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Assessing Dietary Intake and Nutritional Status of Women of Reproductive Age: A Case of Sokoni Ward Kilifi County

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Abstract:

Malnutrition is a multi-factorial factor in the human body and poor dietary habits is still a serious public health issue in Kenya today. The objective of this study was to assess the dietary habits and nutritional status of women of reproductive age in Sokoni ward of Kilifi County. The study used a cross sectional study conducted from Jan-April 2022 on women aged 15-49 years who were randomly selected from Sokoni ward. Fisher's formula was used to determine sample size and a sample of 174 participants was arrived at. Data on anthropometric measurements were collected for nutritional status assessment. Data on socio-demographic characteristics, socio-economic status and dietary habits were collected. Analysis was done using SPSS version 20 and NUTRI survey. Results showed that the majority (49%) of women had attained primary education and 48.4% did not attain formal education. Majorities (79%) were married and the average household size was 5-7 persons (60%). Majority (58%) of participants were housewives with 22% as traders and 14% farmers. Majority of women were underweight (67%) while the majority consumed carbohydrates foods at 51.4% protein was consumed at 30%, fruits at 30% and vegetables at 53%. The study concludes that the study participants had poor dietary habits and poor nutritional status. They also were deficient in educational status and had unreliable economic activities. There is need to front nutrition education for women of reproductive age and also encourage them to take an active role in economic activities to ensure food security and well-being of such women.

Keywords **—** dietary intake, nutritional status, women, reproductive age

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INTRODUCTION

Poor dietary quality and diversity are a key reason for mortality and disability in the world today. This can increase the risk for overweight and non-communicable (NCDs) which have been identified as global priority (Marinel et al, 2019, WHO, 2016). Insufficient dietary intakes coupled with infection and exacerbated by poor health care result in malnutrition, which is a complex condition that encompasses severe undernutrition, micronutrient deficiencies, overweight and obesity (Chisela et al, 2019). Maternal stunting and low Body Mass Index (BMI) increase the risk for fatal growth restriction, obstructed labor and neonatal and maternal death (Black et al, 2013, Chisela et al, 2019).

World-wide in 2016 about 40% and 15% of adult women were estimated to be overweight and obese respectively (WHO, 2018, Chisela et al., 2019). Iron, zinc, iodine and vitamin A deficiencies affect about 2 billion people (WHO, 2015, Nkirigacha et al, 2016). Anemia prevalence has decreased lately but it is still considered a public health concern according to the World Health Organization (Stevens, 2013). At the World Health Assembly,

United Nations member states committed to prevention of all forms of malnutrition in the vision 2030 document (UNGATW, 2015). Globally malnutrition is prevalent among women of reproductive age, where approximately 15% are underweight and 35% are overweight (WHO, 2015). In Kenya analysis of BMI shows that 9% of women aged 15-49 years are underweight while the proportion of overweight and obese women increased from 15% in 2008-2009 to 35% in 2015 (Arimond et al., 2010). In addition, estimates from the Kenya Ministry of public Health (MoPHs, 2011) shows that micronutrients malnutrition is also predominant among women of reproductive age, where 48, 52 and 40% suffer from iron, zinc and vitamin A deficiency respectively (MoPHs, 2011).

Macro- and micronutrient deficiencies impose a large health burden in terms of lost productivity, increased susceptibility to diseases, impaired Arimond et al., 2010 growth and development (Popkin &Slining, 2013). Intake of high diverse diets has been associated with lower rates of malnutrition, hence increasing dietary diversity among women will be an important approach to improve their nutritional and health parameters (Nkirigacha et al, 2016). Women have increased dietary and nutrients needs during pregnancy and lactation and when these requirements are not met women may suffer from malnutrition. This situation is likely to negatively influence the growing fetus and the quality of breast milk (Nkirigacha et al, 2016, Maureen et al, 2019).

Monotonous diets often dominated by starchy staples and a lack of fruits, vegetables and animal-source foods, are the norm in resource-poor settings (Arimond et al., 2010; Giles et al, 2020). Nevertheless, comprehensive data on dietary patterns, diet quality and subsequent micronutrient adequacy from nationally representative studies are scarce (Gile et al., 2020). In women of reproductive age, other than inadequate dietary intake patterns, reproductive biology, lack of education, socio-cultural traditions, poverty and disparities in household also contribute to undernutrition in women (Bhandari, 2016). Women who consume limited diets in protein and carbohydrates can be severely malnourished mothers who are at increased risk of child mortality (Dimissie, 2003; Bhandari et al 2016).

Nutritional status is an indication of the overall well-being of a population. Adequate nutritional status of women is important for good health and increased work capacity of women themselves as well as for the health of their offspring (Bhandari et al, 2016; Gileset et al, 2020). When women of reproductive age portray poor nutrition this becomes an indicative of greater health risk to both mother and children born to them (Bhandari et al, 2016). This is what necessitates continuous monitoring of their nutritional status and dietary intake especially in poor resource countries like Kenya.

Numerous methods are available for assessing individual dietary intake (Giles et al, 2020, Gison et al., most necessitate highly proficient enumerators and executory resource-intensive data collection, processing and analysis (Giles et al, 2020).

The study's objective is to assess the dietary patterns and nutritional status of women of reproductive age in the study area. In other words, the study intends to measure diversity in dietary behavior with regard to important and commonly consumed food groups and nutritional status of women of reproductive age.

Methodology

Study Area

The county has six sub counties namely, Kilifi, Ganze, Malindi, Magarini, Rabai and Kaloleni. **Kilifi County** is a County of Kenya. It was formed in 2010 as a result of a merger of Kilifi District and Malindi District. Its capital is Kilifi and its largest town is Malindi. The county has a population of 1,453,787. It covers an area of 12,245.90 km^2 (4,728.17 sq mi). Kilifi County has a total population of 1,453,787 of which 704,089 are males, 749,673 females and 25 intersex persons. There are 298,472 household with an average household size of 4.4 persons per household and a population density 116 people per square kilometer. The county is located north and northeast of Mombasa. Kilifi has fewer tourists than Mombasa County, but there are some tourists' beaches in Kikambala, Watamu and Kilifi. The study was conducted in Kilifi North Sub-County. The Sub-County has seven wards namely Tezo, Sokoni, Kibarani, Dabaso, Matsangoni, Watamu and Mnarani. Data was collected on women of reproductive age from Sokoni and Kibarani wards.

Study Methodology

The study population was women of reproductive age (15-49 years) residing in the randomly selected Sub-County of Kilifi County. This household level study was conducted from January to April 2022 in the randomly selected Kaya ward in the sub-county. Interviews of reproductive age women were done at the household using structured questionnaires. Information regarding socio-demographic characteristics, anthropometric measurements, dietary intake patterns, possession of kitchen garden, use of iodized salt, nutrition education by health institution, and food security were obtained. A random sampling technique was used for the selection of sub-county. The Wards covering all the three ecological regions were selected consulting Ministry of Public Health /Health Offices. It was assumed that those areas are supposed to have poor health and nutrition. Interview of the study subjects started from one end of the Sub-county by selecting a house. However, if there were no study subjects in the house, or they were out of the house at the time of data collection, the house was skipped and

nearby house was selected, and the percentage of the study population skipped reported. Local health facility staffs and female community health volunteers (FCHVs) helped in finding the location of the houses. First the questionnaire was made in English, later; they were translated into Swahili (Kenyan National Language) so that the participants who were women could easily understand.

Study population

The targeted study population consisted of women of reproductive age (15-49 years) who hails from Kilifi Central Sub- County of Kilifi County Kenya.

Crop and Livestock Production

The main crops grown for subsistence are maize, cowpeas, green grams and cassava. The major cash crops in the county include coconut, cashew nuts, pineapples, sisal, and mangoes. Livestock is a major economic activity in the county providing income and food to the residents in the hinterlands of Ganze, Langobaya and Magarini. The main types of livestock in the county include cattle, sheep, goats and poultry. Upgrading of local livestock breeds would play a major role in the growth of the sub sector because the majority of the livestock in the county are indigenous.

Education

Education ensures that a population is empowered both socio-economically and politically so that they can participate in gainful activities and make informed decisions. The county has 935 pre-schools, 492 primary schools, 120 secondary schools, 13 youth polytechnics, one college (KMTC- Kilifi) offering medical training and Pwani University, Mount Kenya University, University of Nairobi and Moi University are institutions of higher learning offering various courses. There is need to improve the physical conditions of the existing institutions and build more to ensure quality and access to education.

Study Design

A cross section survey of descriptive nature was undertaken, among households of women of

reproductive age, of Kilifi Central Sub-County of Kilifi County, Kenya in the months of January and April, 2022.

Sample Size

Sample Size Determination

The sample size was determined according to Fisher et al., (1991) formula using prevalence of malnutrition in Kilifi county as 35% KDHS, 2003). The formula is:

$$N = \frac{Z^2\, pq}{D^2}$$

Where n=the desired sample size

Z=the standard normal deviations which is 1.96 for the 95% confidence interval

P=the proportion of mothers estimated to have underweight BMI at 36% in Kilifi County (KDHS, 2014)

Q=the proportion of mothers who are considered to be underweight

D=degree of accuracy desired, 0.05.

Therefore $n = \frac{(1.96)^2 *(0.35)+(0.13)}{0.05^2}$

$$= 173.47$$
$$\sim\sim 173$$

Sampling procedure

Multistage sampling was used to identify the study population. At stage one, Kilifi County was selected using random sampling which was followed by selection of Kilifi Sub-County using the same method. At the third stage, mothers of reproductive age (15-49) years were selected at random. At fourth stage, 173 women of reproductive age (15-49) years of whom are residents of Kilifi Sub-County were selected randomly and ultimately included in the study. The villages whose households were All interviews and discussions were conducted by the researcher and two assistants who were trained nutritionists at diploma and degree level. Information was audio-taped using digital recorders, and thereafter transcribed and uploaded in *Atlas-ti*in windows for coding and subsequent analysis.

sampled were selected using simple random sampling. The total number of households was computed so that each ward in the Sub-County is proportionally represented.

Of the 173 households, randomly sampled 30 households were randomly selected for participating in the 24 hour dietary recall assessment.

Qualitative data was collected using Focus Group Discussions (FGD's), Key Informant Interviews (KII's) and observation checklist. FGDs were held with mothers (12) and fathers (9) of young children, senior citizens (12) and community health workers (12).Senior citizens in the FGDs were adults aged between 50 and 70 years and were included in the FGDs because they are perceived to possess traditional knowledge and practices, which the younger adults may not have. Moreover, they also often have influence on women feeding and care practices (Roberts and Pettigrew, 2010; Aubel, 2011). Each Community Health Worker (CHW) was in charge of 20 households giving researcher direction and giving a conducive environment since they are familiar to the respondents, they also took part in health and nutrition talks in the community. Women were the main sources of information on current nutrition knowledge and practices in the community. Consent to carry out the study was obtained from the Killifi Sub-County Nutrition office. Informal consent was obtained from each participant.

The key informants included the Kilifi County Nutritionist, the Kilifi Sub-County Nutritionist, the County Clinical Health Officer, and the County Veterinary Health Officer and County Agriculture Officer. Discussions and interviews were conducted using structured interviews and question guides.

The sampling technique used in the selection of the study sample is shown in figure 2.
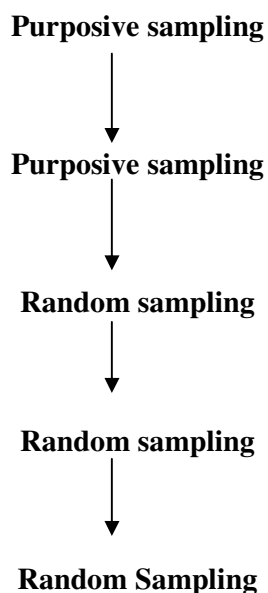
Purposive sampling

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Purposive sampling

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Random sampling

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Random sampling

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Random Sampling

Figure 1. *Flow chart showing sampling procedure.*

Pilot study

A pilot study was carried out in 10 households in a village not selected for the main study. The pilot study helped the researcher and her assistants to familiarize themselves with the questionnaire, using the measuring instruments, and allocating reasonable time for each questionnaire. The results of the pilot study were also used to adjust/modify the data collection tools for the study. This pre-testing of the questionnaire was vital to ensure that the questions are asked in the right manner, and elicit the right responses.

Data collection

Data collection at household level was conducted in selected wards of Kilifi North, of Kilifi County. Women of reproductive age (15 to 49 years) were the study subjects. At the household interviews, structured questionnaires were used to obtain information on socio-demographic characteristics, anthropometric measurements, dietary intake patterns, consumption of junk foods, possession of kitchen gardens, and food security issues. Dietary intake pattern was determined by information collected through the structured questionnaires comprising food items-cereals, pulses/legumes, vegetables, meat fruits, and milk and milk products. Interview of the study subjects was started from one end of the Sub-county by selecting a house. However, if there were no study subjects in the house, or they were out of the house at the time of data collection, the house was skipped and nearby house was selected, and the percentage of the study population skipped was reported. First the questionnaire was made in English, later; they were translated into Swahili (verbally) so that the participants who were women could easily understand.

Dietary intake data

Dietary intake pattern was determined by using a tool previously used to determine the same. This tool was modified with consultation with experts to include as much information as possible. The data was collected through the questionnaires that comprised six groups of food items: 1. Cereals, 2. Pulses/legumes 3. Vegetables 4. Meat 5. Fruits 6. Milk and milk products. In addition, junk foods (sweetened beverages, instant noodles, cookies and biscuits available in local markets) were included in different categories. Cereals which were included were; rice, wheat, millet, sorghum, maize and barley. Pulses/legumes also consisted of beans, peas, soy beans, pigeon peas, green grams and lentils. Vegetables included long leaf vegetables, green leafy vegetables, cauliflower, ladies finger, brinjal (egg-plant), pumpkin and others grown in the fields or bought from the markets. Meat includes chicken, mutton, fish, pork and beef. Fruits included seasonal fruits grown in their fields or bought in their markets. Milk and milk products consisted of milk, yogurt, mala, curd and cheese. The participants were asked how often they consume food groups daily, thrice a week, weekly, monthly or never. Anthropometric measurements were done on women, and the data processed using EPI-NUT in EPI-INFO.

Anthropometric measurement

Weights of the women was measured to the nearest 0.1 kg on a battery powered digital scale (SecaGmBH& Co.kg., Germany) and the heights was measured to the nearest centimeter using a height scale following standard anthropometric techniques (Bruce, 2001) for weight and height measurements, study subjects were requested to remove their shoes, jackets and wear light clothing. Body mass index (BMI) of the study subjects was calculated by dividing the weight in kilogram to the height in meter squared (kg/m2). BMI less than 18.5 was considered as underweight (malnourished) (WHO, 2017).

Ethical and human rights consideration

Informed consent was obtained from each respondent before the interview. Confidentiality of the information obtained was assured and respondents were not obliged to give their names. Consent to carry out the research was obtained from Pwani University Research and Extension committee and Kilifi county department of Agriculture in form of research permit. A further consent was sought from the area Chief.

In each household a separate confidential interview of the women was conducted in a convenient place. During the study, about half an hour was taken on the whole procedure of conducting questionnaires. Before introducing questionnaires, the women were informed about the purpose of the study. They were also made aware of the fact that they can withdraw from the study at any stage of the study. Written consent was taken from each study subject. For women who were below 18 years of age, written consent from them as well as from their parents/guardians was obtained.

Data Quality Control Measures

Proper and close supervision of the interviewers was done to ensure that they were doing the right thing and to help clarify any issues that arose in the course of the exercise. There were daily briefs by the chief investigator to ensure all was well. All the questionnaires were checked for completeness and any anomaly at the end of the day. Calibrations of the equipment were done daily to ensure correct measurements were obtained.

## Data Management and Analysis

Data entry and cleansing

The responses were coded before entry into the computer. Data was entered, cleaned, processed and analysed using the SPSS ver.20 (Statistical Packages for Social Sciences). Anthropometric data were converted into indices of nutritional status using EPI-INFO soft-ware and NUTRI-SURVEY soft-ware. Graphs on descriptive information were done using Microsoft excel. Both descriptive and analytical methods were used in the generation of the results of this study.

Results

Socio demographic and socio-economic status of women of reproductive age. Age of women

Figure 1: Distribution of women by age categories.
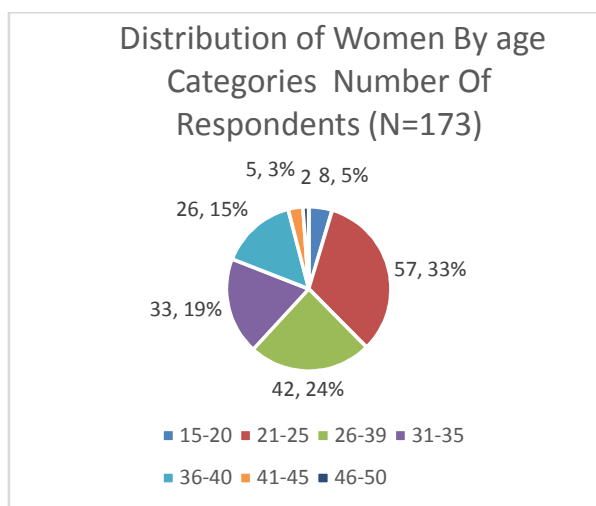
The age categories of women are shown in table 1. The minimum age of women of reproductive age was chosen as 15 as this is the minimum age of child bearing of Kilifi County. The maximum age was chosen as 49 years, the maximum for reproductive age. The highest number (33%) of

women fell in the age range of 21-25, followed by 26-30 at 24%. The least number (1%) was at the age range of 46-49. This shows that at the age range of 21-30 women maximize child bearing.

Marital status of women of reproductive age.
Figure 2: Distribution of women by marital status
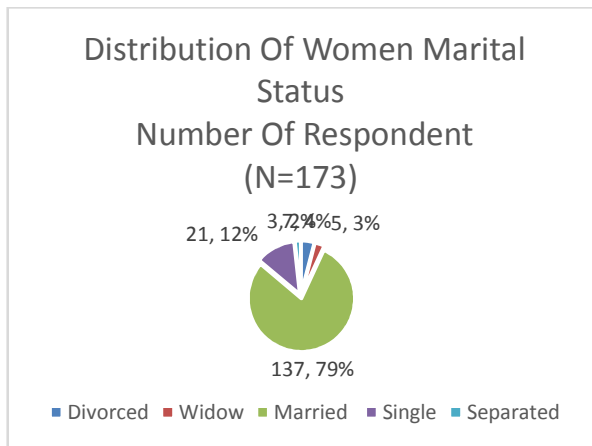
The marital status of women is shown in table 2. Majority (79%) of women were married, 12% were single, the remaining were either widowed at 4% or separated 2%.

Education level of women

The education level of women is shown in table 3. Majority (49%) had attained primary level of education. 22% A' level secondary level, 20% o'level secondary level and 5% were illiterate and the least was 4% University level.
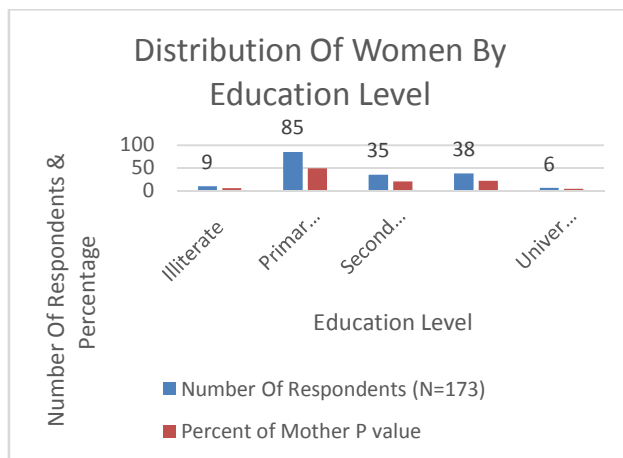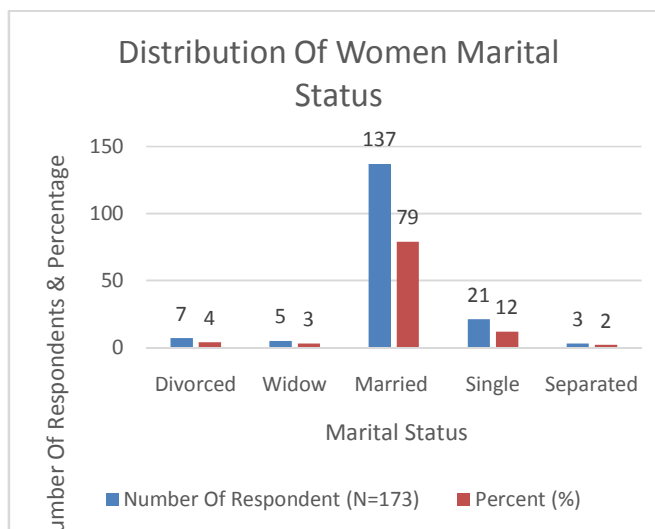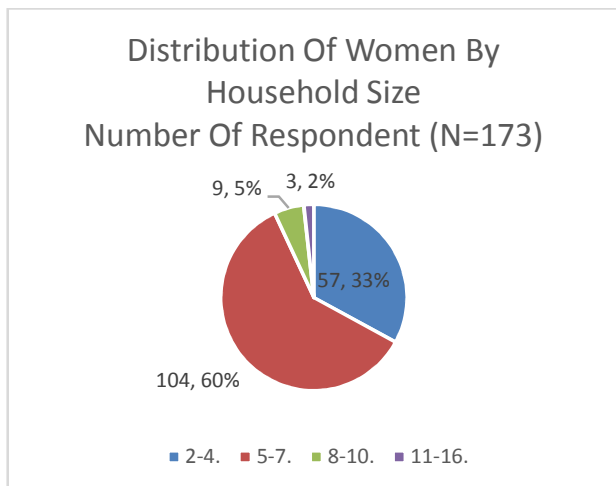

Figure 3.Distribution of women by education level

Household size of women

Figure 4: Distribution of mothers by household size

Distribution Of Women By Household Size Number Of Respondent (N=173)

Distribution of household sizes is shown in figure 4. In this study the majority (60%) of the households had 5-7 persons, 2-4 persons had 33%, 8-10 persons had 5% and the least number (2%) of persons were in 14-16 persons.

Occupation of mothers
Figure 5: Distribution of women by occupation

### Distribution Of Mothers By Occupation
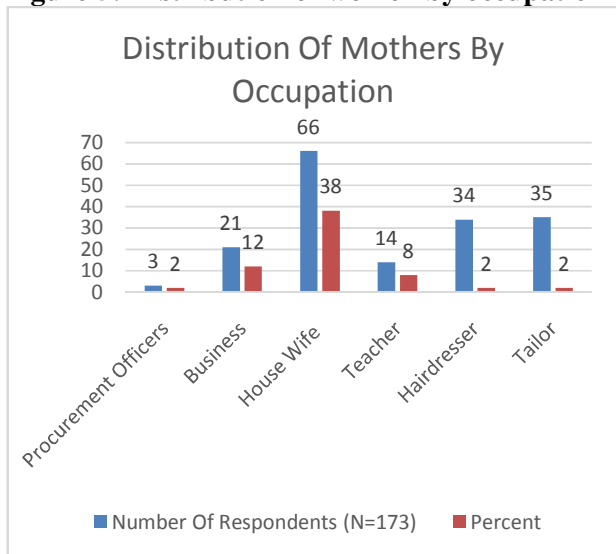
The occupation of the mothers is shown in figure 5. There are many different occupations among the respondents. Majority (58%) were housewives, 31.9% did small business,17.3% were tailors, 10.6% were hairdressers and the least occupation was teacher

(8.1%) and procurement officers (1.3%) respectively.

Women and monthly income

Figure 6: Distribution of women by monthly income.

Distribution Of Mother's Household By Income Number Of Respondents (N=173)
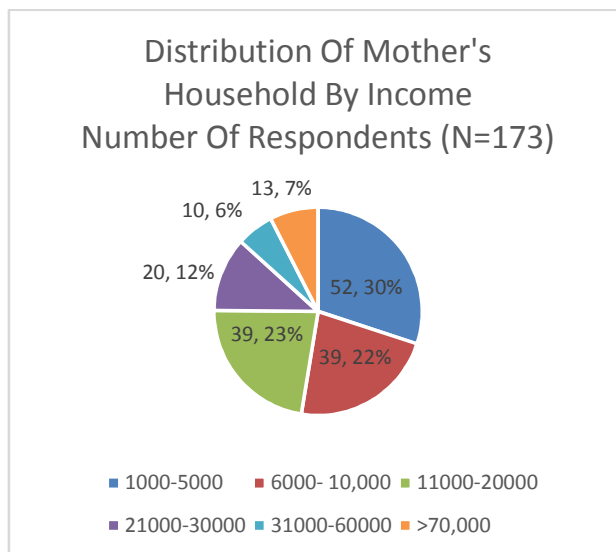
The monthly income levels of the households in Kenya shillings (KES) of the households are shown in table 6. Majority (30.2%) of women households earned KES 1,000-5,000, and the least (2%) earned KES >70,000.

Frequency of food consumption among women of reproductive age.

The frequency of food consumption by women of reproductive age is shown in table 1. The respondents consumed grains and the most consumed grain in the study was rice (51.4%) on daily basis, followed by maize (35.8%). Starchy roots were consumed with cowpeas at (76.3%) on daily basis and the least consumed was Irish potatoes (9.8%) and arrowroots were rarely consumed. The most consumed vegetables were kales at 46.8%, followed by tomatoes 38.7% and French beans at the same level. Meat and eggs were consumed by women the leading being chicken

47.3% and fish at 30%. Fruits consumed were pawpaw at 47.3% and avocado at 31.2%.

Table 1. Frequency of food consumption among women of reproductive age.

Food item	Frequency (%)			
	Daily	3-6 times/week	1-2 times/week	once/month
Grains				
Maize	62 (35.8)	49 (28.3)	52(30.0)	10(5.7)
Wheat	19(10.9)	50(28.9)	76(43.9)	28(16.1)
Rice	89(51.4)	20(11.5)	49(28.3)	15(8.6)
Starchy Roots				
Cassava	119(68.7)	80(46.2)	26(15.0)	-
Irrish Potatoes	17(9.8)	85(49.1)	71(41.0)	-
Sweet potatoes	75(43.3)	10(5.7)	79(45.6)	
Arrow roots	-	-	-	56(32.3)
Legumes, pulses and nuts				
Groundnuts	78(45.0)	49(28.3)	38(21.9)	8(4.6)
Pigeon peas	-	110(63.5)	49(28.3)	14(8.0)
Green grams	124((71.6)	11(6.3)	13(7.5)	25(14.4)
Cowpeas	132(76.3)	25(14.4)	11(6.3)	5(2.8)
Coconuts	141(81.5)	19(10.9)	12(6.9)	1(0.5)
Cashew Nuts	151(87.2)	10(5.7)	12(6.9)	-
Vegetables				
Traditional leafy vegetables				
Carrots	55(31.7)	80(46.2)	12(6.9)	-
Tomatoes	67(38.7)	79(45.6)	14(8.0)	-
Kales/spinach	81(46.8)	78(45.0)	16(9.2)	
French beans	67(38.7)	53 (30.6)	15(8.6)	
Cucumber	45(26.0)	43(24.8)	12(6.9)	
Meat and eggs				
Beef	76(43.9)	62(35.8)	12(6.9)	15(8.6)
Chicken	82(47.3)	51(49.4)	18(10.4)	10(5.7)
Goat	76(43.9)	69(39.8)	12(6.9	20(11.5)
Fish	52(30.0)	17(9.8)	15 (8.6)	25(14.4)
Eggs	12(6.9)	32(18.4)	17(9.8)	78(45.0)
Fruits				
Mangoes	54(31.2)	32(18.4)	37(21.3)	10(5.7)
Avocados	17(9.8)	45(26.0)	82(47.3)	14(8.0)
pawpaw	-	82(47.3)	-	10(5.7)
Dairy Products				
Fresh milk	21(12.1)	15(8.6)	12(6.9)	20(11.5)
Yoghurt	-	-	17(9.8)	10(5.7)
Mala	10(5.7)	-	21(12.1)	19(10.9)

Nutritional status for women of reproductive age.

TABLE 2. Distribution of nutritional status of the women of reproductive age.

The study showed that women of reproductive age (23.1%), was underweight and was at the age bracket of 21-25 years followed by 15.0% at the age bracket of 31-35 years. Overweight had women at the age bracket of 46-50 years with (10%).

BMI Catagories (N=173)	percent		
Age of the women in years	<18.5	18.5-25	>25
15-20	4(2.3)	4(2.3)	1(0.6)
21-25	40(23.1)	10(5.7)	7(0.4)
26-30	22(12.7)	7(4.0)	2(1.6)
31-35	26(15.0)	5(2.8)	3(1.7)
36-40	9(5.2)	4(2.3)	3(1.7)
41-45	2(1.6)	2(1.6)	6(3.4)
46-50	1(0.57)	10(5.7)	5(10)

4.4 Distribution of womens' BMI and socio-economic status

The study showed that women who earned >41,000 majority (12.6%) had normal BMI and 19.4% were overweight. Those earning KES 5,000-10,000 had the majority (8.6%) underweight.

Table 3. Distribution of women's BMI and socio-economic status.

Monthly income of the households	BMI catagories (N=173)		Percent	
	<18.5	18.5-25	>25	P.Value
1,000-5,000	2(1.2)	-	24(13.8)	0.08
5,100-10,000	15(8.6)	5(2.9)	1(0.6)	0.001
11,000-20,000	7(4.04)	16(9.2)	3(1.7)	0.04
21,000-30,000	6(3.4)	3(1.7)	15(8.7)	0.07
31,000-40,000	1(0.6)	10(5.7)	20(11.5)	0.004
>41,000	3(1.8)	22(12.6)	51(19.4)	0.005

Women's household size and nutritional status

Majority (52%) of women from households of >10 persons were underweight and those from households with 2-4 persons had 17.9% overweight.

Table 4. Distribution of women by household size and nutritional status.

Household size	BMI Categories (N=173)		Percent	p value
	<18.5	18.5-25	>25	
2-4 persons	60(34.7)	29(16.7)	31(17.9)	0.005
5-7 persons	8(4.6)	2(1.5)	1(0.5)	0.001
>10 persons	9(52)	28(16.1)	20(11.6)	0.03

Nutritional status and education

Majority (35.2%) of women who had attained primary education were underweight while those with secondary education had 18.5% overweight.

Table 4. Distribution of women by nutritional status and education.

Education level	BMI catagories (N=173)		Percent	
	<18.5	18.5-25	>25	p-value
Illiterate	8(4.6)	1(0.5)	-	0.03
Primary	61(35.2)	11(6.3)	13(7.51)	0.002
Secondary	15(8.6)	26(15)	32(18.5)	0.001
Tertiary	2(1.6)	5(2.9)	-	0.002

Women's nutritional status and household head

The study showed that the majority of women who were underweight belonged to households headed by children and those with normal BMI (16.8%) were headed by husbands with 12.7% of the same households being overweight.

Table 5: Distribution of women by nutritional status and head of household

Head of household	BMI categories (N=173)		Percent	p-value
	<18.5	18.5-25	>25	
Husband	10(5.8)	29 (16.8)	22(12.7)	0.003
Woman	32(18.5)	9(5.2)	3(1.7)	0.01
Child	50(28.9)	3(1.7)	1(0.6)	0.05
Grandmother	12(6.9)	1(0.5)	1(0.5)	0.01

Table 5: Correlation between some socio-demographic characteristics and nutritional status of women

Variables	Nutritional status		
	Underweight	Normal	Overweight
Education	0.127	0.123	0.124
Occupation	0.013***	0.012***	
Age	0.028*	0.027*	0.023*
Income	0.364	0.254	0.279
Household size	0.424	0.381	0.389

Discussion

In this study women without formal education were more likely to be malnourished than women with formal education especially those who had not attained tertiary education. This study concurs with a study done in Nepal (Bhandari et al, 2016), which showed that majority (48.5%) of women of reproductive age had no formal education. Education for women of reproductive age on the other hand serves as an important tool in alleviating malnutrition in households. Such women are able to access nutrition education materials and consequently, have efficient knowledge when choosing diets for their families. This means that educated women could easily participate in formulating nutrition related policies and implementation of the same (Zahid et al, 2013, Bhandari et al, 2016).In this study majority (49%) had attained primary education and 42% had attained secondary education. This study contradicts a study that was done (Nkirigacha et al, 2016) which found that the majority (44.6%) in their study in Eastern Nairobi Kenya had attained primary education. Low level education for mothers can contribute to food insecurity and poor nutrition status for mothers and their households considering that in most households' women are decision makers on what is eaten by their families (Nkirigacha et al, 2016). Socio demographic status is a factor that is related to quality of food intake in households, while higher education attainment is associated with better food knowledge and better income, enabling improved accessibility to a variety of foods (Shrimpton et al, 2016, Ewles&Simrett, 2003, Marinel et al, 2019).Education is the most important indicator for empowerment of women both at home and the society. This is because it creates a bridge for women to access health services, provide nutritious diets to their families, land and consequently credit facilities (Dhanaraj&Mahambare, 2019). According to Morrison et al, 2007 increasing the number of educated women are a key factor for empowering women. Basic education provides women with a foundation for developing the flexible skills needed to participate in knowledge intensive activities (Khurshid, 2016). When women are adequately educated it means that they could participate in formulation of nutrition related policies and implementation of the same thus making the world a better place to live in (Bhandari et al, 2016, Zahid et al, 2013).

Age

In this study the majority of respondents fell in the age range of 21-25 years at 33%. This differs from a study done in Nigeria which found majority of the respondents age ranged between the ages of 36-40 years (Ukegbu, 2014). These findings agree with a study conducted in Ghana which found that 63% of female farmers were in the age bracket of 21-25 years (Ackerson & Awuah, 2010). In Namibia as well majority of respondents were young women falling in the age bracket of 21-25 years (Dima et al, 2002). In Eldoret, the mean age of respondents was 28 years (Kadenyeka et al, 2013. The study differs with a study done by Salau& Attah, 2012 which found the mean age was 49 years.

The fact that women in this study had a majority at the age bracket of 21-25 years places these respondents at a safe age bracket for child bearing. Being a young mother is more beneficial to the baby's health (Nkirigacha, 2019). Moreover, the odds of conceiving are increased in the late 20s or early 30s. Getting pregnant during this time also reduces the chances of having a pregnancy complication. It is at this stage that women are able to draw their benefits associated with educational and financial gains accrued from post phoning child bearing at an earlier age (Kessler et al. 2005). It also enables mothers to draw from socio-emotional skills and human capital which may complement one another in the production of healthy child development, which may be a particular benefit to women who delay childbearing. The age at which a woman commences child bearing is crucial as it will determine how she transmits her human capital to her children efficiently (Greg et al, 2018).

Marital status

In the study majority (79%) were married and 12% were single and the rest were either separated or widowed. These results are in line with a study done in Kasarani Nairobi metropolis by Nkirigacha, 2019, which found that majority (62.7%) of women were married and 25.4% were single. This study concurs with a study done in Nigeria which found 90% of women respondents were married (Salau& Attah, 2012). The study also differs with a study done in Namibia (Dima et al, 2002) which found a lower number of women respondents were married at 58%.

Marital status of women in the households determines the stability they will have when making health and nutrition decisions of their household members. This particular socio demographic indicator can impact on the main guidelines for implementing successful development projects related to women and their empowerment. Households which are headed by women are ten times likely to be food and nutrition insecure (Yusulf et al, 2015, Nkirigacha, 2020).

Household size

The maximum number of households' members was 60% with 5-7 members. Households with 2-4 persons were at 33% and households with 11-16

persons were at 2%. The maximum number was less than the household's numbers found by KDHS (2014), which found that the average household size in Kenya was 3.9 members. Malapit et al, 2013, Carlson et al, 2015 have asserted that larger households are likely to diversify diets due to increased non-food expenditures.

The results of this study differ with results of a study done in Nairobi Kenya which revealed that the majority (56.4%) of households' members were 2-5 persons (Nkirigacha, 2019). The higher the household size bloated the expenditure and this may lead to failure to use household income adequately on food thus leading to poor food access rendering the household food insecure.

This study concurs with a study done in Nigeria Salwu et al, 2020 which found that majority 60% of the household size ranged between 5-7 persons. Another study done in Ghana (Ackerson & Awuah, 2010); the household size was 5-6 persons at 28%.

Occupation

Majority of the respondents in this study were housewives at 58%, those who were in small businesses were 31.9% and those in formal employment were 9.4%. These findings differ with the findings of a study conducted in Ghana by Salau& Attah (2012) which showed that 63.3% of the respondents were civil servants, while 22.2% were traders and 14.5% were full time farmers. The findings also differ with those of a study conducted in Nairobi Kenya (Nkirigacha, 2019) which showed

that 23.9% were housewives and 28.6% were doing small businesses.

This study differs with a study done in Pakistan by Daniel et al, 2019, which revealed that 18.9% of the respondents were government employees with 20.8% who were unemployed. In the same study 3.7% were labourers and farmers were 26.8%. Pregnant women who carry out manual jobs and undergoing unemployment report significantly more depressive symptoms which is an outright suggestion that the third trimester may be more stressful for low-income women (Goyal et al, 1020). At two to three months postpartum women with low income have been found to experience significantly more depressive symptoms than women with high-income (Nkirigacha et al, 2016, Goyal et al, 2010).

World Health Organization (WHO, 2013) noted that women with insecure, low-status jobs, with little to no-decision-making authority experience higher levels of negative life events, insecure housing tenure, more chronic stressors and reduced social support. Low employment rank is a strong predator of depression (WHO, 2013).

Nutritional status of the respondents

In this study the majorities (23.1%) of the respondents were underweight and were at the age range of 21-25 years. Respondents at the age range of 26-30 years had a majority of 10% who were underweight. This age bracket was followed by 15% underweight from the ages of between 31-35 years. These findings are similar to findings of a study

done by Lesley &Audrey, 2008 which found most women were underweight and few were overweight and only few were obese. These results contradict the results of a study done in Cameroon by Christelle et al., 2020 which revealed that prevalence of underweight was highest in the women of child bearing age at 31-40 years and this was significantly different across all the age groups (p<0.05). Study participants aged 26-30 recorded the highest prevalence of obesity. This could be contributed by the fact that these are women who had business around and were consuming more carbohydrates foods leading to them being rice. This study differs with a study done in Cameroon BY Christelle et al., 2020 which revealed that study participants in the 41-49 years had the highest prevalence of obesity (16.1%). These differences were significant across all the age groups (p< 0.05). The differences found in the two studies could be contributed by the socio economic status of the two study participants since at the age of 41-49 years most families have big children and therefore there is less responsibility especially physical work on the side of women of reproductive age. his study differs with a study done by Otunchieva et al., 2022 in Kyrgyzstan which revealed that the majority of the study participants 58.8% had a normal BMI and only 7.6% were underweight. These differences come about because in Kyrgyzstan a lot of nutrition intervention was fronted by the European community thus leading to improvement in the nutritional status of women of reproductive age in the county (Otunchieva et al., 2022). Such interventions should be fronted by the Kilifi County government to help improve the nutritional status of women of reproductive age in the region and break the malnutrition cycle as well.

Dietary habits of the study participants

The study revealed that most of the respondents were consuming carbohydrates rich foods where rice was the leading starchy staple at 51.4% consumed on a daily basis. Root tubers were also highly consumed on a daily basis in this study led by cassava at 68.7%. This could have been contributed by the fact that the region is drought prone and most of the root tubers which do well and are drought resistant like cassava are grown widely in the region. It can also be used to prepare a variety of dishes like kima (mixer of cassava and millet flour), -----. Another plausible reason for high Consumption of carbohydrates on a daily basis could also be due to the fact that carbohydrates foods are cheap and readily available and also bulky. This study concurs with a study done by Christelle et al., 2020 which revealed that cereals and tubers were consumed by women of reproductive age at 86.4% at 95% confidence interval (CI).The study also agrees with a study done in Parkistan by Jo-Anna et al., 2021 which eluded that staple starches were the most consumed foods by women at 92.5% in their diets. In this study pulses in the form of green grams were

consumed at 76.2% and nuts at 87.2% this could be due to the fact that the region grows cashew nuts and coconuts and they are cooperated in a wide variety of dishes. Consumption of nuts and seeds by women of reproductive age is crucial since they are rich sources of protein, healthy fats, fibers, vitamins and minerals. This can help women gain in iron, zinc, iodine, calcium and vitamin A which are critical nutrients during pregnancy and lactation (Nkirigacha*et al*., 2019, Popkin *et al*., 2020). This study differs with a study done by Popkin *et al*., 2020 which revealed that nuts were least consumed by women of reproductive age at 10%. The study participants did not consume protein foods adequately with consumption of fish at 30%. Although food security is a prerequisite for nutrition security, it is not enough for ensuring the sufficiency of maintaining good nutritional status. This shows that food access is a problem in the area since their proximity to the Indian Ocean is there yet their rate of fish consumption is low. There is also a need also to conduct nutrition education to such women so that they are able to understand the nutritional value of such protein rich food and the importance of the same nutrients to their body especially during the critical period of childbearing. This study agrees with a study conducted by Otunchieva et al., 2022 which revealed that fish was consumed minimally by women of reproductive age. In this study vitamins and minerals were consumed minimally with a

consumption of green leafy vegetables at 53% and fruits at 30%. Food diversity is important for adequate nutrition and health. Intake of diversified foods is often advised to prevent the body from lacking important micronutrients. Consuming a variety of foods from different food groups is the underlying method for achieving and preserving nutrient adequacy. Women of reproductive age during pregnancy should be able to consume more fruits and vegetables to provide their bodies with sufficient micronutrients such as calcium, iron, zinc and iodine for themselves and their off-spring. Iodine is especially vital for brain development. Proper nutrition of women of reproductive age during pregnancy is vital for her and her off-spring's brain and neurodevelopment. Lack of these nutrients in-utero may have lifelong consequences for the off-spring (Aipen et al., 2022). These women of reproductive age need sensitization on the importance of consuming these foods for them to be free from hidden hunger. Addressing the consumption of healthy and sustainable diets, poverty and under nutrition are essential components to the achievement of sustainable development goal two (zero hunger) (United Nations, 2015) as well as having stable and healthy women of reproductive age (Popkin et al., 2020).

This study revealed that women of reproductive age who were illiterate and those who had attained only primary education level were more likely to be underweight than their counterparts who had

acquired secondary education and above p-value (0.05). This could have been contributed by the fact that such women who are illiterate may not be able to read information on dietary intake and attend seminars on the same while their counterparts are exposed to a wide range of information from posters, workshops and seminars. Due to low incomes, lack of information, knowledge and high prices of food, women of reproductive age end up consuming low nutrient diets which silently expose them to hidden hunger (Nkirigacha et al., 2019, Aiperi et al., 2022).

The study concludes that women of reproductive age who were illiterate and did not engage in economic activities were underweight. Households which had more than ten members had women of reproductive age who were underweight. The study participants had the majority of them consume carbohydrates rich foods more than protein, mineral and vitamin rich foods which was likely to expose them to hidden hunger.

RECOMMENDATION

There is need to empower women economically and provide adequate education to them. This will enable them to access food and nutrition educations which will enable them provide nutritionally rich diets to their households and themselves.

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