



## Towards Food Safety: Hand Washing and Environmental Hygiene Practices of Farming Households in North-Central Nigeria

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**Abstract:** In recent times, the potential of good health status of farmers in improving the agricultural productivity had been a concern hence, this study examined the hand washing and environmental hygiene practices for food safety among farming households in North-Central Nigeria. Five-stage random sampling technique was employed to select 256 farming households for the study. Interview schedule was used to elicit data from the respondents. Data collected were analyzed using frequency counts, charts, mean score and Pearson Product Moment Correlation. The result of the study shows that respondents mean age was 37years. The average number of respondents' visits to health service workers was 3 times/per annum. Majority (73.8%) of the respondents are aware of the need to always wash hands after using the toilet. There is low knowledge on the use soap/ash to wash hand before eating (36.3%), preparing food/cooking (20.3%), changing baby's wear (24.2%), after defecating (19.1%) and before feeding children (18.40%). Majority of the respondents got their water for household purposes from dug well (57%) and bore holes (52%). Majority (84%) treat their water by allowing it to stand and settle before use. The use of bush (41.8%) and pit latrine (41.4%) are the major means of defecation. Household wastes were mostly dump in a nearby bush (mean=2.51). Pearson product moment correlation analysis shows that age ( $r=0.538$ ,  $p \leq 0.05$ ), level of education ( $r=0.398$ ,  $p \leq 0.05$ ) and number of contacts with community health service workers ( $r=0.402$ ,  $p \leq 0.05$ ) were positive and significantly related to farmers households' knowledge of hand-washing and environmental hygiene practices. The study concluded that respondents were aware of the need to wash hands as food safety measure mostly before and after eating food and after defecating. It is recommended that government and other concern agencies should intensify effort in programmes that promotes food safety practices and sensitize farming households in the study area on the important of hand-washing most especially after cleaning/changing baby wears and before preparing food/cooking.

**Keywords:** Knowledge, hand washing, sources of water, waste disposal

### 1. Introduction

#### Background to the study

The practice of self-hygiene especially hand hygiene is crucial because hand is the major agent that transmits microorganisms and intestinal parasites to foods. Hand washing with soap saves more lives than any simple vaccine or medical intervention (Aarnisalo et al., 2006). It is among the most effective and inexpensive ways to prevent diarrhoea diseases and pneumonia, which together are responsible for the high mortality rate especially in developing countries. Yet, despite its lifesaving potentials, it is seldom practiced by many people in the world (UNICEF, 2008). The

use of only water to wash hands is not an effective means to remove the filth and pathogenic microorganisms from it thereby exposing the individuals to the imminent danger of food borne diseases (Bizatu and Negga, 2010).

Improved sanitation and waste management is a critical issue in the worldwide. Proper waste disposal is essential to sustain healthy living conditions in any environment and helps to insulate the inhabitants from the threat of infectious diseases that can be transmitted especially through flies and mosquitoes which can be detrimental to the living standard of the people. The uses of open unregulated system of dumping

wastes around the households are still the predominant methods of waste disposal in most developing countries including Nigeria and globally, about 2.6 billion people or 39 percent of the world population do not use improved sanitation system (William et al., 2005). Improved sanitation can lead to reduction of risk of diarrhea by 36% and good hygiene practices improve overall health through reduced rates of vulnerability to food borne diseases such as pneumonia, influenza, scabies, skin and eye infections (Cairncross et al., 2010 and UNICEF, 2010). Individual households' ability to use flush toilet and latrine promotes cleanliness of the environment, free it from odour and protect the inhabitants from diseases. On the contrary, the use of bush as place of excretion in the house is likely to expose them to vulnerability of diseases.

However, Phaswana-Mafuya and Shukla (2005) had indicated that low income statuses of the households, poor living condition, low literacy, poorly built houses, poor access to electricity and high cost clean water hinders the adoption of hygienic food safety practices. A safe and convenient water source is of paramount importance to human health and the well-being of any society. According to the report of UNESCO-WWAP (2003), rural Africans have the lowest level of access to clean water and sanitation facilities compared to other developing areas of the world. African population without access to improved sources of drinking water has increased from 280 million in 1990 to 341 million in 2006 (UNICEF/WHO, 2008). According to UNICEF/WHO (2008), more than half (58%) of rural population in Africa got their water for drinking and other household purposes from unimproved sources which put them to the risks of threat of diseases and other economic consequences such as reduction in supply of farm labour as result of disability caused by water borne diseases. The Food Security Analysis Unit (FSAU) (2007) reported that most households especially from rural areas rely on water from unprotected sources including dug wells, bore holes and rivers. A source of water is an important determinant of safety of households' health and

vulnerability of households to the risk of outbreak of food borne illnesses.

### **Problem Statements**

In African region, the number of food consumers who are highly vulnerable to food borne illness is growing (CSPI, 2005). UNICEF/WHO (2008) reported that 44% of rural population in Africa practice open defecation. In a similar vein, Gbadegesin and Olorunfemi (2007) also reported that almost half of the rural households in Nigeria used bush/field for defecation. Nigerians has over the years suffered from the problem of food-borne diseases with their implication on social, economic and health costs (Ifenkwe, 2012). Nigeria Punch Newspaper (2012) had published that over 200,000 people die from food poisoning every year in Nigeria. These deaths were caused by foods contaminated through improper processing, preservation and unhygienic handling of food. In many instances, people shake hands with people, visits toilets and even touch highly contaminated objects without caring to wash their hands properly with soap when they want to handle food. A report by the Federal Ministry of Health revealed that cholera killed close to 5,470 people in Nigeria between 2008 and 2010 (Punch Newspaper, 2012). The high prevalence rate of diarrhoea as a result of poor sanitation and hygiene practices is about 18.8 percent in Nigeria (Adejero, 2013).

Studies on knowledge of hand-washing and environmental hygiene practices for food safety in rural communities of the study area are few and the number of consumers who are highly vulnerable to food-borne illness is growing in this region (Sudershan, Rao and Polasa, 2009). It is against this back drop the research assessed the hand-washing and environmental practices for food Safety of farming households in North-Central Nigeria.

### **Objectives of the study**

The main objective of the study was to examine the hand-washing and environmental practices for food Safety of farming households in

North-Central Nigeria. The specific objectives were to:

1. Describe the socioeconomic characteristics of farming households in the study area;
2. Examine the knowledge of farming households on hand-washing in the study area;
3. Assess the importance of hand-washing among farming households in the study area;
4. Identify the sources of water among farming households in the study area; and
5. Investigate the methods of waste disposal among farming households in the study area

### Significance of the study

It is important to obtain the baseline information on food safety practices especially the aspects of knowledge of hand washing and environmental hygiene in the study area. The understanding of hand-washing and environmental hygiene practices of farming households in the study area is expected to help extension policy process for awareness creation of food safety. An increase in rate of awareness and implementation of proper hand-washing and environmental hygiene practices will promote food safety in many homes and hence prevent food borne illness out-breaks (Adejero, 2013). High knowledge of hand-washing will help in ensuring that safe food is produced, prepared and consumed in any household (Nee and Sani, 2011).

The information gathered through this cross-sectional survey of hand-washing and environmental hygiene practices will help state, national, international aid agencies to locate areas where information and education efforts for food safety remain to be plan and implemented. Such policy process will. The intervention of the concern agencies is expected translate to safeguard risks of incidences of food borne illnesses among farmers, ensure good health status of farmers and hence improved agricultural productivity in the study area.

It is important to obtain the baseline information on food safety practices especially the aspects of knowledge of hand washing, sources of

water and environmental hygiene practices of the rural farming households so that strengths and deficiencies can be noted and appropriate educational intervention can be planned and implemented.

### 2. Methodology

The study was conducted in the North-central region of Nigeria which comprises six states. The region has a total land area of 296, 898 km<sup>2</sup> representing about 32% of the total land area of the country.

The population of the study comprised of farming households in the study area. The respondents were households' food preparers or their representatives who are in charge of the responsibility of preparing foods for the entire household.

Five-stage random sampling technique was employed for the study. The first stage involves random selection of two (2) States from the North-Central Nigeria. The selected States were Niger and Nassarawa States. The second stage involves random selection of one zone from each of the selected States. Zone C was selected in Niger State while Western zone was selected in Nassarawa State. Third stage involves random selection of four (4) local governments areas (LGAs) in each zone selected. Fourth stage involves random selection of four (4) rural communities in each of the selected LGAs and lastly the fifth stage involves random selection of 8 farming households from each of the selected rural communities. In all, a total of 256 farming households were selected for the study.

Interview schedule was used to elicit data from the respondents. Data collected were analyzed using frequency counts, charts and mean score.

### 3. Results and Discussion

**Age of respondents:** Age is often assumed that as human age increases the rate of experience on various activities also increases and it is most often used to classify rural population into targetable groups (Tyabo et al., 2014). The result in Table 1 shows that 38% of the respondents are in the age range of 31 – 40 years. The mean age of

the respondents was 37 years. This finding implies that most of the food preparers of farming households are young adults who are still strong and could have the ability to supply the labor required to carry out activities for food preparation. According to Rahman et al. (2012) and Mohammed (2013), this age group of able food preparers can positively influence their food safety practices behaviour.

**Level of education of respondents:** Result in Table 1 reveals that 43% of the respondents had no formal education and only 24% of the respondents had secondary education. This implies that the educational level of the respondents was relatively low in the study area.

**Table 1.** Socio-economic characteristics of respondents

Characteristics	Frequency	Percentage
<b>Age (Years)</b>		
19 – 30	62	24.2
31 – 40	98	38.3
41 – 50	55	21.5
51 – 60	34	13.3
>60	7	2.7
Mean = 37		
Total	256	100
<b>Levels of education</b>		
No formal education	111	43.4
Quranic education	53	20.7
Adult education	6	2.3
Primary education	18	7.0
Secondary education	62	24.2
Tertiary education	6	2.3
Total	256	100
<b>Frequency of visit to health care centers per annum</b>		
<3 times	91	35.5
3 – 4 times	106	41.4
>4 times	59	23.0
Mean = 3 times		
Total	256	100

Source: Field survey, 2014.

This can be related to a similar study conducted by Musa and Akande (2003) who reported that majority of the food vendors in Ilorin had no formal education. Bizatu and Negga (2010) had reported that the poor habit of hand

washing after defecation is significantly associated with the low educational status of food preparers. This implies that low level of education observed among respondents may lead to low hand washing and environmental hygiene practices and this may increase the tendency of their exposure to the risk of food borne diseases in the study area.

**Number of health service workers' visit or contact with farming households:** The result in Table 1 reveals that most (41%) of the respondents in the study area had 3 to 4 contact with health service workers. The mean number of farming households contact to health service workers was 3 times in a year. This study suggests that the number contact to health service workers is low. This may have a negative impact on the awareness and education of farming households on food safety measures and the importance of hygienic environment.

**Knowledge of hand-washing:** The result in Table 2 indicated that majority (73.8%) of the respondents are aware of the need to always wash hands after using the toilet, while 14.80% and 11.3% of the respondents respectively gave a negative response towards knowledge of hand-washing after using the toilet. This implies that majority of the respondents are aware of the need to wash hands after using toilet although this may not translate into practices or change in attitudes. Nee and Sani (2011) reported that, increase in the level of awareness or knowledge of food safety practices by households does not always produce a positive change in food handling attitudes. However, this finding is contrary to the report of Gul (2012) who reported that a great number of food handlers are not aware and do not wash their hands before handling food, after touching their body parts and after the use of toilets.

From Table 2, the result also revealed that only 30% of the respondents indicated that it is enough just by washing hands under running water to remove dirt before touching food. In addition, 34.8% of the respondents denied the statement while, 35.20% of the respondents

indicated they don't know. This implies that the knowledge level on the inadequacy of washing hand under running water to remove dirt before touching food is not enough.

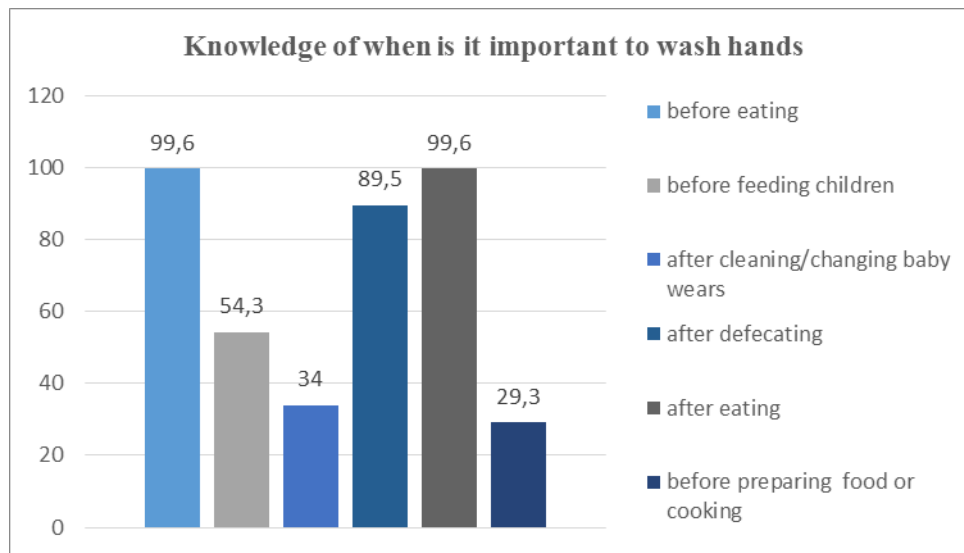
**Table 2.** Distribution of respondents on the knowledge of hand-washing (n = 256)

Knowledge level on hand washing	Yes	No	I don't know	Total
	Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)
Do you know you should always wash your hands after using the toilet?	189(73.80)	38(14.80)	29(11.30)	<b>256(100)</b>
Is it enough just by washing your hands under running water to remove dirt before touching food?	77(30.01)	89(34.80)	90(35.20)	<b>256(100)</b>

Source: Field survey, 2014.

**When wash hand is important:** The result in Figure 1 shows that majority of the respondents indicated that hand-washing important as food safety measures before and after eating food (99.6%) and after defecating (89.5%). Only 34.0% and 29.3% of the respondents respectively indicated that it is important as food safety practices to wash hands after cleaning/changing baby wears and before preparing food/cooking. The findings from the result implies that the

majority of the sampled respondents in the study area were aware of the importance of washing hands before and after eating, and washing hands after defecating. This is to say, the knowledge of respondents on importance of hand washing is considered relevant to food safety practice in the study area. This can be related to the study of KIRDARC (2009) who reported that there is increase awareness of importance of hand washing in some African countries.



**Figure 1.** Knowledge of when is it important to wash hands? Source: Field survey, 2014

**Knowledge of when soap is used to wash hands:** From the result presented in figure 2, it can be deduced that only small proportions of the respondents are aware of when to use soap to wash hands. The result indicated that 36% of the respondents use soap to wash hand before eating,

24% use it after cleaning or changing baby wears, 20% use it before preparing food or cooking and only 19% and 18% of them use it after defecating and before feeding children respectively. This implies that, the knowledge on the use soap to wash hand before eating, preparing food/cooking,

changing baby’s wear, after defecating and before feeding children is low in the study area. This may have serious negative consequence on the safety of food consumed by the households which can increase their level of vulnerability to food borne disease. This can be related to the finding of Warnock (2007) who reported that only small proportion of the rural community households’ practice washing hands with soap or ash. Although it is a common belief that washing hands with water alone to remove visible dirt is sufficient to make hands clean in most countries. But washing hands with water alone is significantly less effective than washing hands with soap in order to remove germs (UNICEF, 2008).

The low usage of soap/ash after each of the above stated activities can expose them to the threat or risk of food borne diseases and contamination. This is because, personal hygiene of farming households’ food preparers is a critical step in preventing food borne diseases and this can be enhanced through a reorientation of hand washing with soap/ash before handling raw ingredients or foods, especially after using toilet, changing babies wear, sneezing or coughing (Abd Patah et al., 2009). The practice of self-hygiene especially hand hygiene is crucial because hand is the major agent that transmits microorganisms and intestinal parasites to foods (Aarnisalo et al., 2006).

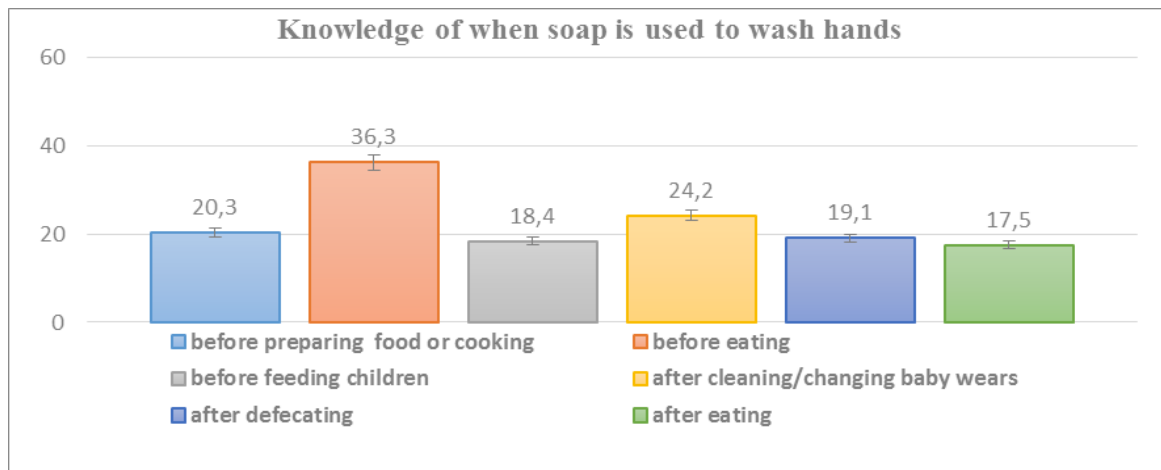
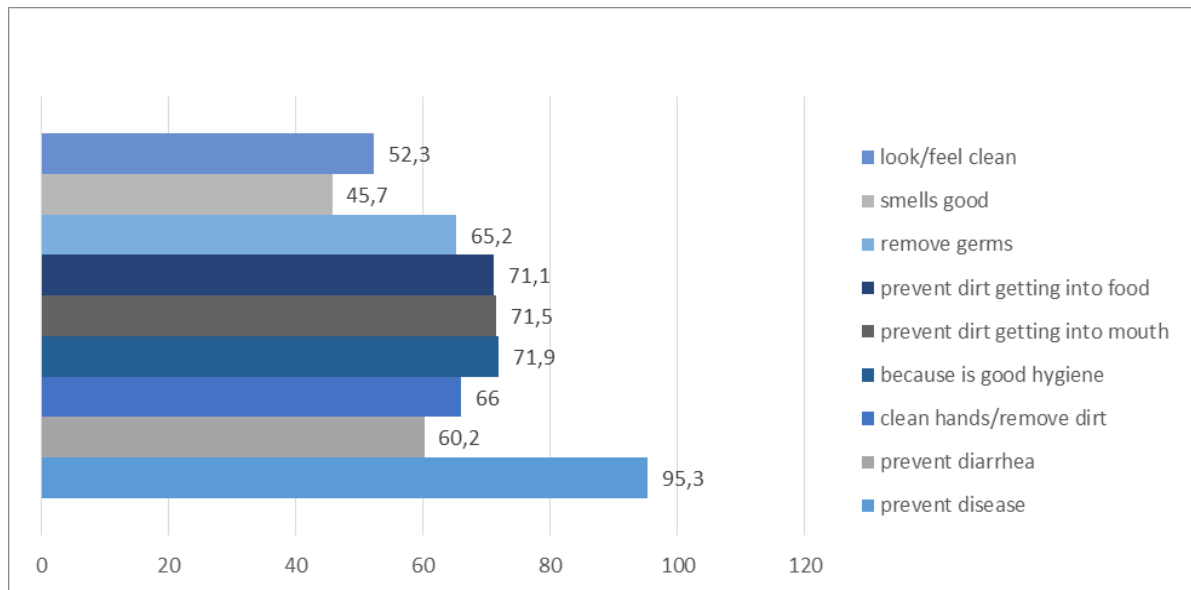


Figure 2. Knowledge of when soap is used to wash hands,

**Knowledge of why it is important to wash hands with soap:** On the importance of hand washing with soap/ash as presented in figure 3, majority of the respondents use soap/ash to prevent diseases (95.3%), as good hygiene practice (71.9%), prevent dirt getting into mouth (71.5%), prevent dirt getting into food (71.1%), remove germs (65.2%), and prevent diarrhea (60.2%). The result implies that there is high rate

of awareness on the importance of hand washing with soap/ash in the study area. In a similar vein, Cairncross et al. (2010) had reported that hand washing with soap reduces the risk of diarrhoea by 48%. UNICEF, 2008) further ascertained that regular hand-washing with soap/ash after using toilet, after changing children’s nappies and before eating or handling food saves more lives than any simple means of medical intervention.



**Figure 3.** Knowledge of why is it important to wash hands with soap

**Sources of drinking water for members of the households:** The result in Table 3 shows that slightly above half (57%) and (52%) of the respondents got their drinking water for members of the households through dug well and bore holes respectively. Similarly, 39% use lake/pond/stream as sources of water for drinking in the households. The trend of the result is an indication that, most households rely on water from unprotected sources. This result can be supported by the report of Food Security Analysis Unit (FSAU), 2007; KIRDARC, 2009) who reported that most households especially from rural areas rely on water from unprotected sources including dug wells, bore holes and rivers. These unprotected water sources results to improper water quality which causes major public health problems affecting mortality rates in highly susceptible people especially in children and immune compromised patients which may lead to lower income problems due to disease-related non-productive time (Jens et al., 2009). Unimproved sources of water put the farming households to the risks of threat of diseases and other economic consequences such as reduction in supply of farm labour as result of disability caused by water borne diseases (UNICEF/WHO, 2008).

**Methods of treating water used by households to make it safe for drinking:** Table 3 presents the summary of methods of treating water used by farming households in order to make it safe for drinking. The result in Table 3 revealed that majority (84.00%) of the respondents only allow the water to stand and settle before drinking or before using it for other household purposes. The result further revealed that only 2.70% and 11.70% of the respondents respectively treat their water through boiling and straining through cloth. This implies that, large proportion of the respondents do not give adequate treatment to the water to make it safe for drinking in the study area. The inadequacy of treating the water as required may endanger the farming households to the vulnerability of food and water borne diseases. Hence, there is need for sensitization of farming households in the study area on how to improve their knowledge and encouragement on some feasible methods of treating water (such as boiling and cloth filtration) to make it safe for drinking and also to educate them on the risks of using water from unsafe sources for drinking and other household purposes.

**Types of toilet facility use in the households:** The results in Table 4 shows that 41.8%, 41.4% and 19.1% of the respondents respectively used bush, pit latrine and toilet inside the house as their means of defecation in their households.

**Table 3.** Distribution of respondents according to sources of drinking water for members and methods of treating water to make it safe for drinking (n = 256)

Source (s) of water	Frequency	Percentage*
Bottle water	4	1.6
Pipe borne water	-	-
Dug well	146	57.0
Spring/river	65	25.4
Bore hole	133	52.0
Lake/pond/stream	99	38.7
Tanker/truck	1	0.4
<b>Methods of treating water</b>		
Boil	7	2.7
Strain through cloth	30	11.7
Filter for water	10	3.9
Let it stand and settle	215	84.0
Add alum	45	17.6
Don't do anything to it	13	5.1

\*Multiple responses, Source: Field survey, 2014

This study can be supported by the report of UNICEF/WHO (2008) that 44% of rural population in Africa practice open defecation.

**Table 5.** Distribution of respondents according to system of waste disposal adapted in the household (n = 256)

Methods of disposing waste in the households	Always Freq. (%)	Sometimes Freq. (%)	Never Freq. (%)	Mean(Std)	Rank
Waste are dumped in a nearby bush	163(63.70)	60(23.40)	33(12.90)	2.51(0.714)	1 <sup>st</sup>
Waste are dumped around the farm to decompose	43(16.80)	130(50.80)	83(32.40)	1.84(0.685)	2 <sup>nd</sup>
Waste are dumped on the open land	52(20.30)	66(25.80)	138(53.90)	1.66(0.795)	3 <sup>rd</sup>
Waste are used as manure on the farm	13(5.10)	144(56.20)	99(38.70)	1.66(0.571)	4 <sup>th</sup>
Waste are dumped in the pit	-	70(27.30)	186(72.70)	1.27(0.447)	5 <sup>th</sup>

Source: Field survey, 2014

Similar finding was reported by KIRDARC (2009) that only small proportion of the respondents properly managed their household waste by using it as fertilizer by making a compost pit, while the vast majority used to dispose refuse by discarding it anywhere. Similarly, William et al. (2005) reported that open

**Table 4.** Distribution of respondents according to type of toilet facility use in the household (n = 256)

Types toilet facilities	Frequency	Percentage*
Pit latrine	106	41.4
Toilet inside the house	49	19.1
Bush	107	41.8

\*Multiple responses, Source: Field survey, 2014

In a similar vein, Gbadegesin and Olorunfemi (2007) also reported that almost half of the rural households in Nigeria defecate in the bush/field. The use of bush for defecation by some proportion of the respondents cannot be unconnected with their poor knowledge on its effect on their health and the hazards of exposing the farming households to the vulnerability of food borne diseases through faeces in the study area.

**System of waste disposal adopted by the households:** From the result in the Table 5, the system of waste disposal adopted by respondents were nearby bush (mean = 2.51), around the farm to decompose (mean = 1.84) and open waste collection site and as manure respectively (mean = 1.66) and pit (mean = 1.27). This finding suggests that method of waste disposal in the nearby bush that was mostly adopted by respondents is improper and could expose them to foodborne diseases.

unregulated dumps are still the predominant methods of waste disposal in most developing countries Nigeria inclusive.

Tested hypothesis using Pearson Product Moment Correlation (PPMC) revealed that there is significant relationship between the socio-economic characteristics of farming households



and food safety practices of hand-washing of respondents. The result on Table 6 shows that age ( $r = 0.538$ ,  $p \leq 0.05$ ), level of education ( $r = 0.398$ ,  $p \leq 0.05$ ) and number of contacts with community health service workers ( $r = 0.402$ ,  $p \leq 0.05$ ) were positive and significantly related to farmers households' knowledge of hand-washing and environmental hygiene practices. This implies that an increase in age, level of education and number of contacts with community health service workers will lead to positive increase in the adaptation of food safety practices of hand-washing. This result supports the reports according to Rahman et al. (2012) and Mohammed (2013) increase in age group of able food preparers can positively influence their food safety practices behaviour.

**Table 6.** Pearson product moment correlation between socio-economic characteristics of farming households and knowledge of hand-washing and environmental practices

Variable	R value	P value	Decision
Age	.538	.011*	Significant
Level of education	.398	.038*	Significant
Number of contacts with community health service workers	.402	.037*	Significant

\* Correlation is significant at the 0.05 levels (2-tailed). *Source: Field survey, 2014*

#### 4. Conclusions and Recommendations

Findings of this study concluded that food prepares in the North-central of Nigeria were:

- i. Young adults and non-literate with few contact of health service workers.
- ii. Aware of the need to wash hands as food safety measure mostly before and after eating food and after defecating.
- iii. Aware of the importance of hand-washing with soap/ash as good hygienic practice to prevent diseases, dirt getting into mouth, dirt getting into food, germs and diarrhea but the use of hand-washing with soap/ash was low.
- iv. Households rely on water from unprotected sources but treat the water by letting it stand and settle.

- v. Disposal of household wastes in the nearby bush is improper and could expose them to foodborne diseases.

Based on findings in this study, the following recommendations were made to improve the food safety practices of hand-washing and environmental hygiene of respondents in the study area.

It is recommended health policy makers and other concern agencies should enhance food safety programme that will bring about increase in service delivery to farming household in the study.

There is need for extension workers to intensify effort in food safety practices programme and sensitize farming households in the study area on the important of wash hands most especially after cleaning/changing baby wears and before preparing food/cooking.

There is need for extension workers and other concern agencies to sensitize farming households on the use and importance of hand washing with soap/ash with emphasis on after defecating and before feeding children.

It is recommended that health extension workers, non-governmental organizations and relevant institutions such as media houses (i.e. radio and television stations) should organize and air food safety programmes to sensitize the farming households and the general public at large on the use and importance of hand washing with soap/ash with emphasized on after defecating and before feeding children as food safety measures. Thus, this can serve as factor of driving change to increase level of education and awareness towards food safety practices and ultimate influence on the knowledge, attitudes and practices or behavior of farming households towards food safety practices.

The unprotected sources of water used by majority of the farming households and inadequate treatment to the water to make it safe for drinking are of great concern. There is need for governments (Federal, state and local) and other private organizations to ensure the provision of safe drinking water where not existing.

To avoid the improper disposal of household wastes in the nearby bush, this study suggest that federal government and other concern international bodies should provide aid and subsidize modern toilets facilities to farming household in the study area.

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