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Relationship between Socio Demographic Status and Risk Factors for Micronutrient Utilization among Mothers in Mwea West Sub County, Kenya

Mugambi, Rahab M.[1], Imungi, J. K.[2], Waudo, J. N.[3], Ondigi, A.[4],

1. Department of Hospitality Management, Kenyatta University
2. Department of Food Science, Nutrition and Technology, University of Nairobi
3. Department of Food Nutrition and Dietetics, Kenyatta University
4. Department of Hospitality Management, Kenyatta University

Abstract
The purpose of the study was to determine the Risk Factors for Micronutrient Utilization among the Mothers in the Sub County and in particular water sources and waste disposal. The sampling frame included all the mothers with at least one child aged 2 to 5 years. The survey design was employed and was cross sectional in nature. The sample size was 401. It was established that canal water was used by majority of the Households. Other sources included piped water, river borehole and roof catchment. The household water source was significantly correlated to Occupation, House construction type, Income level and Size of land owned by the households. These variables contributed up to 60.1% of the variations in household water sourcing in the Sub County. Majority of the respondents, disposed of their waste through burning the refuse, compost pit, or fed it to livestock. The waste disposal methods were not significantly correlated to household socio-demographics.
Key Words: Malnutrition, Micronutrient Status, Micronutrient utilization, Food Security, Micronutrient risk factors

1. Introduction

Micronutrients (minerals and Vitamins) are required by the body in very small quantities, but they have to come from specific foods especially animal products, vegetables and fruits. They have the role of protecting the body from infections as well as facilitating growth. However, there are many risk factors that affect micronutrient utilization negatively including: poor access to health care, low education/low literacy of the mother resulting to low income, poor water and sanitation resulting to infectious diseases, inadequate care practices, monotonous plant based diet, low intake of animal source foods, and seasonal variations. According to Konttinen et al., 2012, low education is related to low income. Low income in turn is a risk factor for micronutrient utilization.

Konttinen et al., (2012), argue that the less educated people tend to consume greater amount of energy dense food than the educated people with more income who will normally consume plenty of fruits and vegetables. People with low incomes consume very little healthy food (fruits and vegetables) because they perceive fruits and vegetables to be expensive and hence spend their money on the familiar energy dense foods like ugali, potatoes and rice. In rural areas where majority of people depend on the food they grow, items like meat and other animal products are usually a luxury only likely to eaten during special holidays like Christmas when every family tries to have at least one meal with meat., it has been found that monotonous plant based diet (ugali, rice, cassava, potatoes bananas), result in low micronutrient intake and poor bioavailability especially of minerals. In addition, low intake of animal source foods, (milk, eggs, poultry meat) due to poverty prevailing in rural areas, is especially a critical factor for micronutrient utilization (Howard and Edge, 2013).

In rural areas, people access food by growing their own food. They depend on adequate and timely rainfall. It is possible to grow many types of food crops for household consumption. However, there may be times when the rain fails the households because crops do not grow. If this happens, micronutrients and food consumption in general becomes affected more so because people in rural areas are unemployed and lack money to buy food. This results in poor food access and insufficient intake of micronutrient rich foods. According Howard and Edge, (2013), water is essential for drinking, preparing food, and maintaining proper hygiene. The lack of access to clean water, (free from microorganisms and other pollutants), is risk factor to micronutrient utilization. Dirty water will result in diarrhea and other water borne diseases all of which interfere with ingestion and absorption of micronutrients, resulting to micronutrient deficiencies. Acute infection resulting from dirty water and poor sanitation increases physiological demand of micronutrients on the individual and makes the micronutrient deficiency even more acute. Disease prevention and management, including proper sanitation and hygiene

practices, are important for proper micronutrient utilization. Undernourished human bodies are more susceptible to illness like diarrheal disease and pneumonia, but with proper nutrition, (diets with the recommended dietary allowances), sanitation and hygiene, many diseases, especially those caused by food and water contaminants, are less likely to occur (Benson, 2004),.

Inadequate care practices as well as unhealthy environment contribute to poor micronutrient utilization too (FAO 2008). The failure to observe hygienic practices, like washing hands after visiting the toilet, before eating and preparing foods, may result in ingesting disease causing microorganisms. This may make them have food infection and poisonings accompanied by diarrhea and vomiting, which results in poor food absorption (poor micronutrient utilization). Benson, (2004) argues that people with poor access to health services are at increased risk of infectious diseases, which affect food utilization and hence may increase risk of micronutrient deficiency. This is because; an infection that is not given medical attention immediately interferes with the appetite of the individual and this affects food intake and hence lowers the amount of nutrients absorbed.

2. Problem Statement

Women are more vulnerable to individual and household food insecurity. They do low paying casual jobs, are responsible for unpaid domestic work such as caring for children and other family members, washing clothes and cleaning the house. Rural women are particularly vulnerable to household food insecurity and its consequences. They have unique characteristics including less education, less chances of employment opportunities while being more likely to be mothers and caring for children (Sharkey et al., 2011). While studies have been conducted on their food security status and dietary intake of micronutrients in the study location, it was found necessary to investigate the factors that may interfere with absorption of Vitamins and mineral salts after food is ingested. The purpose of the study was to analyze the Risk Factors for Micronutrient Utilization among the Mothers in the Sub County and in particular water sources and waste disposal.

3. Hypothesis

H_0: There is no correlation between Socio Demographic Status and Risk Factors for Micronutrient Utilization among Mothers in Mwea West Sub County, Kenya

4. Methodology

4.1 Research Design, Target Population and Sampling

The survey design was cross sectional in nature and facilitated collection of self-reporting data using a structured questionnaire tool. The sampling frame was all mothers with at least one child aged 2 to 5 years. There were 12,909 households (GOK, 2009). The size of the sample was calculated using the formula proposed by Fisher et al., (1991) with the inputs of 95 % confidence level, 5 % of margin of error, non-response rate of 5 % and the poverty prevalence rate of 46%, (GoK, 2005). Accordingly, sample size of 401 was computed. Probability proportionate to size of population sampling technique was then adopted as suggested by Turner (2003). Socio-economically, Mutithi households are poorer than those of Kangai (GoK, 2009).

4.2 Data and Data Methods

Information on their demography was sought respective of their education occupation, income, household's arable land and on household's expenditure on food. Information on water sources was also sought where options included: piped water, river, canal, roof catchment, protected borehole, unprotected borehole, protected spring and unprotected spring. The mother was also to state their opinions on the safety of the water and the steps she under took if she suspected that the water source was not safe for drinking. On environmental sanitation, the mothers were to state how they disposed of dry waste from their household and whether her family had a latrine. The responses were computed for frequencies, proportions and cross tabulations, while t-test was used to test the hypothesis. The factors were then run through logistical regression to assess their impact on risk factors for micronutrient utilization.

5. Findings

5.1 Sources of water

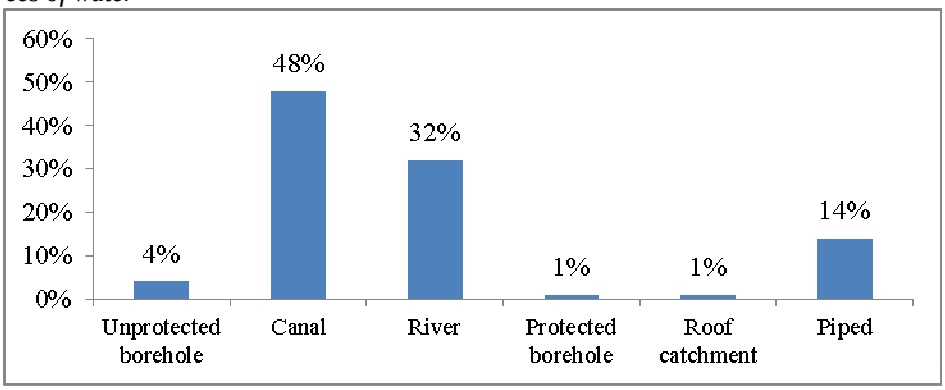

Figure 5 Household sources of drinking water

The findings were that canal water was used by majority of the population, in the study area. The percentage of respondents using surface water is alarmingly high and is much higher than the findings by Famine Early Warning Systems Network (FEWS NET, 2013) who in their document, Kenya Food Security Brief of December 2013, indicate that only 39% of the population used surface water mainly from lakes, rivers streams and canals. Water that is safe for drinking should be piped and treated to ensure that it has no pathogenic microorganisms and other dangerous substances like industrial wastes. This study found that only 14% of the respondents accessed piped water. Bore holes were used by about 4% of the respondents which means that they are uncommon in the study area. However, other studies found bore holes to be quite important sources of water in the rural areas. For example, Waiswa (2008) found that 76.6 % of her respondents used bore holes and public wells as sources of water. In this study majority of the respondents used either canal or piped water. To determine if the household water sources were influenced by the social demographics, a correlations analysis was conducted as shown in Table 2

Table 3Correlation between household water sources and social demographics

	Pearson Correlation		Spearman's Correlation	
	r	p- value	r	p- value
Occupation	0.201	0.000*	0.192	0.000*
Education level	0.062	0.217	0.047	0.348
Type of house construction	0.101	0.044*	0.190	0.000*
Household monthly food expenditure	0.082	0.104	0.079	0.118
Size of land owned	0.112	0.026*	0.131	0.009*
Income level	-0.159	0.002*	-0.158	0.002*

It was established that the household water source was significantly correlated to Occupation, House construction type, Income level and Size of land owned by the households. The null hypothesis is therefore rejected.

Perceptions on water safety

The mothers were required to state if their water source was safe for drinking.

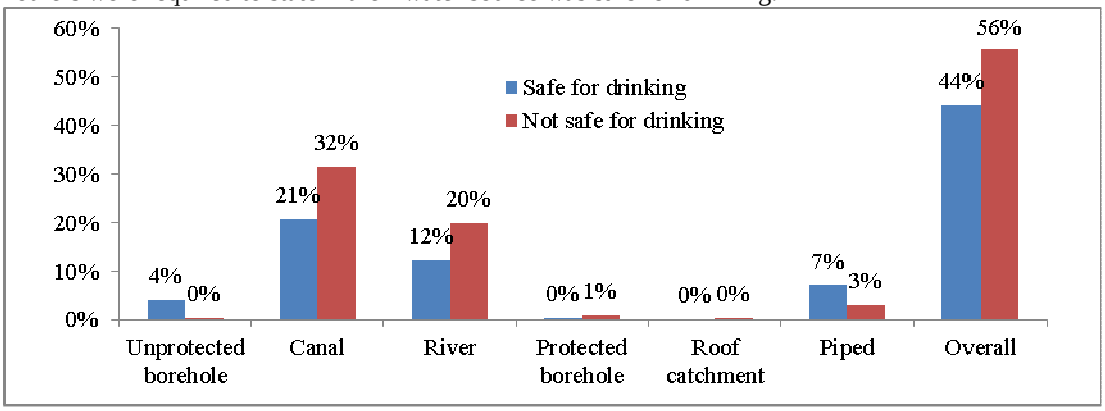

Figure 6 Mothers' perceptions on water safety

Only about half (56%) of the mothers said that their water source was safe for drinking. There was no single source of water that the mothers unanimously agreed was a safe for drinking. To determine if their perceptions were influenced by social demographics, a correlations analysis was conducted as shown in Table 3

Table 4 Correlation between

	Pearson Correlation		Spearman's Correlation	
	r	p- value	r	p- value
Occupation	-0.013	0.801	-0.045	0.371
Education level	-0.005	0.917	-0.018	0.725
Type of house construction	-0.100*	0.046	-0.108*	0.031
Household monthly food expenditure	-0.052	0.304	-0.051	0.307
Size of land owned	-0.100*	0.046	-.126*	0.012
Income level	0.118*	0.019	0.096	0.057

It was established that the perceptions on water safety was significantly correlated to house construction type, Income level and Size of land owned by the households. The null hypothesis is therefore rejected.

Water treatment methods

The water treatment methods employed by those who indicated that their water source was unsafe were summarized in Figure 3

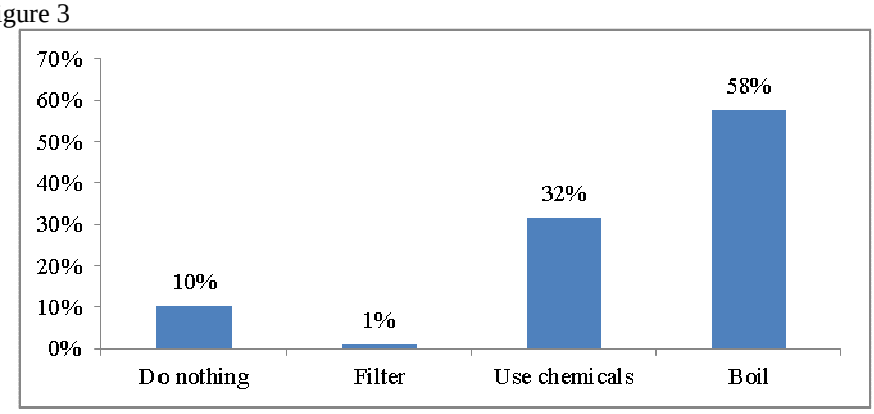

Figure 7 Household water treatment practices

The majority of the mothers indicated that they made the water safe by boiling (58%), using chemicals (32%) or filtering (1%). The percentage of respondents treating their water was quite high compared to findings of other studies. For example, a study done by WFP, (2009) found that only 2.1 % treated their drinking water while 97.1% of the respondents did not. To determine if water treatment practices were influenced by social demographics, a correlations analysis was conducted as shown in Table 4

Table 5Correlation between

	Pearson Correlation		Spearman's Correlation	
	r	p- value	r	p- value
Occupation	-0.095	0.159	-0.051	0.455
Education level	-0.017	0.8	0.009	0.897
Type of house construction	0.03	0.658	0.102	0.129
Household monthly food expenditure	-0.13	0.053	-0.111	0.099
Size of land owned	-0.171	0.071	-0.148	0.068
Income level	-0.02	0.769	-0.121	0.073

It was concluded that the water treatment methods were not significantly correlated to household demographics.

Waste disposal

Information sought from the mothers on their waste disposal practices was summarized in Figure 4

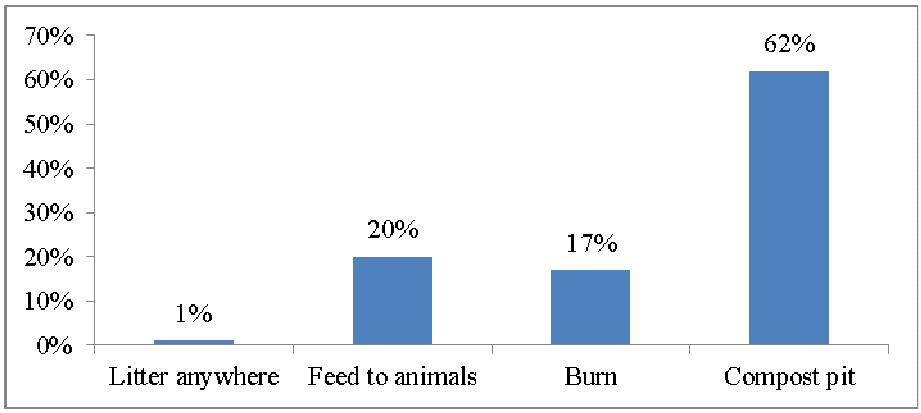

Figure 8 Household waste disposal practices

Majority of the respondents, (62%) put the waste in a compost pit, burnt the refuse, or fed it to livestock. while 1% just littered the compound. The littered solid waste is likely to hold water which can be a breeding ground for dangerous pests, insects and parasites. To determine if waste disposal practices were influenced by social demographics, a correlations analysis was conducted as shown in Table 5

Table 6Correlation between

	Pearson Correlation		Spearman's Correlation	
	r	p- value	r	p- value
Occupation	0.117	0.122	0.077	0.134
Education level	-0.034	0.513	-0.034	0.503
Type of house construction	0.06	0.24	0.08	0.119
Household monthly food expenditure	0.044	0.387	0.074	0.148
Size of land owned	-0.004	0.946	0.015	0.772
Income level	-0.011	0.823	-0.005	0.918

It was established that the waste disposal methods were not significantly correlated to household socio-demographics.

Use of pit latrine

Information sought on the use of pit latrine was summarized in Figure 5

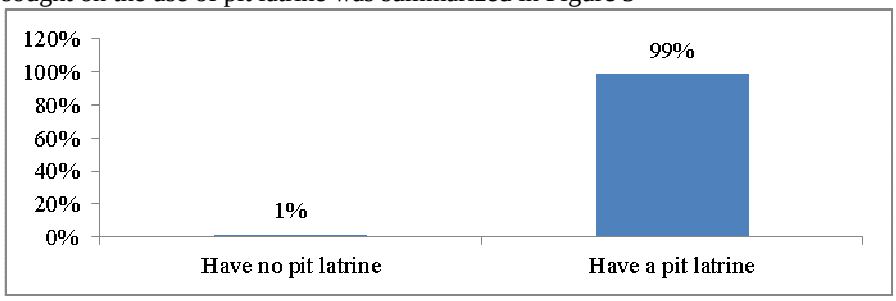

Figure 9 Households' use of pit latrines for sanitation

Majority of the households also had pit latrines, with the few (1%) without indicating that they used the neighbor's.

Access to improved sanitation facility, like access to piped water is very important. A household's toilet facility is considered hygienic if it is used only by household members (not shared by other households). The findings were almost similar to those of Waiswa (2008). In her study "household food insecurity and micronutrient status of the under five years old in Nava Kholo Division, Kakamega (2008)," Waiswa found that 1.5% of her respondents did not have latrines. Those without latrines used the neighbor's. The percentage of respondents accessing a latrine is also similar to that of Kirinyaga County (90%) (CDP, 2013). The rate of accessing a latrine was very good when compared to other countries like Cambodia where only 16.4 % of the rural residents had access to a toilet/ latrine (www.foodsecurityatlas.org 2009). To determine if waste disposal practices were influenced by social demographics, a correlations analysis was conducted as shown in Table 6

Table 7Correlation between

	Pearson Correlation		Spearman's Correlation	
	r	p- value	r	p- value
Occupation	-0.044	0.381	-0.045	0.376
Education level	0.034	0.501	0.034	0.501
Type of house construction	-0.073	0.15	-0.069	0.17
Household monthly food expenditure	-0.067	0.183	-0.076	0.136
Size of land owned	-0.034	0.498	-0.034	0.508
Income level	0.01	0.843	0.012	0.816

It was established that the use of pit latrines was not significantly correlated to household socio-demographics.

5.2 Effect of socio demographic variables on risk factors for micronutrient utilization

5.2.1 Effect of socio demographic variables on sources of water

Table 8 Logistical regression on socio demographic variables and sources of water

Model Fitting Information				
Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	637.168			
Final	348.621	288.548	90	.000
Pseudo R-Square				
Cox and Snell		.517		
Nagelkerke		.601		
McFadden		.369		
Likelihood Ratio Tests				
Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	348.621[a]	.000	0	.
Occupation	568.773[b]	220.153	15	.000
Education level	372.594[b]	23.974	15	.066
Type of house construction	472.467[b]	123.847	15	.000
Household food expenditure	369.335[b]	20.714	15	.146
Size of land owned	386.394[b]	37.774	20	.009
Income level	373.600[b]	24.980	10	.005

The findings therefore show that *Occupation, House construction type, Income level* and *Size of land owned by each household* were the most critical socio- economic variables as far as water sources was concerned and contributed up to 60.1% of the variations in household water sourcing in the Sub County.

Table 9 Logistical regression on socio demographic variables and waste disposal practices

Model Fitting Information				
Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	568.830			
Final	481.012	87.818	54	.002
Pseudo R-Square				
Cox and Snell		.205		
Nagelkerke		.239		
McFadden		.117		
Likelihood Ratio Tests				
Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	481.012[a]	.000	0	.
Occupation	490.862	9.850	9	.363
Education level	496.479	15.467	9	.079
Type of house construction	513.912	32.900	9	.000
Household food expenditure	490.416	9.405	9	.401
Size of land owned	498.146	17.135	12	.145
Income level	484.604	3.592	6	.732

The findings therefore show that type of house construction was the most critical socio-economic variable as far as waste disposal was concerned and contributed up to 23.9% of the variations in household waste disposal practices in the Sub County.

6. Conclusion

Safe drinking water is a determinant of health and nutrition status of mothers and other members of the household. Safe drinking water can reduce the risk of major diseases such as diarrhea (WFP, 2011). Water is required for domestic work and its availability is necessary for washing and cooking and this helps to control infections. Poor access to drinking water as well as poor environmental conditions are all indicators of poor utilization of micronutrients. Studies have found river and canal water to be polluted with micro-organisms (bacteria, virus, and parasite) which cause diseases like typhoid, cholera, diarrhea and dysentery (Marshall, 2011). These diseases interfere with micronutrient absorption and utilization. It was concluded that the communities studied were likely to be both food and micronutrient insecure. Additionally, Bamji (2011) inadequate access to: safe drinking water, clean disease free environment, health care facilities, and care for vulnerable members of the society contribute to micronutrient deficiencies. Accordingly micronutrient deficiencies are therefore hidden hunger which is triggered by infections resulting from dirty water and dirty environment and consequently cause loss of appetite and impaired absorption and utilization of micronutrients. Education level of mothers was found to be correlated to micronutrient insecurity. a recommendation is made that the mothers be organized in self-help groups and be equipped with life skills particularly in health education (importance of boiling drinking water) and nutrition (importance of fruits and vegetables in the diet, importance of balanced diet).

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