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ASSESSMENT OF WATER HARVESTING SYSTEM PRACTICES FOR HOUSEHOLDS USE IN KUNCHI LOCAL GOVERNMENT, KANO STATE, NIGERIA

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Abstract

The study of water harvesting technique (WHT) for households' uses resulted from the failure of the centralized system to provide adequate water for domestic uses in rural Kano and the recent concern on its scarce studies in developing countries, Nigeria inclusive. The aim of the study was to determine the factors affecting water harvesting technique in Kunchi Local Government Area. The study adopted field survey through semi-structured questioners administered to 357 households using multi-stage sampling technique and analyses using IBM SPSS Statistic software version 20. The finding shows that, hand pump boreholes were the predominant source of water supply in both seasons and water scarcity existed to the extent that, people trek 1km to get water. The scarcity intensifies between the months of April/May. Households were aware of water harvesting techniques and practice them informally. Indigenous knowledge was the prime source of information on the techniques. Rooftop collection (48.2%) was the most practiced technique for domestic uses (51%). Logistic model showed that, education, period of water scarcity, awareness of the techniques and information source were variables that had a statistical significant effect on the practice of the techniques. The study found that, although water harvesting was not always sufficient to meet long term demand, various strategies were adopted to control the short term supplies for short term uses. Ground water harvesting was the major strategy (44%). Therefore, water harvesting techniques should be promoted during raining season to attain formal adaptation.

Key Words: Water, Harvesting System, Practices, Household Use

1. Introduction

Population is increasing rapidly, the supply of adequate water of equal access to satisfied various needs became one of the most fundamental challenges faced by stake-holders and policy makers, this is because areas of water pressure and water scarcity are rising particularly in the dry land region of the Nigeria in which there is lack of adequate rainfall for several months of the year and where drought and environmental degradation have seriously affected agricultural production and livelihood, (Adewumi, Sobowale and Kolawole, 2015). This led to an interest in alternatives to the utilization of surface and ground waters which became the source of the most modern water supply systems. In most urban places, in consideration to the physical alternatives to achieved sustainable management of freshwater, there are two solutions: finding alternate or additional water resources using conventional centralized approaches; or utilizing the limited amount of water resources available in a more efficient way (UN HABITAT, 2013). In present day, much attention has been given to the first option and only limited attention has been given to make the best use of water management systems and among the various technologies to increase freshwater resources, rainwater harvesting use is a decentralized, environmentally sound solution, which can avoid many environmental problems such as contaminations that lead to much spending in the area of water treatment, sometime caused by conventional large-scale projects using centralized approaches (UN HABITAT, 2013).

One of the largest challenge facing Nigeria and to be specific, Kano state is water scarcity (Tanko, 2014; Adewumi *et al*., 2015). The effect of which have negative effects on many factors such as health, food security consequently leading to an increase in the drop of the potentialities of agricultural lands (Tanko, 2014). Furthermore, the problem of water scarcity is more serious in rural areas (Rilwanu, 2014), which have aggravated rural-urban migration, as, impact of water scarcity on food can force people to migrate in search of a place with more water (Miletto, Caretta and Zalucchi, 2017). Globally, there has been increase interest in rainwater harvesting (RWH) as a major source of clean water, especially in developing countries like Nigeria (Abdulla & Al-Shareef, 2009; Amos, Rahmana & Gathenya, 2018).

Rainwater harvesting has been practiced for more than 4,000 years, owing to the temporal and spatial variability of rainfall (UN HABITAT, 2013). It is an important water source in many areas with significant rainfall but lacking any kind of conventional, centralized supply system. It is also a good option in areas where good quality fresh surface water or ground water is lacking. The use of appropriate rainwater harvesting technology is important for the utilization of rainwater as a water resource (UN HABITAT, 2013).

Although in Nigeria, there was no direct rainwater harvesting interventions by government agencies in its dry lands. Farmers are usually opportune the use of naturally existing depressions and abandoned burrow pits close to their farmlands to harvest rain water for surface irrigation using petrol engine pumps (Sobowale *et, al.*, 2015).

Consequent to this, the Federal Ministry of Environment, as reported by Vanguard, on 16 June 2017 said that, the ministry is developing roof rainwater infrastructures in the Adamawa, Gombe and Bauchi States of the Federation to ameliorate soil erosion and provide water for both drinking and other uses.

In the Kano Region, the availability of water is of immense importance to the inhabitant influencing their lives in several ways. However, due to rapid increase in population together with sharp rises in water demand for households, agricultural and industrial development have impose severe stress on the available freshwater resource in term of quality and quantity, (Abdulhamid in Tanko and Momale, 2014).

According to JUCN-KYBTF-Afromedev (2006) as cited by Tanko (2014), that by the year 2025 the total number of people in this section is estimated to reach 25 million from the 15 million in 1991. Also Abdulhamid in Tanko and Momale (2014) cited WMO (2002) to consider climatic harshness as the major component that can distort geomorphic system and water resource of a place. And Kano will not be the exception as it form part of the semi-arid region of Nigeria.

As such, harvesting excess rainfall (surface runoff) in the humid period for utilization in the dry season where evaporation is higher, soil moisture is depleted and stream flow recedes became necessary to help and rise the cultivation time of farmers, and can yield marginal income to enhance livelihood. In the raining period, rainwater harvesting can also reduce the rising load on groundwater level (Sultana 2007).

However, with regard to household's uses the quality of rainwater is directly related to the cleanliness of the atmosphere, cleanliness and quality of material used for catchment surface, gutters and storage tanks (Ariyananda, 1999). In areas where the rooftop is clean, impervious, and made from non-toxic materials, roof rainwater is usually of good quality and does not require much treatment before consumption (Lekwot *et al.*, 2012). Availability of adequate and clean water for household uses is an enormous problem for rural households in developing countries (Mwendera, 2006). Likewise in rural villages of Nigeria, many people have informally collected rainwater from roofs of their homes for storages in small and large containers for domestic uses.

However, there is inadequate information with regard to water harvesting system by households and mode of uses in rural Kano. Hence, the need for careful study of water harvesting system for households use in Kunchi local government area of Kano State for sustainable development, the present study will fill in the gap and provide a basis for subsequent studies, on water harvesting system for households use for effective water resource management and development in developing countries, particularly Nigeria.

2. Geographical Location and Extent of the Study Area

The kunchi local government area is located in the extreme northwestern part of Kano Sate and lies between latitude 12°30' 05"N and 12°.50'39"N and longitude 8°16' 18"E and 8°27'167"E. It has an overall land area of 671 km^2. The area is bounded to the west and northwest by Ingawa local government area of Katsina State, to the northeast by Roni local government area of Jigawa State, to the south by Bichi and Tsanyawa local government areas, and to the southeast by Makoda local government areas of Kano State respectively (Figure 1).The area has a total population of 111,018 inhabitants, (NPC 2006) and mostly consist of Hausa and Fulani tribes. The unifying role of Hausa as "lingua Franca" in the area enhance greatly and cements the linguistic and cultural homogeneity of the people in the 31 villages that make up the Kunchi Local Government Area.

The area form part of the high plains of the Hausa land (Olofin, 2014) underlain by the basement complex rocks belonging to the Pre-Cambrian Basement Complex group. Notable rock outcrop in kunchi local government area include Hugungumai granite rock outcrop which extended up to south western part of yandadi ward and janbige; and Kaya and Matan-Fada forest Hills situated at the north eastern and northwestern part of the area. The elevation of the area above sea level ranges from about 400 meters at the north-eastern margin to over 1200 meters at the southern tip of Kano State, that is, the highest elevation occurs in the south and decreases both northwards and north-eastwards. The Area (Kunchi Local Government Area) been part of Kano, is also characterized as semi-arid climate, with a mean daily temperature of 30°c the months of December to February are colder, having the lowest temperature of 20°c. Rainfall seasons start from May to October and dry season from November to April. The climate of Kano is described as seasonally arid and in southern Kano rainy season average is about 150 days May to October. Mean annual rainfall in the southern parts is about 1000mm and in the north it is 635mm (Sara and Charles, 1988).

The vegetation of the study area is Sudan Savanna by type. Olofin (1987) as reported by (Rilwanu, 2014) observed that the indigenous vegetation of the study area is tropical grassland characterized by scattered trees of 20 meters high. The grasses are seasonal and are mostly one meter in height.

The Soil of the study area is Tropical Ferruginous rich in sand, while the zonal soils are affected by anthropogenic manipulation to a varying degrees (Olofin, 1987) Areas in the extreme West or Southwest are characterized by clayey loamy soils. Soils at the hill slopes are predominantly skeletal with no horizon differentiation because they are younger soils or undeveloped soils. At the valley bottom and flood plains of River Gari, alluvial soils and Aeolian deposits occurred.

The drainage of the area is part of the inland drainage system of the Chad Basin and consists of the head stream of the river system known as Gari. It's influenced by the climate, rock structure and anthropogenic activities. Gari System has its source from Kaduna and katsina States highlands around Malumfashi and it is also one of the headwaters of Challawa River System that produce dendritic structure moving eastward (Abdulhamid, 2014) The water bodies available in the area include Gari Dam, Dankauri Dam and Dankwai Dam. Gari Dam is the largest reservoir among them, it is also the third largest reservoir in Kano State, and was constructed in 1980.

Figure 1: Map of the Study Area
Source: Department of Geography, GIS Lib. BUK (2017)

3. Research Methods

The study involves the use of both qualitative and quantitative data. The reconnaissance survey of the study area was carried out to enable the researcher to be more acquainted with the study area in term of its scope, location of villages, checking and updating what is on the map of the area. It was at this time the researcher was able to plan the actual field work in term of sampling and method used during the field work. Information about the nature of the various water harvesting system which may likely to be found in the area was obtained, as well as physical inspection of the water collection, transporting and storage in the study area.

For the researcher to study the households' rainwater harvesting system and uses in kunchi local government area, two sources of data were required; these are primary and secondary data. The primary data was obtained through interview schedule, used to interview the respondents in the area. This was conducted by the researcher and three research assistants. Three hundred and fifty seven interview were used. A camera was used to snap pictures which were used as plates. The secondary data used in the research work were documents, such as journal, articles, unpublished thesis and dissertation and maps relating to the study area.

The population of the study composed of the households, in the 31 villages of the area, which were: Baje, Bumai, Danjaka, Dankwai, Dishishi (kuka), Dumbule, Gadaba, Galadimawa, Garun sheme, Gwadama, Gwarmai, Hugungumai, Jangefe, Jodade, Karofawa, Kargon kunchi, kaya, Kunchi, Kuku, Magawata, Matan Fada, Falle, Ridawa, Shamakawa, Shuwaki, Sodawa, Tabanni, Tofawa, Unguwar Gyartai, Yandadi and Yankifi which combined together to make 10 Wards of Bumai, Garun Sheme, Gwarmai, Kasuwar Kuka, Kunchi, Matan Fada, Ridawa, Shamakawa, Shuwaki, and Yandadi of Kunchi local Government Area. The study targeted households that are practicing various water harvesting system and uses base on this, the polio immunization office of medical department, Kunchi Local Government Area (LGA) revealed that, there were 20893 households in the study area (Field survey, 2017). Base on this estimated households, sample size was calculated using krejcie and Mogan, 1970 table of sample determination to arrive at 357 samples.

The sampling procedure was multi-stage sampling that is, cluster sampling was used to divide the area into two base on their hydrological similarities (upstream and downstream) while purposive sampling was used to select 3 villages from each cluster, to make 6 villages as the location of the study base on their level of water scarcity, while proportionate sampling was used to allocate the number of respondents to each village and arrived at a total sample size of 357 households used in the study (Table 1) and simple random sampling was used to select the respondents from each village. Therefore, the following formula, was used determined the number of sample size allocated to each village, as proposed by Bowley captured by Pandy and Verma (2008) i.e. $\mathbf{n = n \times Ni/N}$.

$\mathbf{n1 = n \times Ni/N}$
$= 357 \times 182/5382 = 12$

$\mathbf{n2 = n \times Ni/N}$
$= 357 \times 1204/5382 = 80$

$\mathbf{n3 = n \times Ni/N}$
$= 357 \times 250/5382 = 17$

$\mathbf{n4 = n \times Ni/N}$
$= 357 \times 972/5382 = 64$

$\mathbf{n5 = n \times Ni/N}$
$= 357 \times 984/5382 = 65$

$\mathbf{n6 = n \times Ni/N}$
$= 357 \times 1790/5382 = 119$

Table 1: Number of sample households per village

S/N	Name of Sample Villages	Total Households	Number of Sample Households per village
1	Bumai	182	12
2	GarunSheme	1204	80
3	KargonKunchi	250	17
4	Ridawa	972	64
5	Shuwaki	1790	119
6	Sodawa	984	64
7	Total	5382	357

Source: Field work, 2017

Data were analyzed and presented quantitatively and qualitatively using different statistical methods to investigate the water harvesting system in the area descriptive statistics; means as well as percentages will be calculated. Logistic regression model with an entry selection process will be used to analyze and estimate the dependent variable as the use of a particular system. The values of the Likert-type scale will be used to analyses the data so as to obtain the mean values of the responses.

4. Result and Discussion

4.1 Source of Water Supply in Kunchi LGA

Water sources available to households in this area include open well, public tap, borehole, surface water, and rain water. The source of water supply profile of the respondents show that, majority of them 43.4% and 47.6% obtained their water from borehole, follow by 22.7% and 37.3% who obtained water from open well in both rainy and dry season respectively and the least was the water vendors who contribute 1.1% and 5% in both seasons (Table 2).

Table 2: Water Sources Available to Households in the Dry and Rainy Seasons

Sources	Rainy Season	Dry Season
Open well	81 (22.7%)	133
Tap water	20(5.6%)	24(6.7%)
Borehole	155(43.4%)	170(47.6%)
Surface water	10(2.8%)	12(3.4%)
Water vendors	4(1.1%)	18(5%)
Rain water	87(24.4%)	0(0%)
Total	357(100.0%)	357(100.0%)

Sources: Field survey, 2018

The result indicated that, the majority source of water supply in the area was borehole (table 2, plate 1 & 2). The result was in agreement with that of Inkani, (2015) who reported hand pump borehole as the most common source of water supply in rural Katsina State, Nigeria. However, it was observed that most of the boreholes were constructed by government and sometime get spoilt without a means to get them back to workable condition and this lead to serious water crises in the area affected.

Plate 1: Borehole at the study area

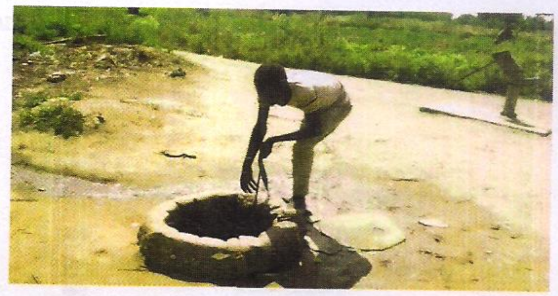

Plate 2: Open well at the study area

Source: Field survey, 2018

Experience on water scarcity can greatly influence the extent to which household is vulnerable to the problem. It was, therefore, important in this study to determine perceptions on water scarcity in the study area. The water scarcity experience of the respondents depicted that majority of the households (90.8%) in Kunchi LGA had experienced water shortage (Table 3).

Table 3: Distribution of the Respondents According to Experience on Water Scarcity

Variables	Frequency	Percent
Yes	33	9.2
No	324	90.8
Total	357	100.0

Source: Field survey 2018

Therefore, based on this, we can conclude that, there is water scarcity in Kuchi LGA. This result is in agreement with the assertion of the Natural Resources Council of Nigeria (NARESCON) which described the area as drought-prone zone in lying above latitude 110 North in the country and this area comprises of the Sudan Savannah and the Sahel Savannah agro-ecological zones of Nigeria (Adewumi *et al., 2015).*

4.2 Period of Intense Water Scarcity in Kunchi LGA

The result indicates that, majority of the households (44%) point out, that they experienced extreme water shortage in the month of May, followed by 41.7% respondents who stated that, they experienced water scarcity in the month of April and the least was the month of January with 0.3% (Figure 2).

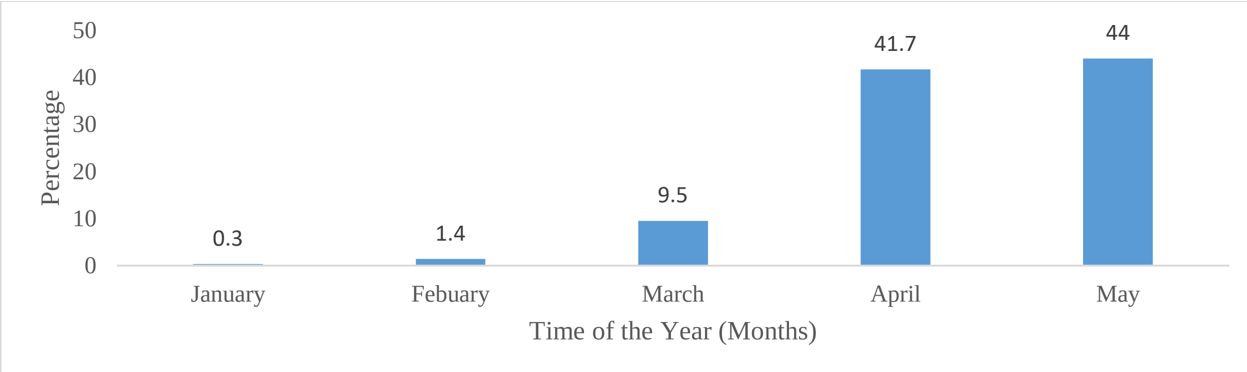

Figure 2: Households Time of severe water shortage
Source: Field survey, 2018

Therefore, the finding of this study indicated that, water scarcity was severe in Kunchi Local Government Area particularly in the month of May and decline to significant level in the month of January (Figure 2).

4.3 Water Harvesting Level of Awareness in Kunchi L.G.A

The information in table 4 reveals that a large number household (91%) were aware of the water harvesting techniques. This may not be unconnected to their mode of accessing water and the level of water scarcity as this can greatly influence households to opt for alternative, such as rainwater harvesting technique.

Table 4: Household level of awareness of water harvesting technique

Variables	Frequency	Percent
Not aware	33	9.2
Aware	324	90.8
Total	357	100

Source: Field survey 2018

Therefore this result is agreement with Ibrahim (2012), findings on Investigation of Rainwater Harvesting Technique in yatta district, Kenya where he found out that most of the farmers were aware about water harvesting techniques and willing to adopt them.

4.4 Source of Information about Water Harvesting Technique

Results of Table 5 shows that most households reported getting information about water harvesting techniques from indigenous knowledge (56.0%) followed by self-initiative (33.9%) and 6.2% relied on social media while the least point out getting information from extension personnel (Table 5).

Table 5: Sources of information for the various water harvesting technique

Source	Frequency	Percent
Self-initiative	121	33.9
Social media	22	6.2
Indigenous knowledge	200	56.0
Radio	11	3.1
Extension personnel	3	8
Total	357	100

Source: Field survey, 2018

This result reflects that, household are more receptive to information passed on indigenously and are ready to practice the technologies, compared to other sources of information. The finding contradicted Ibrahim (2012) who reported extension workers as the most prefer source of information with regard to adoption of water harvesting technology. However, the results indicate the need of institutional intervention as reliable on primitive ideology hinders expedient acceptance and proper utilization of technology.

4.5 Types of Water Harvesting Practice in Kunchi LGA

Water harvesting practice profile of the respondents depicted that, majority 48.2% were practicing rooftop technique to harvest water from rain, followed by 12.6% who were practicing earth dam to harvest water and this may not be unconnected with the present of Gari Dam in the area and the least were practicing burrow pit technique, this may be related to the present abandoned burrow pits by road side (Table 6 & plates 3, 4 & 5).

Table 6: Distribution of the respondents according to water harvesting techniques

Harvesting techniques	Frequency	Percent
Micro Dam	21	5.9
Burrow pit	4	1.1
Rooftop	172	48.2
Earth Dam	45	12.6
Runoff	5	1.4
Shallow Depression	29	8.1
None applicable	81	22.7
Total	357	100

Source: Field survey, 2018

Plate 3: Informal RWH Design
Source: Field Survey 2018

Plate 4: RHW Collection Tech.
Sourece: Field Survey 2018

Plate 5: Burrow pic Collection Technique
Sourece: Field Survey 2018

Plate 6: Shallow Depression Tech.
Source: Field Survey 2018

Plate 7: Gari Dam Reservoir
Source: Field Survey 2018

Plate 8: Micro Dam Reservoir
Source: Field Survey 2018

Therefore, rooftop technique, have been recorded the higher responses, as such rooftop rain water harvesting technique, is hereby revealed as the major water harvesting technique practice for household uses in Kunchi LGA followed by earth Dam. This may be connected to their perception of cleanness, accessibility and cheap people attached to rain water. The finding is in agreement with the assertion of Pacey and Cullis (1986) which point out that in rural area, the most common practice of water harvesting techniques is a small scale rooftop (Tobin *et, al., 2013)* is also consistence with that of Ibrahim (2012).

4.6 Reasons of practicing different water harvesting techniques

Opinion profile of the respondents reveals that within the households who patronized rooftop technique, 86 opted for it due to its cleanness, easy and cheap, followed by 65 who preferred it due to its cleanness only, while 22 persons were using the technology because it collects lot of water, easy and less expense respectively. Also out of the 43 that patronized earth dam, 20 applied it due to their perception of its cleanness, easy and cheap, 15 were due cleanness of water from dam and 3 respondents was due to the reason that, earth dam collect large body of water compared to other technique another have the motive that, water harvested using earth dam was considered easy and need no cost at all, others have no reason of using earth dam. Micro dam was also considered important technique of Water Harvest (WH) as out of 29 respondents who's reasoned the technique stated that 11 respondents applied the technique due to cleanness, 15 due to Clean, easy and cheap, 3 due to Percy large collection of water of the technique (Table, 7).

Table 7: Reasons of applying the different techniques

Water Harvesting Techniques	Reasons for Harvesting rainwater of the respondents: Clean	Collects lot of water	Clean, easy and cheap	Easy access and less cost	Non applicable	Total
Micro Dam	11	3	15	0	0	29
Burrow pit	3	1	3	0	0	7
Rooftop	65	6	86	4	0	161
Earth Dam	15	3	20	3	2	43
Runoff	3	0	5	0	0	8
Shallow Depression	5	7	17	1	0	30
Non applicable	0	0	0	0	79	79
Total	102	20	146	8	81	357

Source: field survey 2018

Runoff technique was also opted by 8 respondents due to Percy cleanness easy and cheap in procession. Shallow depression was opted 30 respondents due to their perception of Clean, collects lot of water, easy and cheap as well as easy access and less cost, this may be related to fact that, the area where shallow depression is practice was largely Chad formation with which water can be exploited with hands as in plate 8. Also 79 respondents indicated no reason to prefer any of the technique. Therefore, the result point out that, rooftop was the preferred technique owning to the perception of its cleanness, easy access and cheap (Table 7). This is in line with that of Ibrahim 2012 who reported that farmers opted for rooftop collection for cleanness purposes.

4.7 Uses of the harvested rain water in LGA

Table 8 depicted that, majority of the respondents (182) in the study area, indicated that, they used the water harvested for domestic purposes, followed by 79 respondents who were not apply rainwater for any purposes, 49 respondents used it for sanitation and building construction, 29 respondents indicated that, they used it for irrigation/animal feed and fishing and 20 respondents point out that they used it for drinking purposes only because of its expected cleanness for visualization refer to plates 9, 10, 11 & 12.

Table 8: Distribution of the respondents according to the uses of the harvested water

Uses	Frequency	Percent
Drinking only	20	5.6
Domestic uses	182	51.0
Irrigation/animal feed/fishing	27	7.6
Sanitation/Building construction	49	13.7
Non applicable	79	22.1
Total	357	100

Source: Field survey 2018

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Therefore, the finding of this study demonstrated that in Kunchi LGA rainwater when harvested was use for various purpose among which domestic purposes accounted as the largest uses, this is in agreement with a study by Tanuja and Aheeyer (2011), who indicated that people use RWH system for various purposes including drinking, sanitation, cooking, washing, clothes wash, bathing, gardening and other households need. And contradicted the finding of Tobi *et al.* (2013) reported personal hygiene as the most common application of the harvested water in rural community of Edo State, Nigeria.

Plate 9: Harvested water from Gari Earth Dam being supplying to irrigation site.
Source: Field Survey 2018

Plate 10: GWH to aid local block construction
Source: Field Survey 2018

Plate 11: Fishing Canons at Gari Reservoir
Source: Field Survey 2018

Plate 12: Treatment site preparing & supplying water from Gari Dam for households uses
Source: Field Survey 2018

4.8 Adequacy of the harvested water for households' uses

Considering the chart representation of respondents' opinions, the harvested water can be judge insufficient as the over whelming majority of the respondents point out that, the water they harvested was inadequate to meet up the demand in the area (Figure 3).

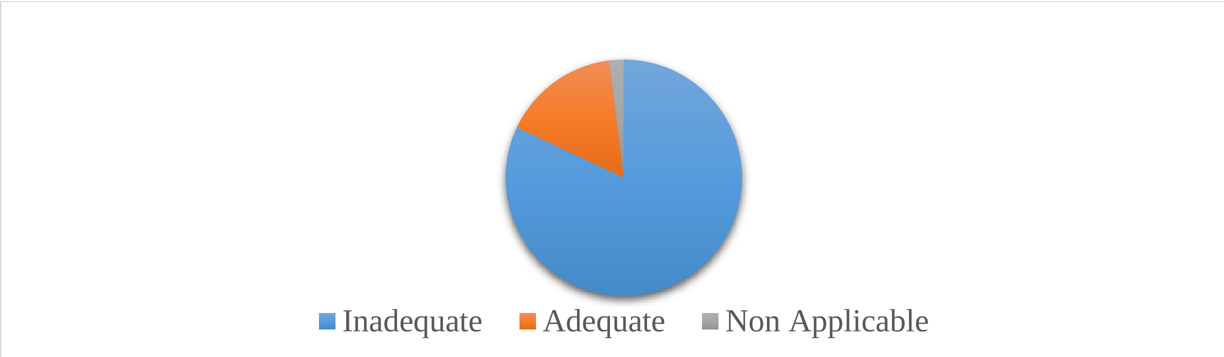

Figure 3: Adequacy level of the harvested water
Source: Field survey, 2018

The result of the finding is not consistent with that of Tobi *et al.* (2013) who reported water harvested as sufficient for family uses throughout the dry season without an alternative sources of water.

4.9 Factors Affecting Water Harvesting Practice in Kunchi L.G.A

Information in table 9 depicted the results of a logic regression analysis for the participation of water harvesting technique. In this model the practice condition use as regressors. The significant of individual variables was tested by Wald static. The column, exp (β), give the exponential value of β raised to the value of the logit regression coefficient, which is the predicted change in odd for a unit increase in the corresponding explanatory variable. The model used six variables: education, period of water scarcity in a year, adequacy of the harvested water, uses of the harvested water, awareness on water harvesting technique and source of information about water harvesting technique, in explaining households practice of water harvesting techniques.

The result depicted that, four variables such as education, period of water scarcity in a year, awareness of water harvesting technique and source of information about water harvesting technique were positively and significantly related to household practice of a water harvesting technique. The remaining variables; uses of the harvested water and adequacy of the harvested water were also negatively and significantly affected household practice of the technique. It also point out that, experience on water harvesting technique had the highest positive and significant effects on the practice of water harvesting technique, time of water scarcity was the second influence, Thirdly was the information sources of the households, the fourth effect was the education, fifth effect was the uses of harvested water which was significant and negatively related to practice of water harvesting technique. And lastly the adequacy of the harvested water which was also significant and negatively affect the practice (Table 9).

Table 9: Regression Model: Factors affecting participation of water harvesting Techniques

Model	B	S.E	Wald	Df	Sign.	Exp(β)
EDU	.67	0.299	5.036	1	.025**	1.955
TWS	5.118	2.112	5.873	1	.015**	166.923
AHW	-11.068	4.376	6.396	1	.011**	.000
EWHS	13.729	5.354	6.576	1	.010**	917065.8
UHW	-9.291	3.903	5.666	1	.017**	.000
SIWHT	3.095	1.598	3.752	1	.050**	22.093
Constant	17.249	7.692	5.028	1	.025	3098138

**Significant at 5% Chi-square=0.204;-2 Log likelihood=16.853; N=357, Cox & Snell R2=632; Nagelkerke R2=975

Source: Field survey, 2018

Experience of water harvesting technique was significant and positively related practice of the water harvesting technique was significant and positively related practice of the water harvesting system. The exp (β) value associated with experience of the technique attained by the head of a household is 917065.8. The exp (β) implies that, in every changes of awareness level of household head, we expect 917065.8 times increase in log-odd of water harvesting practice. This suggest that, more experience of the head of the households are more likely to practice water harvesting technique compare to those who had no experience. This is in agreement with the finding of the other empirical studies, such as (Ibrahim, 2012; Rabeka 2006 & Shikur & Beshah, 2013).

Time of water scarcity of the households had a positive and significant influence on the practice of the techniques. The exp (β) value associated with period of water scarcity was 166.923. Hence, with 1-unit increase in income from farming, the odds for practice increase by 166.923. Therefore Households who had knowledge of the time of water scarcity was like to practice water harvesting technique compared to those who had not (Table 12). This finding is consistent with that of Ibrahim (2012).

Source of information about WHT has a statistically significant and positive effect on the practice of RWHT. The exp (β) value associated with source of information level attained by the head of a household is 22.093. The exp (β) implies that, in every additional increase in information source about WHT of the head of the households, we expect 22.093 times in log odds of water harvesting practice. The reveal that, the more information source of the households the more are likely to practice water harvesting technique than those with less information source (Table 12), this finding is in agreement with that of Kiriuku (2011).

Education has a statistically significant and positive effect on the practice of RWHT. The exp (β) implies that, in every additional year increase in education level of household head, we expect 1.955 times increase in log-odds of practice of rainwater harvesting techniques. This point out that, more educated households are more likely to practice rainwater harvesting techniques than less educated households. This is in consistent with most adoption studies, which depicted that people with higher levels of education attainment are more likely to practices rainwater harvesting techniques compared to less educated farmers (Dewjef & Dagne, 2015).

Uses of water had a statistically significant negative effect on practice of RWHT. The exp (β) value associated with uses is 0.000. Therefore when uses increase by 1-unit, the odds for practice of rainwater harvesting techniques decrease by 0.000. This means that households, whose uses of the harvested water were large, were less likely to practice the rainwater harvesting techniques (Table 12). This may not be unconnected to the present of others sources (Gari Reservoir) instead of depending on rainwater for their various uses in the area.

Adequacy of the harvested water had a statically significant negative effect on RWHT. The exp (β) value with adequacy of the harvested water is .000. Implying that, 1 unit increase in the level of the harvested water will decreases the practice of RWHT by 000 (Table 12).

5. Conclusion

Informal rooftop collection was the major technique practice for domestic uses, followed by earth dam technique for irrigation and animal fed in the area and the result reveals that, among the factors that affect households water harvesting technique and uses; awareness of the technique, was the major factor, follow by the water scarcity, then information source and lastly education level of the households which were found statistically positive and significant in explaining water harvesting practice for households uses in Kunchi Local Government Area.

6. Recommendations

An outreach campaign by stake holders on the encouragement of preserving the cultural heritage of the people of the area of passing information about water harvesting awareness shall be organize from time to time so that, the current level of awareness can be retained if not elevated

Awareness and mobilization on the potentialities of rooftop rain water harvesting practice and its role in bridging the gap of water supply created by the menace of water shortage should be organize in the area timely by the Local Government council Water Hygiene and Sanitation (WASH) Department and other interventionists

There is need for policy makers to increase investment in the rural dwellers education attainment as the study reveals education to have effect in enlighten people to increase RWH Practice in Kunchi Local Government Area, Kano State.

In view of the forgoing, it is recommended that all effort by stakes holders should be geared toward the promotion of rain water harvesting practice in the area by providing technical support and proper storage facilities to households to make the practice attain formal adaptation.

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