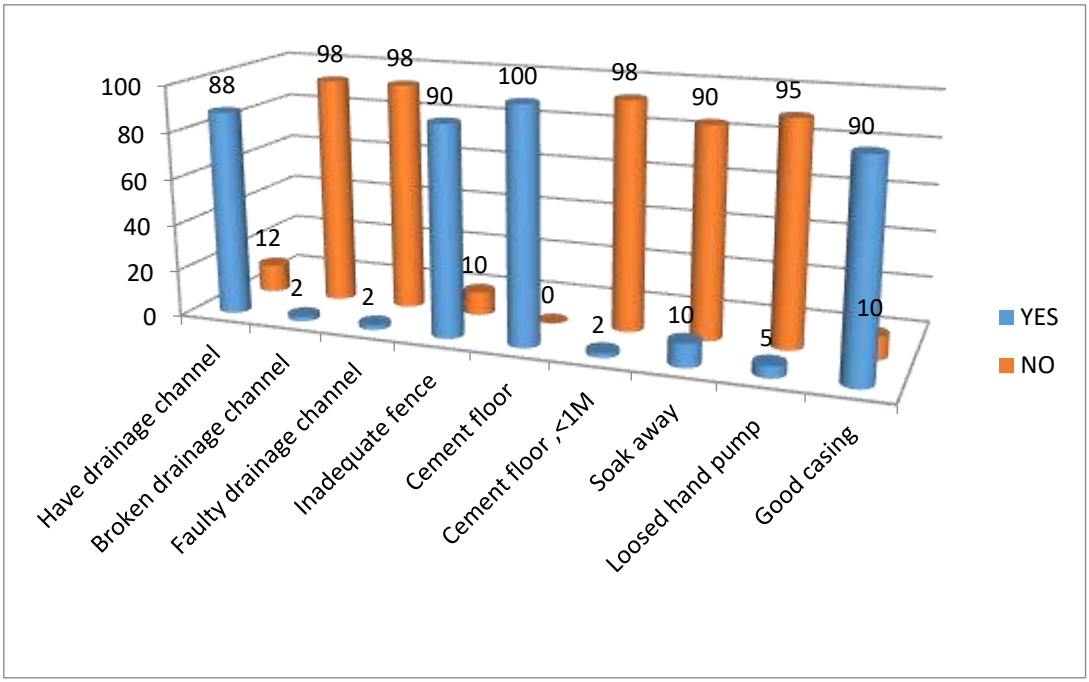
In contrast, significant number (54%) of the boreholes were sited downstream from the sources of contamination; these boreholes stand the chance to be contaminated more especially in an area that has loose soil (Park, 2009). However,

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93% of the boreholes installed have ponded water less than 2M away from the borehole basement as can be seen on table 1 above and this remains a source of concern to public health professionals. This is because, it is evident that there shall be infiltration of waste water into the aquifer and mosquito proliferation (Mustafa, et al, 2012 and WSM, 2022).

Table 2: Physical Sanitary Features of Boreholes



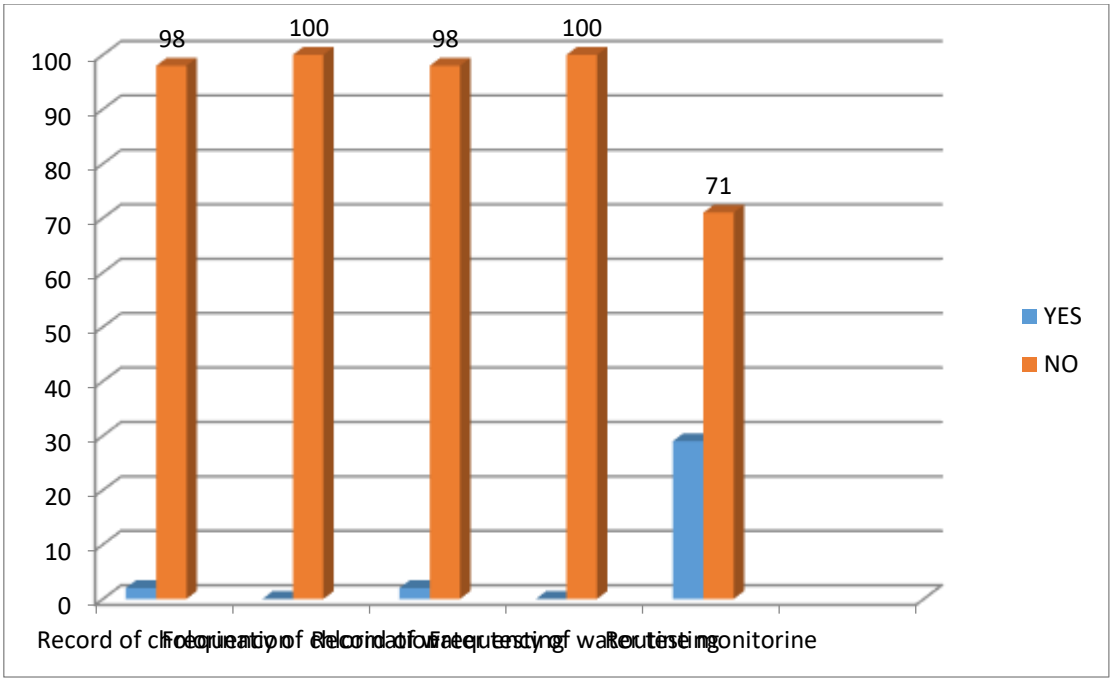
Despite the indication that there was good casing (90%), the presence of drainage channel (88%), drainage systems not broken (98%) or faulty (98%) in the boreholes installations as shown on table 2 above, 90% of the borehole installed don't have a soak-away pit that is mean to collect drained splash and spill water, this contravene WHO and NIS standards for installation of boreholes as can be read in the Technical Guidelines for the Construction, Rehabilitation of Drilled Water Wells (WASHCluster, 2020 and NIS, 2007). Thus, leading to ponding of splashed and spilled water and resulted in the breeding of flies, mosquitoes, and odour nuisances as well as cross-contamination of water (William and Mary, 2008).
However, ponded water attracts animals from the community as 90% of the installed boreholes were not inside the fence as indicated in the results on table 2 above. Organic substrates degrade; animals defecate and urinate in the ponded

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water around the borehole, rendering the boreholes vulnerable to organic contamination (Environmental Agency, 2006).

Table 4: Water Quality & Safeguard



WHO Factsheet 2006 suggested that borehole chlorination and water quality testing should be carried out twice a year while Nigerian Industrial Standards (NIS) suggested that routine monitoring (Sanitary inspection) should be done once in 3 years (NIS, 2007). But, the result on table 4 above indicates that there was inconsstent periodic borehole water chlorination and water quality testing with each at 2% only. The result also indicates inadequate monitoring (71%) of the installed boreholes in the study area. Therefore, with these results, the safety of the boreholes and the users can not be assured.

Conclusion and Recommendation

Sanitary compliance remains a key factor in Water Sanitation and Hygiene provision as compromising this will render the effort ineffective and open up to other water and water-related public health issues such as malaria, Salmonellosis, odour nuisances, and un-aesthetic vision (Lucas and Gills, 2003). There are adequate numbers of boreholes to supply water to the residents of the study area but faced challenges of some sanitary requirements such as soak-away pits, good

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drainages, chlorination, and water quality testing to ascertain its safety conditions. Therefore, it is evident that sanitary compliance to standardsin the installed boreholes in Dass town was compromised and the safety of end users can not be guaranteed. The installations were providing a good breeding environment for water-related vectors as physical sanitary features were not adequate or available. Implementation of policies and programs in Nigeria remainsa challenging issue as so many bureaucratic protocols tend to compromise with some of the standards, thereby affecting the quality and performance of the projects. Water Safety Management (Plan) from the collection, transportation, storage, processing, and consumption cannot be achieved once there is a break in the chain of all kinds of protection and hygiene practices. The studied boreholes remain vulnerable to contamination at the basement and at the point of collection provided ponding water exists. Chances of proliferation of water related vector of diseases in the vicinity of the boreholes cannot be imagined. Therefore;

1. Government, Nongovernmental organizations and any other donor agent sponsoring WASH programs should ensure strict compliance to standards by bringing into consideration neglected features of sanitation in borehole installation such as soak away pit, drainage, apron, fence, etc.
2. WASH stakeholders such as WASHCom should participate fully in the installation of boreholes in their communities to ensure standards and best practice is done and to also ensure continue borehole monitoring, periodic chlorination and water quality testing to alleviate fear of drinking unsafe water.
3. With the current situation in the studied boreholes, quality assessment should be made to determine the physical, chemical, biological and radiological properties of the water in comparison to standards.
4. Further research work should be conducted on the relationship between ponded water around theWASH boreholes in Dass town and the incidence or prevalence of malaria, water andwater related diseases.

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