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EEFECTS OF KNOWLEDGE OF HAND WASHING, SOURCES OF WATER AND ENVIROMENTAL HYGIENE OF FARMING HOUSEHOLDS ON SUSTAINABLE AGRICULTURE IN NORTH-CENTRAL NIGERIA

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ABSTRACT

The study assess the knowledge of hand washing, sources of water and environmental hygiene practices of farming households in North-Central Nigeria. Multi- stage simple random sampling technique was used to select 256 farming households in the study area. Interview schedule was used to elicit data from the respondents. The responses were analyzed using frequency counts and mean score. The result of the study shows that 38% of the respondents are in the age range of 31 – 40 years with a mean of 36.7 years, they had low level of education and the mean number of number of visits of health service workers to farming households is 3 times per annum. The results revealed that majority (73.80%) of the respondents are aware of the need to always wash hands after using the toilet but the knowledge on the use soap to wash hand before eating (36.30%), preparing food cooking (20.30%), changing baby's wear (24.20%), after defecating (19.10%) and before feeding children (18.40%) is low in the study area. Majority of the respondents go their water for household purposes from unprotected sources such as dug well (57%) and bore holes (52%) and the majority (84%) treat their water by allowing it to stand and settle before drinking or before using it for other household purposes which is inadequate and may endanger the farming households to the vulnerability of food and water borne diseases. The use of bush and pit latrine are the major means of defecation in the households and dumping of household waste in a nearby bush is the system of waste disposal always adopted by majority (63.70%) of the households. Health extension workers and the local authorities should establish joint participatory committees to sensitize, motivate and organize food safety promotion programmes on the need to enforce some crucial food safety practices especially hand washing with soap/ash, on the danger of open defecation and poor system of waste disposal.

KEYWORDS: *Knowledge, Hand washing, Sources of Water, Waste disposal.*

INTRODUCTION

Much of the social and economic welfare of farmers, farm workers, and their local communities depend upon farming and therefore farming must be economically viable to be sustainable. However, health and safety of food, water and environment are of important concern for those involved in farming operations in order to ensure sustainable operation and productivity.

Incidents of food-borne diseases have become a global phenomenon; every person is at risk of food born-illness emanating from consumption of unsafe food, poor hygiene and bad source of water. Even in developed countries, one out of three consumers contract disease from food-borne pathogens each year which results to death of up to 20 persons per million (FAO, 2001). In African region, the number of consumers including farming households who are highly vulnerable to food borne illness is growing, the high incidence of diarrhea diseases among newborns and young children are serious indications of poor food hygiene situation. Most children in the region experience five episodes of diarrhea per year and close to 800,000 children die each year from diarrhea and dehydration (Centre for Science in the Public Interest (CSPI), 2005).

Good levels of knowledge especially on hand washing towards food safety practices among farming households' food handlers and the effective use of such knowledge in food handling are imperative in ensuring the safe production, processing and preparation of food in any household. Aarnisalo *et al.* (2006) reported that, 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. It is among the most effective and inexpensive ways to prevent diarrhoea diseases and pneumonia, which together are responsible for the high children 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)*. 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. 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 odor 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, low income statuses of the households, poor living condition, low literacy level, unhygienic living environment and absence of infrastructural development such as poorly built houses, poor access to electricity and good/affordable water supply and have negative consequences on the living standard of the households and also hindered the adoption of hygienic food safety practices (Phaswana-Mafuya and Shukla, 2005).

Improved and better access to infrastructures like water is expected to enhance better practices, reduce vulnerability to risks of exposure to diseases, increase farm productivity and improved standard of living of farming households. 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). Hence, increase in access to improved affordable sources of water is not keeping pace to population growth. Phaswana-Mafuya and Shukla (2005) reported that high cost of water is among the factors hindering the adoption of hygienic food safety practices. According to UNICEF/WHO (2008), more than half (about 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. Absence of adequate affordable sources water either in quantity or quality can be a limiting factor in poverty alleviation and economic recovery, resulting in poor health and low productivity, food insecurity and constrained economic development (Gbadegesin and Olorunfemi, 2007). 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.

An increase in rate of awareness and implementation of proper food safety practices in many homes may help in preventing food borne illness out breaks (Adejero, 2013). Hence, food safety education of farming households will play an important role in preventing food- borne Illness. Knowledge about hand washing, proper sanitation and good sources of water for households purposes especially cooking are key factors in driving change that can lead to improvement in household food safety practices (Warnock, 2007; Liu, 2007). Good levels of knowledge towards food safety among farming households and the effective practices of such knowledge in food handling helps in ensuring that safe food is produced, prepared and consumed in any household (Nee and Sani, 2011). Since most of the activities involving food handling and food preparation are mostly carried out by females, there is need to investigate the level of knowledge on hand

washing, systems of waste disposal and sources of water of farming households in order to minimize food borne disease outbreak especially at home. 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. It is against this back drop the research initiative raises the following objectives to assess the knowledge of hand washing, sources of water and environmental hygiene practices of farming households in North-Central Nigeria. The specific objectives are to: describe the socio – economic characteristics of farming households in the study area; examine the level of knowledge of farming households on hand washing in the study area; assess the knowledge of farming households on importance of hand washing in the study area and assess the methods of disposal of waste, excreta and sources of water for farming households in the study area.

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^2 representing about 32% of the total land area of the country. It is located between latitude 6°30^{1}N to 11° 20^{1}N and longitude 2°30^{1}E to 10°30^{1}E. The research design was a descriptive survey method and the population of the study comprised farming households in the study area. The respondents were rural women who are in charge of the responsibility of preparing foods for the entire household. Multi stage sampling technique was employed for the study. The first stage involves random selection of two States from the North – central Nigeria which comprises of six States. The second stage involved random selection of one agricultural zone from each of the selected States. In the third stage, simple random sampling technique was also applied to select four (4) Local Government Areas (LGAs) from each of the selected agricultural zone. Furthermore, simple random sampling was equally applied to select four (4) rural areas in each of the selected LGAs and lastly, 8 farming households were randomly selected from each of the selected rural areas through simple random sampling technique. In all, a total of 256 farming households were selected for the study. Interview schedule was used to elicit data from the respondents. The responses were analyzed using frequency counts, charts and mean score.

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents:

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 about 38% of the respondents are in the age range of 31 – 40 years. The mean age of the respondents is 37 years which is an indication that most of the food preparers of farming households are young adults who are still strong and capable of undertaking rigorous activities in the households. This means that, the respondents are in their active age, have the ability to supply the labor required to carry out activities for food preparation for the entire farming household and this can influence their food safety practices or behaviours (Rahman *et al.*, 2012; Mohammed, 2013). This finding agrees with the report of Safefood (2002); Sanlier (2009) and Nee and Sani (2011) that food safety knowledge tends to increase with age and practice; and there was a significant difference between food safety knowledge and food preparation practices of young and adult consumers (in favour of adult consumers).

Level of education of respondents: This refers to the educational attainment of respondents which is not only an important determinant of adoption of new practices and but also an instrument for successful implementation of new practices that equips individuals with the required knowledge of how to make a living. Result in Table 1 reveals that most (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. 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. The trend of the results may lead to low knowledge level of 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. Low education among farming households' food handlers will lead to inadequate information on food safety practices such as hand washing and environmental hygiene that will lead reduction of incidences of outbreak of diseases (CSPI, 2005). Bizatu and Negga (2010) also reported that the habit of hand washing after defecation is significantly associated with the educational status of the respondents ($P<0.01$).

Number of health service workers' visit or contact with farming households: The result in Table 1 is a response of number of times the farming households have personal contact with health service workers in

the last 12 months. The result in Table 3 reveals that most (41.40%) of the respondents in the study area had 3 – 4 times contact with health service workers. The mean number of contacts between health service workers and farming households is 3 times in a year. This implies that the number of contact is low. This will have a negative impact on creation of awareness and education of farming households on food safety measures to adopt at home especially the sanitation of their environment; and on the need to use pure sources of water and to educate them on the best way to treat water for household purposes to safeguard against occurrence of food borne diseases.

The result in Table 2 indicated that majority (73.80%) of the respondents are aware of the need to always wash hands after using the toilet, while 14.80% and 11.30% 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 results also revealed that only 30.01% of the respondents indicated that it is enough just by washing hands under running water to remove dirt before touching food. In addition, 34.80% 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. Washing hands only with water is not an effective means to remove the filth and pathogenic microorganisms from it (UNICEF, 2008; Bizatu and Negga, 2010).

Knowledge of when it is important to wash hands: The result in Figure 1 shows that higher proportion (99.60%) or almost all of the respondents indicated that the knowledge of importance of washing hands before and after eating is crucial to food safety practices in the study area. Similarly, 89.50% of the respondents indicated their knowledge of importance of washing hands after defecating. Good levels of knowledge towards food safety among farming households and the effective practices of such knowledge in food handling helps in ensuring that safe food is produced, prepared and consumed in any household (Nee and Sani, 2011). However, only 34.00% and 29.30% of them respectively indicated that it is important to wash hands after cleaning or changing baby wears and before preparing food or cooking. This implies that the knowledge on this aspect of food safety practices is low in the study area. This may have negative influence on sustainable farming and productivity in the study area. This may expose the farming households to the threat of diseases and also influence sustainable agricultural production especially in the supply of farm labour as result of disability caused by food borne diseases, increased in cost of health care services and diversion of attention to other non – farm activities such as taking care of sick family members. 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).

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 36.30% of the respondents use soap to wash hand before eating, 24.20% use it after cleaning or changing baby wears, 20.30% use it before preparing food or cooking. Similarly, only 19.10% and 18.40% of them use it after defecating and before feeding children respectively. This implies that, the knowledge on the use soap on these food safety practices is low in the study area. This to say only small proportion of the rural community households' practice washing hands with soap or ash (Warnock, 2007). This has serious negative consequence on the safety of food consumed by the households which can increase their level of vulnerability to food borne disease, contaminations and reduction in farming activities. Washing hands only with water is not an effective means to remove the filth and pathogenic microorganisms from it (UNICEF, 2008; Bizatu and Negga, 2010). Hand washing with soap/ash although seldom practiced by majority of people saves more lives than any simple vaccine or medical intervention. It is among the most effective and inexpensive ways to prevent diarrhoea diseases and pneumonia, which together are responsible for the high children mortality rate

especially in developing countries (UNICEF, 2008). Personal hygiene of farming households' food preparers is a critical step in preventing food borne diseases and this can be enhanced through compulsory washing of hands with soap/ash before handling raw ingredients or foods, especially after using toilet, changing babies wear, sneezing or coughing (Abd Patah *et al.*, 2009).

Knowledge of why it is important to wash hands with soap: On the importance of hand washing with soap/ash, the results revealed that high proportion (95.30%) of the respondents indicated that washing of hands with soap is important in order to prevent diseases, because is a good hygiene (71.90%) and to prevent dirt from getting into mouth and food. Similarly, only about 45.70% of the respondents considered importance of washing hands with soap just for hands to smell good. The result implies that, there is high rate of awareness on the importance of hand washing with soap in the study area. This can be related to the study of Campbell (2011) who reported that washing hands with soap is important to be cleaned and reduce vulnerability to food borne diseases. In a similar vein, Cairncross *et al.* (2010) also reported that hand washing with soap reduces the risk of diarrhoea by 48%. Although 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 (UNICEF, 2008), but 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 of the households' food preparers (Nee and Sani (2011).

Sources of drinking water for members of the households: The results in Table 3 show 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, about 38.70% 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. FSAU, 2007; KIRDARC, 2009 reported that most households especially from rural areas rely on water from unprotected sources including dug wells, bore holes and rivers. This 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 diseases resulting to nonproductive 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: 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 other household purposes.

Types of toilet facility use in the households: The results in Table 4 shows that 41.80% and 41.40% of the respondents respectively used bush and pit latrine as their means of defecation in their households while only 19.10% of the respondents have their toilets in the house. This study can be supported by the report of UNICEF/WHO (2008) 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. Poor sanitation, hygiene and unsafe water are responsible for high cases of diarrhea in the world especially developing countries which results to high children mortality rate (UNICEF, 2008). 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 faces 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 majority of the respondents includes "wastes are always dumped in a

nearby bush" (mean = 2.51), followed by "waste are dumped around the farm to decompose" (mean = 1.84) and "waste are dumped on the open waste collection site or open land" (mean = 1.66). The result further revealed that majority (mean = 1.27) "never dumped their waste in a pit". This implies that majority of respondents in the study area do not always observe the proper system of waste disposal through dumping them in the pit or using/dumping them around the farm to decomposed to serve as manure. Hence, there is high tendency of farming households to be exposed to the risk of diseases especially diarrhea. Proper disposal of household wastes and improved sanitation attributes to 36% reduction in risk of diarrhea (Cairncross *et al.*, 2010). This result implies that only small proportion of the rural households properly manage their household waste by using it as fertilizer through making a compost pit. Hence, open unregulated dumps are still the predominant methods of waste disposal in most developing countries Nigeria inclusive (William *et al., 2005; KIRDARC, 2009).*

CONCLUSION AND RECOMMENDATIONS

From the result of the study it can be inferred that majority of food preparers of farming households are young adults with low level of education and the number of visits of health service workers to farming households is also low. The knowledge level of hand washing and importance of this practice is high in the study area but the knowledge on the use of soap to wash hands before eating, preparing food/cooking, changing baby's wear, after defecating and before feeding children is low in the study area. Majority of the households rely on water from unprotected sources which is inadequately treated to make it safe for drinking and this can endanger the farming households to the vulnerability of water borne diseases. Most of the households use bush and pit latrine as their means of defecation and waste are mostly dumped in a nearby bush in the study area. Health extension workers and the local authorities should establish joint participatory committees to sensitize, motivate and organize food safety promotion programmes on the need to enforce some crucial food safety practices especially hand washing with soap/ash, on the danger of open defecation and poor system of waste disposal. This will help to change their behaviours, perception and reduce vulnerability to diseases. The use of households' wastes for economic benefits such as manure through composting which can serve as a good source of organic manure should also be encouraged in the study area.

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Table 1: Socio-economic characteristics of respondents in the study area (n = 256)

Characteristics	Frequency	Percentage
Age (Years)		
19 – 30	62	24.20
31 – 40	98	38.30
41 – 50	55	21.50
51 – 60	34	13.30
>60	7	2.70
Mean = 37		
Total	**256**	**100**
Levels of education		
No formal education	111	43.40
Quranic education	53	20.70
Adult education	6	2.30
Primary education	18	7.00
Secondary education	62	24.20
Tertiary education	6	2.30
Total	**256**	**100**
Number of visits by health service workers to farm households per annum		
<3 times	91	35.50
3 – 4 times	106	41.40
>4 times	59	23.00
Mean = 3 times		
Total	**256**	**100**

Source: Field survey, 2016.

Table 2: Distribution of respondents on level of knowledge on 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)	256(100)
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)	256(100)

Source: Field survey, 2016.

Table 3: Distribution of respondents according to sources of drinking water for members and methods of treating water used by households to make it safe for drinking (n = 256)

Source (s) of water	Frequency	Percentage*
Bottle water	4	1.60
Pipe borne water	-	-
Dug well	146	57.00
Spring/river	65	25.40
Bore hole	133	52.00
Lake/pond/stream	99	38.70
Tanker/truck	1	0.40
Methods of treating water		
Boil	7	2.70
Strain through cloth	30	11.70
Filter for water	10	3.90
Let it stand and settle	215	84.00
Add alum	45	17.60
Don't do anything to it	13	5.10

*Multiple responses
Source: Field survey, 2016.

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	41.40
Toilet inside the house	49	19.10
Bush	107	41.80

*Multiple responses
Source: Field survey, 2016.

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

Source: Field survey, 2016.

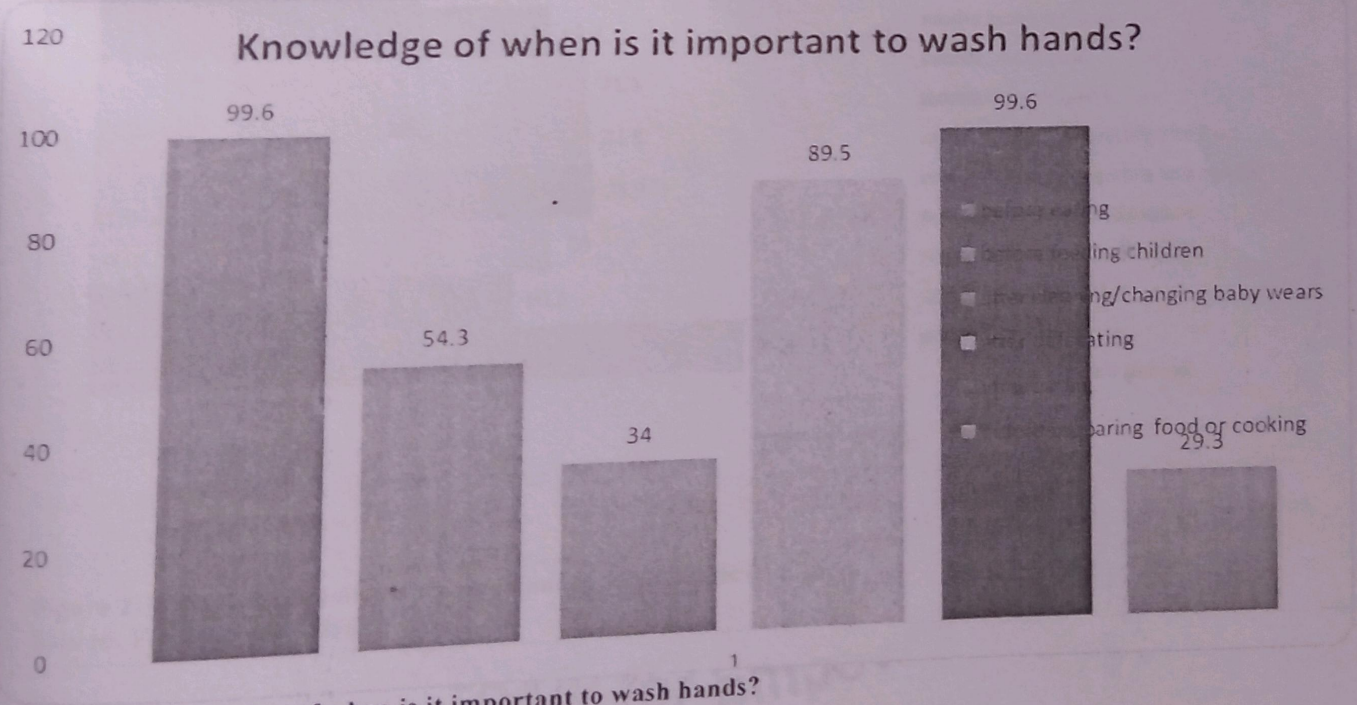

Figure1: Knowledge of when is it important to wash hands?
Source: Field survey, 2016.

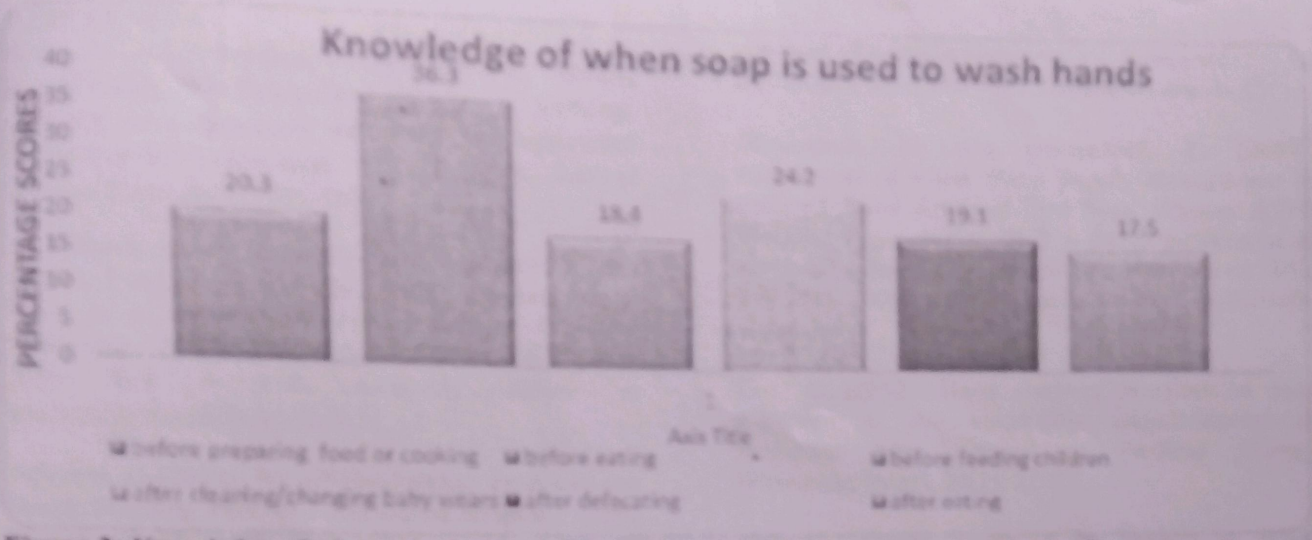

Figure 2: Knowledge of when soap is used to wash hands
Source: Field survey, 2016.

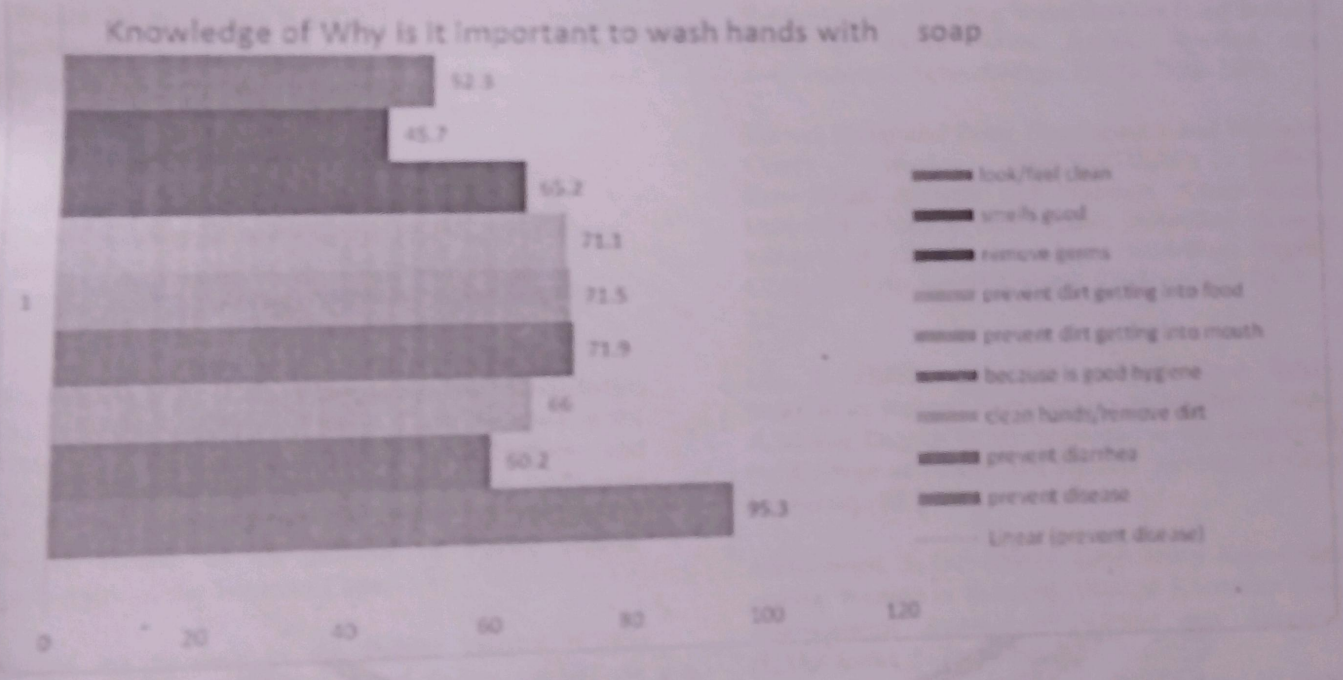

Figure 2: Knowledge of why is it important to wash hands with soap
Source: Field survey, 2016.

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