

# Food Intake and Health of School Children in Southeast Tanzania:

## Preliminary Questionnaire in Raha Leo Elementary School, Lindi Municipal

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### Introduction

#### 1. Health and nutrition status in Tanzania

Health and nutrition are essential for achieving the Sustainable Development Goals (SDGs), yet many people have not been able to fulfill these goals. In Tanzania, on the east coast of Africa, great improvement has been seen in Under-five Mortality Rates (U5MR) and Infant Mortality Rate (IMR) at 66.5 and 46.2 per 1,000 live births respectively, almost reaching the Millennium Development Goal (MDG) of 64 and 38 per 1,000 live births<sup>1</sup>. However, MDG to reduce hunger shows a mixed picture. The prevalence of underweight for children under-five is 13.4% which is close to reaching the target of 12.5%, as well as the Global Acute Malnutrition (GAM) or wasting measured by weight-for-height at 3.8%. However, chronic malnutrition or stunting measured by height-for-age remains at 34.7%.<sup>2</sup>

Regional disparities are also prevalent in Tanzania. In the *2010 Tanzania Demographic Health Survey* (TDHS), Iringa (52%), Dodoma (56%), and Lindi (54%) regions had the highest percentage of stunting over 50%. TFNC (Tanzania Food and Nutrition Centre) survey 2014 earmarks Kagera (51.9%), Njombe (51.5%), and Iringa (51.3%), as regions of stunting over 50%. Lindi region was at 36.2%, slightly higher than the mainland average of 35.0%.<sup>4</sup>

As for rate of GAM, Zanzibar (7.2%), Dodoma (5.2%), Tanga (4.8%), Mara (4.9%), and Singida (4.7%) have the highest, and Iringa has the lowest at 0.7%. Lindi region is at 2.9%, lower than the national average.<sup>5</sup>

For underweight, Kagera (22.2%) and Dodoma (21.8%) regions have the highest, followed by Kigoma (18.8%), Pemba South (18.1%), Pemba North (16.7%),

and Iringa (15.5%). Dar es Salaam has the lowest percentage of underweight (6.6%). Lindi region is at 11.0%, lower than the average.<sup>6</sup>

Tanzania has improved underweight and children's mortality at the national level, but has high level of chronic malnutrition. Furthermore, there are steep disparities among regions.

#### 2. Previous research

Nutrition and health of under-five children have been well researched in Tanzania, but of primary school children have not been extensively researched.

Lack of data on older children is indicated and, a study on anthropometry and nutrition status of primary school children in Arusha region indicates that 24% suffer from undernutrition including stunting (16%) and thin (11%).<sup>7</sup>

Public health issues among primary school children in Tanzania vary across different regions. In an inland region such as Ludewa district, Iringa region where goiter is prevalent, 62% of 50 primary school children were found to have mild and moderate forms of iodine deficiency suggesting high consumption of non-iodized salt and bad preserving method.<sup>8</sup> In the lake zone where lack of sanitation and clean drinking-water such as the island areas on the Lake Victoria, children tend to be undernourished and anemic due to poor dietary nutrients. Their good dietary intakes are hindered by schistosomiasis and soil-transmitted helminthiasis which are parasitic infectious diseases.<sup>9</sup> It has also been further identified that after taking anti-parasitic drug (Praziquantel), the prevalence of anemia decreased but the other way around for wasting and stunting.<sup>10</sup> Besides this, due to high level of fluoride in drinking-water and low calcium,

children of Hai district in the high land areas were found to have brittle bone disease (Osteogenesis).<sup>11</sup>

In the largest urban city Dar es Salaam, obesity and blood pressure are more common among children with high socio-economic background compared with children in rural areas.<sup>12</sup> Despite past researches on different public health issues and geographical settings, no research on the health of primary school children has been done in small coastal towns.

Understanding the relationship between the student's subjective health evaluation and food group intake will enable relevant nutrient advices for improving their health. This is a preliminary research to evaluate the subjective health situation through a questionnaire in an elementary school in Lindi Municipal.

### 3. Research target

The research target is 5<sup>th</sup> grade students in Raha Leo Elementary School in Lindi Municipal, Lindi region. Raha Leo Elementary School is located near the coast in Lindi Municipal (Map 1).

Raha Leo Primary school is among 71 primary schools in Lindi Municipal. It has been established in 1959 with registration number LD/01/2/002 and

later registered by National Examination Council of Tanzania (NECTA) number 0803010.

Raha Leo Primary school has a total number of 712 students consisting of 347 boys and 365 girls. The total number of teachers are 11, 2 men and 9 women.

**Table 1. Enrollment by Gender**

No	Grade	Boys	Girls	Total
Pre	Kindergarten	24	29	53
1	One	51	58	109
2	Two	53	61	114
3	Three	51	44	95
4	Four	30	40	70
5	Five	39	42	81
6	Six	48	44	92
7	Seven	51	47	98
<b>Grand Total</b>		<b>347</b>	<b>365</b>	<b>712</b>

Source: Created based on information from Raha Leo Primary School.

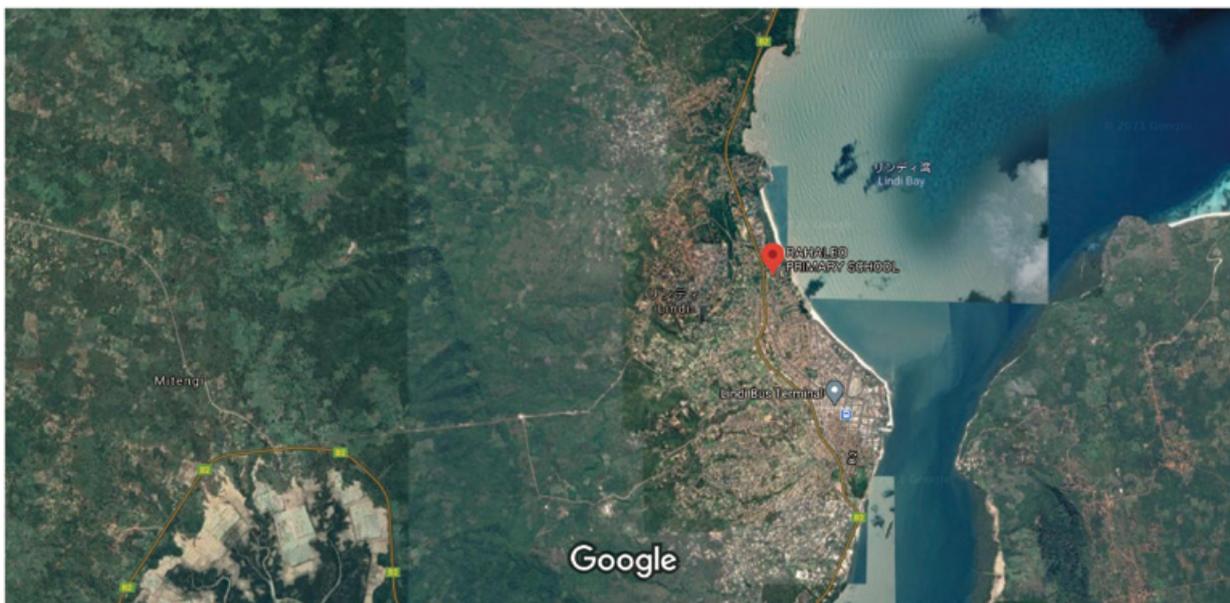
Raha Leo Ward is along the coast of Indian Ocean in Lindi Municipal. Current population is 1,587 consisting of 743 men and 844 women.

**Table 2. Population Summary of Raha Leo Ward (2020)**

No.	Street	House Hold	Men	Women	Total
1	Ufukoni	116	205	210	415
2	Raha Leo	107	177	205	382
3	Majengo	140	228	281	509
4	Mchinga Road	138	133	148	281
<b>Total</b>		<b>501</b>	<b>743</b>	<b>844</b>	<b>1,587</b>

Source: Based on information from Ward Executive officer (WEO), 2020.

**Map 1. Raha Leo Elementary School, Lindi Municipal, Tanzania**



Source: Created by the author from google Earth.

#### 4. Methodology

A questionnaire is constructed of basic questions about the student, food intake (food types, wild food, and frequency by food groups each season), and health evaluations. Questions on food intake frequency have been formulated based on research in Japan,<sup>13</sup> adjusted to food in Tanzania based on *Tanzania Food Composition Tables*<sup>14</sup> and discussions with nutrition specialists in Tanzania. Health evaluation has been developed based on a manual for students' health check-up by Japan Society of School Health.

The research has been explained and agreed by the Raha Leo Elementary school teachers and students. Those who have agreed in the 6<sup>th</sup> grade have answered the questionnaires during Sept. to Dec. 2019. The questionnaire has been inserted and checked in April 2020. It has been further compiled by July 2020, and analyzed using correlation.

In the article, the compilation of the questionnaire explains the situation of the food intake and health situation will be introduced in the II Results, and the co-relation (Spearman) between food intake and the health situation will be indicated in the III Analysis using SPSS (version Ver. 25), leading to Conclusion.

## II. Results

### 1. Research respondents

The respondents are 55 boys, 45 girls, and 1 student without indication of the sex, totaling 96 fifth grade students. Their ages range between 11 to 18, and respondents per age is as indicated in Table 3.

**Table 3. Age and Number of responses**

Years old	11	12	13	14	15	16	17	18	Total
No. of responses	8	41	28	13	4	1	0	1	96

Source: Tables are formulated by the authors from the questionnaire unless otherwise stated.

### 2. Types of food eaten

#### (1) Types of main food

Types of the most common main food eaten are rice, maize, and cassava. Wild tubers such as **Vitundi** (*Dioscorea* sp.) and **Ming'oko** (*Dioscorea hirtiflora* subsp. *orientalis*)<sup>15</sup> are also eaten. All the main foods mentioned are indicated in Table 4.

**Table 4. Types of staple food eaten (n=96)**

Staple food	Swahili	%	No.	Scientific name of wild food
1 Rice	Mchele	92%	88	
1 Maize	Mahindi	92%	88	
1 Cassava	Muhogo	92%	88	
4 Yam	<b>Vitundi*</b>	55%	53	* <i>Dioscorea</i> sp.
5 Other tubers	Viazi	45%	43	
6 Wheat	Ngano	27%	26	
7 Bananas	Ndizi	23%	22	
8 Wild tuber	<b>Ming'oko**</b>	22%	21	** <i>Dioscorea hirtiflora</i> subsp. <i>orientalis</i>
9 Yam	Magimbi	5%	5	
9 Sorghum	Mtama	5%	5	
11 Potatoes	Mvilingo	3%	3	
12 Millet	Uwele/Ulezi	2%	2	
Others	Kingine	71%	68	Others include 4, 8, 11, and 13

Note: In bold are Swahili names of wild food

#### (2) Types of relish eaten

For relish, green vegetables were the most commonly eaten followed by fish and beans. Meat and milk were consumed by a minority.

1. Green vegetables (87%, 82 respondents)
2. Fish (72%, 68)
3. Beans (60%, 56)
4. Meat (33%, 30)
5. Milk (6%, 4)

#### 3. Wild food eaten

The examples of wild foods eaten by students per food group in each season are indicated in Table 5.

The major wild staple food listed was **Ming'oko** (*Dioscorea hirtiflora* subsp. *orientalis*) eaten in the dry season, indicated by 30% of the students.

There were a variety of wild meat mentioned. The most common wild meat was dikdik (**Ng'onde**, 36%) and bushbucks (**Mbawala**, 31%) in the dry season, and birds in general (**Ndege**, 28%) in the rainy season. Guinea fowls (**Kanga**, 13%), rabbits (**Sungura**, 5%), and gazelle (**Swala**, 5%) were eaten in the dry season.

For vegetables, **Matemebele** (*Ipomoea* sp., 59%) was the most commonly eaten in the dry season, and **Lilende** (*Courchorus* sp., 38%) was the most commonly eaten in the rainy season. **Matemebele** may actually be a cultivated **Matemebele** (*Ipomoea batata*) or a wild species.

The most popular seeds were tamarind (**Ukwaju**, *Tamarindus indica*), which was 66% in the dry season and 13% in the rainy season. Baobab (**Ubuyu**, *Adansonia digitata*) were also indicated by 57% of the

students during the dry season. **Ubudubu** (*Grewia* sp.), which may be categorized as fruit if raw, and nut if dried, was mentioned by 51% during the dry season.

Wild fruits were the most mentioned wild food amongst all food groups, especially in the rainy season. **Vitoro** (*Landolphia kirkii*, 79%) followed by Marula (**Mgongo**, *Sclerocary birrea* subsp. *caffra*, 72%) and **Mabungo** (*Landolphia parrifolia*, 58%)

were the most popular. Mango (**Embe**), which could be cultivated or wild, was mentioned by 39% in the rainy season and 22% in the dry season. **Usofu** (*Uvaria* sp.) was mentioned by 18% in the dry season and 14% in the rainy season. Guava (**Mpera**) which could be cultivated or wild was mentioned by 18% in the rainy season and 7% in the dry season.

**Table 5. Wild food per food group each season indicated by students**

Food group	Swahili	English or scientific name	Dry season		Rainy season	
			%	No.	%	No.
Staple	Ming'oko	<i>Dioscorea hirtiflora</i> subsp. <i>orientalis</i>	30%	29		
	Vitundi	Yam, <i>Dioscorea</i> sp.			1%	1
Meat	Ng'onde	<b>Dikdik</b>	36%	35	1%	1
	Mbawala	<b>Bushbuck</b>	31%	30	6%	6
	Ndege	<b>Bird</b>	4%	4	28%	27
	Kanga	Guinea fowl	13%	12	1%	1
	Sungura	Rabbit	5%	5	1%	1
	Swala	Gazelle	5%	5	1%	1
	Kisimsim	Unidentified	1%	1		
	Njiwa	Pigeon			1%	1
	Nyani	Baboon			1%	1
	Chura	Frog			1%	1
	Panya	Rat	1%	1		
Suduza	Unidentified			1%	1	
Vegetables	Matembele**	<i>Ipomoea</i> sp.	59%	57	22%	21
	Liliende	<i>Courchorus</i> sp.	5%	5	38%	36
	Ajachu ngakitu	Unidentified			1%	1
	Janga	Unidentified			1%	1
	Mlenda**	(sticky relish)			1%	1
	Mujuni ya mumbu	Unidentified			1%	1
	Nawa	Unidentified			1%	1
	Tangara	Unidentified			1%	1
	Moringa*	Moringa	1%	1		
Mabuyu	Baobab, <i>Adansonia digitata</i>	1%	1			
Seeds	Ukwaju	<b>Tamarind</b> , <i>Tamarindus indica</i>	66%	63	13%	12
	Ubuyu	<b>Baobab</b> , <i>Adansonia digitata</i>	57%	55	9%	9
	Kungu*	Almond			8%	8
	Pumba za paka	Unidentified	1%	1	2%	2
	Datu	Dates	1%	1		
	Keli	Unidentified			2%	2
	Magona	Unidentified			1%	1
	Njafa	Unidentified			1%	1
	Shogo	Unidentified	1%	1		
	Umbajo	Unidentified	1%	1		
	Mbegu za papai*	Papaya seeds	1%	1		
Fruits	Ubudubu	<i>Grewia</i> sp.	51%	49	1%	9
	Vitoro	<i>Landolphia kirkii</i>	41%	39	79%	76
	Mgongo	<i>Marula</i> , <i>Sclerocary birrea</i> subsp. <i>caffra</i>	10%	10	72%	69
	Mabungo	<i>Landolphia parrifolia</i>	14%	13	58%	56
	Embe*	<b>Mango</b>	22%	21	30%	29
	Usofu	<i>Uvaria</i> sp.	18%	17	14%	13
	Mpera*	<b>Guava</b>	7%	7	18%	17
	Matopetope	<i>Annona senegalensis</i>	2%	2	2%	2
	Mafando	Unidentified			1%	1
	Nyuru	Unidentified	1%	1		
	Maduno	Unidentified			1%	1
	Shanga	Unidentified			1%	1
	Tatama	Unidentified			1%	1
Other	Epo	Unidentified	1%	1		
	Manda	Unidentified	1%	1		
	Somali	Unidentified	1%	1		

Note: \* May not be wild; \*\* May or may not be wild. In bold are major wild food.

#### 4. Frequency of food intake

The frequency of food intake is indicated in Table 6 and by box and whisker plot indicating median, upper and lower quintile, and upper and lower extreme (Diagrams 1 and 2).

In general, the frequency is rated low especially considering staple food mean at 2.13 (2=4, 5, 6 days a week). Although the difficulty in understanding the rating by students cannot be denied, further research is necessary to confirm the lack of food.

As relish, vegetables are the most common especially in the dry season (2.57) with a significant seasonal difference ( $p < 0.05$ ). Fish is also a common relish especially in the rainy season (2.24, Diagram 2), although the seasonal difference is not statically significant (Table 6). Beans are also a stable relish both in the dry season (2.06) and the rainy season (2.00). Meat is less frequently consumed, and milk is hardly consumed.

Nuts are also consumed both in the dry season (2.00) and the rainy season (2.14), which is assumed to be coconuts that is commonly used to cook relish and at times rice. Among the food groups/category, salt, oil, and sugar is the most frequently used (Table 6, Diagrams 1 & 2).

Fruits are more frequently consumed during the rainy season (2.06), which is significantly higher in comparison to the dry season (1.51).

**Table 6. Frequency of food groups intake in the dry and rainy seasons**

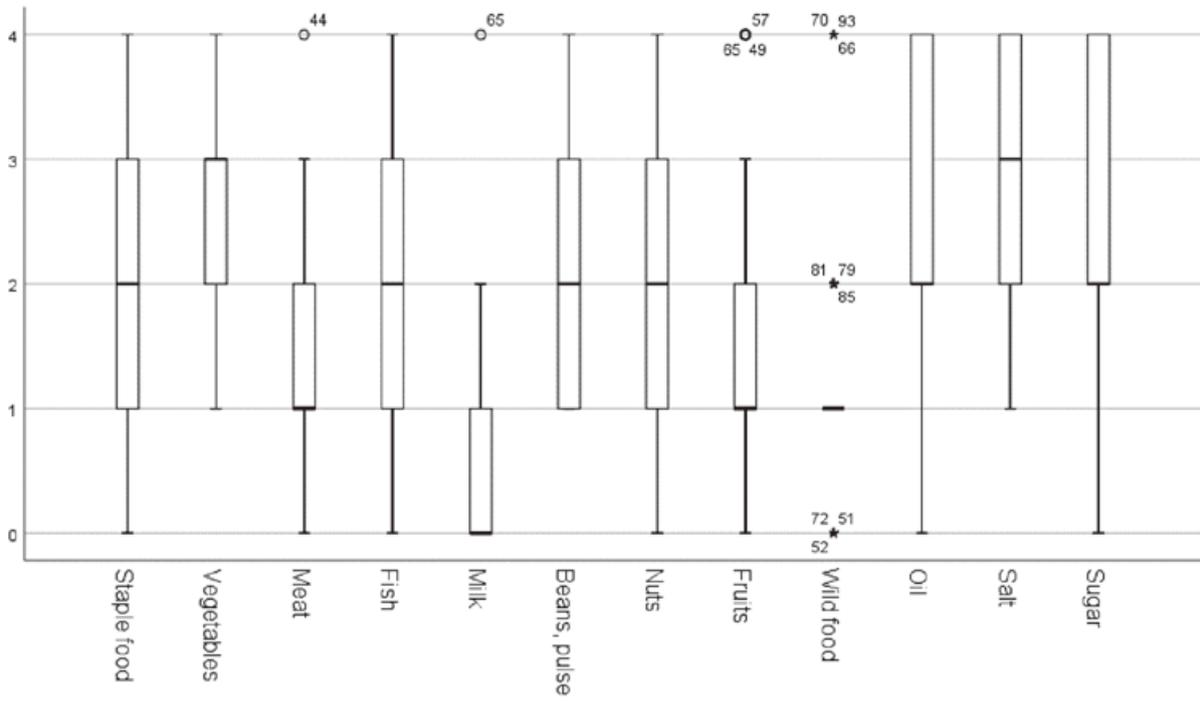
Food group	Dry season		Rainy season		Dry vs. Rainy <i>p</i> -value
	Mean	Std. Error	Mean	Std. Error	
Staple food*	2.13	± 0.11	2.13	± 0.11	n.s.
Vegetables*	2.57	± 0.11	2.17	± 0.10	<0.05
Meat**	1.44	± 0.07	1.47	± 0.10	n.s.
Fish**	2.21	± 0.10	2.24	± 0.12	n.s.
Milk**	0.63	± 0.08	0.56	± 0.07	n.s.
Beans, pulse**	2.06	± 0.10	2.00	± 0.10	n.s.
Nuts**	2.00	± 0.12	2.14	± 0.11	n.s.
Fruits**	1.51	± 0.09	2.06	± 0.13	<0.05
Wild food**	1.15	± 0.08	1.23	± 0.08	n.s.
Oil*	2.55	± 0.11	2.57	± 0.11	n.s.
Salt*	2.88	± 0.10	3.02	± 0.10	n.s.
Sugar*	2.66	± 0.10	2.75	± 0.11	n.s.

Note: Paired-sample T test was done between the Dry season and the Rainy season with significance level at 5%. n. s. = not significant.

\*4: More than twice a day; 3: Once every day; 2: 4, 5, 6 days a week; 1: Less than 3 days a week; 0: Don't eat

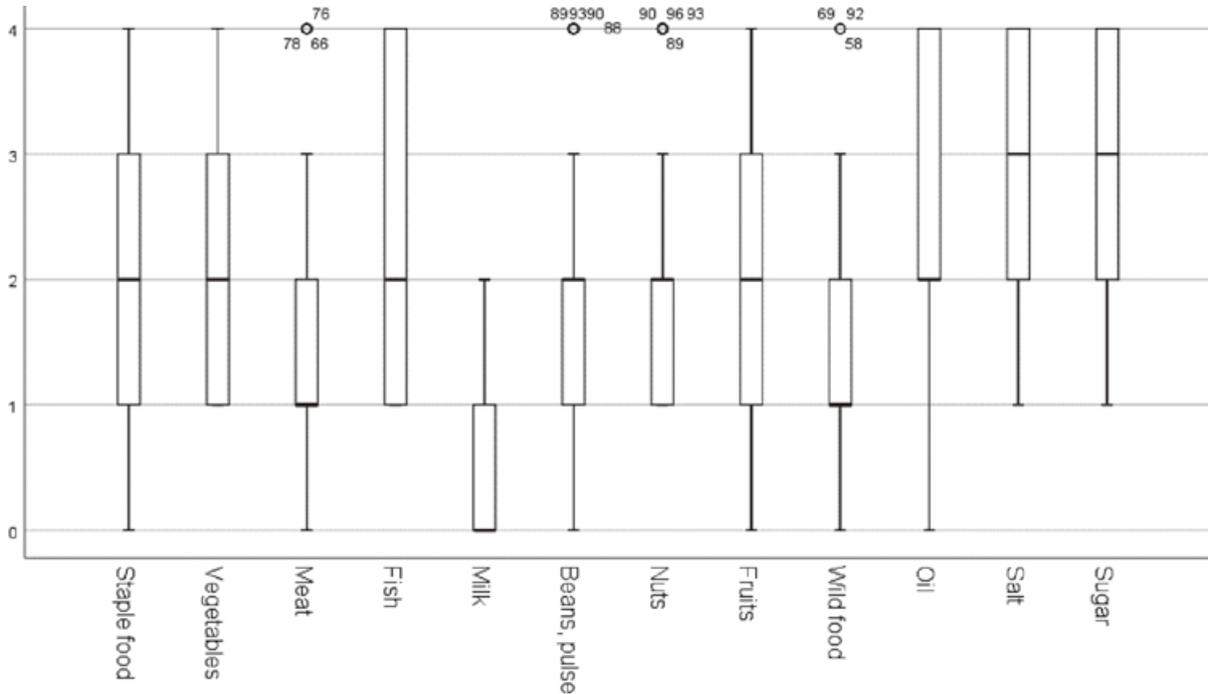
\*\*4: Every day; 3: 4, 5, 6 days a week; 2: 2, 3 days a week; 1: Once or less than once a week; 0: Don't eat

**Diagram 1. Frequency of food groups intake in the dry season**



Note: In the center is Median. The boxes indicate upper and lower quintile, and the lines indicate the upper and lower extreme. ○ and ★ are outliers.

**Diagram 2. Frequency of food groups intake in the rainy season**



Note: In the center is Median. The boxes indicate upper and lower quintile, and the lines indicate the upper and lower extreme. ○ and ★ are outliers.

**5. Health evaluations**

The health self-evaluations by students of each aspect are indicated in Table 7 and Diagram 3. The most common problem is waking up or feeling ill in the morning (1.36) and not having an appetite (1.31). Body feeling tired (1.15), not feeling like doing anything (0.96), and having a stomach ache (0.94) is also a problem.

While the average frequency is “sometimes” (1), there are a number of students who have the mentioned health problem(s) (except diarrhea) “all of the time” (4) (Diagram 3).

Difference between girls and boys have been analyzed for all the health problems. Leven’s Test for equality of variances indicated significance variance between boys and girls. More boys indicated higher frequency of not having an appetite at 1.38±0.11 in comparison to girls at 1.22±0.08. According to the t-test for equality of means, there were no health problems with significant difference between boys and girls.

**Table 7. Subjective health evaluation of students**

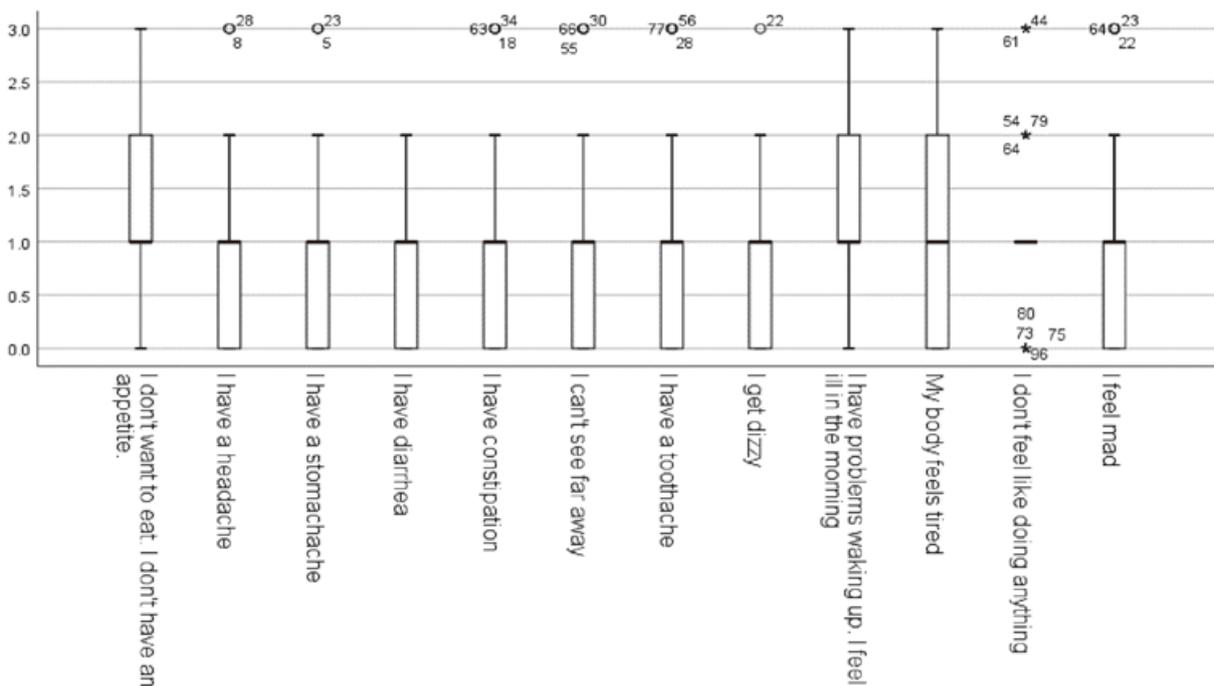
Subjective health evaluations	Frequency	
	Mean	Std. Error
(i) I have problems waking up. I feel ill in the morning	1.36	± 0.10
(ii) I don't want to eat. I don't have an appetite.	1.31	± 0.07
(iii) My body feels tired	1.15	± 0.10
(iv) I don't feel like doing anything	0.96	± 0.08
(v) I have a stomachache	0.94	± 0.08
(vi) I feel mad	0.88	± 0.09
(vii) I have constipation	0.84	± 0.08
(viii) I have a headache	0.82	± 0.06
(ix) I have a toothache	0.80	± 0.09
(x) I can't see far away	0.67	± 0.08
(xi) I get dizzy	0.62	± 0.07
(xii) I have diarrhea	0.59	± 0.07

0: None of the time; 1: Sometimes; 2: Frequently; 3. All of the time

**III. Analysis**

Table 8 analyzed the correlation between food intake frequency and subjective health evaluation. Correlation with the common health problems will be introduced.

**Diagram 3. Health evaluation of students**



Note: In the center is Median. The boxes indicate upper and lower quintile, and the lines indicate the upper and lower extreme. ○ and ★ are outliers.

Table 8. Correlation (Spearman) between food groups intake and subjective health evaluation

		Dry season										Rainy season									
		Staple food	Milk	Beans, pulse	Nuts	Wild food	Sugar	Staple food	Vegetables	Beans, pulse	Fruits	Oil	Salt	Sugar	Staple food	Vegetables	Beans, pulse	Fruits	Oil	Salt	Sugar
(i) I have problems waking up. I feel ill in the morning	Correlation Coefficient Sig. (2-tailed) N	0.004 0.968 90	-0.035 0.743 90	<b>.273**</b> <b>0.009</b> <b>90</b>	0.103 0.341 88	-0.205 0.053 90	0.108 0.309 90	0.184 0.082 90	0.152 0.151 90	0.169 0.111 90	<b>.282**</b> <b>0.007</b> <b>90</b>	<b>.220*</b> <b>0.038</b> <b>89</b>	<b>.271**</b> <b>0.010</b> <b>90</b>	0.184 0.082 90	0.152 0.151 90	0.169 0.111 90	-0.099 0.355 90	<b>.282**</b> <b>0.007</b> <b>90</b>	<b>.220*</b> <b>0.038</b> <b>89</b>	<b>.271**</b> <b>0.010</b> <b>90</b>	
(xii) I have diarrhea	Correlation Coefficient Sig. (2-tailed) N	0.058 0.585 91	0.031 0.770 91	<b>-.265*</b> <b>0.011</b> <b>91</b>	0.061 0.573 89	-0.013 0.902 91	0.035 0.744 91	0.096 0.368 91	0.151 0.152 91	-0.046 0.667 91	-0.134 0.204 91	-0.003 0.981 91	0.195 0.065 90	0.096 0.368 91	0.151 0.152 91	-0.046 0.667 91	-0.134 0.204 91	-0.003 0.981 91	0.195 0.065 90		
(ii) I don't want to eat. I don't have an appetite.	Correlation Coefficient Sig. (2-tailed) N	0.111 0.289 93	0.084 0.423 93	-0.139 0.184 93	-0.061 0.568 91	-0.040 0.707 93	-0.016 0.876 93	<b>-.205*</b> <b>0.049</b> <b>93</b>	-0.082 0.436 93	-0.157 0.133 93	0.033 0.753 93	0.119 0.256 92	0.101 0.336 93	<b>-.205*</b> <b>0.049</b> <b>93</b>	-0.082 0.436 93	-0.157 0.133 93	0.033 0.753 93	0.119 0.256 92			
(iv) I don't feel like doing anything	Correlation Coefficient Sig. (2-tailed) N	<b>-.241*</b> <b>0.027</b> <b>84</b>	-0.022 0.840 84	0.208 0.057 84	0.023 0.835 83	0.042 0.705 84	0.000 0.997 84	-0.018 0.874 84	0.160 0.146 84	-0.096 0.386 84	<b>-.222*</b> <b>0.042</b> <b>84</b>	0.058 0.599 84	0.048 0.666 84	-0.018 0.874 84	0.160 0.146 84	-0.096 0.386 84	<b>-.222*</b> <b>0.042</b> <b>84</b>	0.058 0.599 84			
(vii) I have constipation	Correlation Coefficient Sig. (2-tailed) N	<b>.225*</b> <b>0.033</b> <b>90</b>	0.018 0.865 90	0.011 0.917 90	<b>.215*</b> <b>0.043</b> <b>89</b>	0.060 0.576 90	-0.024 0.821 90	-0.009 0.935 90	-0.075 0.484 90	0.007 0.945 90	<b>-.214*</b> <b>0.043</b> <b>90</b>	0.096 0.370 90	0.127 0.470 90	-0.009 0.935 90	-0.075 0.484 90	0.007 0.945 90	<b>-.214*</b> <b>0.043</b> <b>90</b>	0.096 0.370 90			
(v) I have a stomachache	Correlation Coefficient Sig. (2-tailed) N	<b>.244*</b> <b>0.018</b> <b>93</b>	0.078 0.457 93	-0.023 0.825 93	<b>.247*</b> <b>0.018</b> <b>91</b>	0.167 0.111 93	-0.035 0.737 93	0.116 0.267 93	-0.048 0.650 93	0.114 0.276 93	-0.051 0.625 93	0.000 0.999 92	0.078 0.455 93	0.116 0.267 93	-0.048 0.650 93	0.114 0.276 93	-0.051 0.625 93	0.000 0.999 92			
(iii) My body feels tired	Correlation Coefficient Sig. (2-tailed) N	-0.041 0.701 90	0.106 0.322 90	0.120 0.258 90	0.041 0.703 88	-0.126 0.237 90	-0.163 0.124 90	0.141 0.184 90	<b>.249*</b> <b>0.018</b> <b>90</b>	<b>.211*</b> <b>0.046</b> <b>90</b>	-0.082 0.444 90	<b>.243*</b> <b>0.021</b> <b>90</b>	0.183 0.084 90	0.141 0.184 90	<b>.249*</b> <b>0.018</b> <b>90</b>	<b>.211*</b> <b>0.046</b> <b>90</b>	-0.082 0.444 90	<b>.243*</b> <b>0.021</b> <b>90</b>			
(viii) I have a headache	Correlation Coefficient Sig. (2-tailed) N	0.122 0.244 93	0.085 0.417 93	-0.084 0.424 93	-0.080 0.450 91	0.016 0.881 93	-0.079 0.452 93	-0.120 0.254 93	0.088 0.402 93	-0.075 0.477 93	-0.197 0.059 93	<b>.218*</b> <b>0.036</b> <b>93</b>	0.035 0.742 93	-0.120 0.254 93	0.088 0.402 93	-0.075 0.477 93	-0.197 0.059 93	<b>.218*</b> <b>0.036</b> <b>93</b>			
(x) I can't see far away	Correlation Coefficient Sig. (2-tailed) N	<b>.231*</b> <b>0.028</b> <b>90</b>	-0.104 0.328 90	-0.095 0.371 90	-0.023 0.832 88	<b>.226*</b> <b>0.032</b> <b>90</b>	0.052 0.626 90	-0.159 0.134 90	0.016 0.878 90	-0.082 0.445 90	-0.098 0.360 90	0.000 1.000 90	-0.007 0.949 90	-0.159 0.134 90	0.016 0.878 90	-0.082 0.445 90	-0.098 0.360 90	0.000 1.000 90			
(ix) I have a toothache	Correlation Coefficient Sig. (2-tailed) N	-0.168 0.112 91	0.084 0.430 91	0.023 0.825 91	0.177 0.095 90	0.118 0.264 91	<b>-.216*</b> <b>0.039</b> <b>91</b>	-0.034 0.751 91	0.046 0.665 91	-0.054 0.614 91	-0.126 0.232 91	-0.086 0.415 91	0.031 0.774 91	-0.034 0.751 91	0.046 0.665 91	-0.054 0.614 91	-0.126 0.232 91	-0.086 0.415 91			
(xi) I get dizzy	Correlation Coefficient Sig. (2-tailed) N	-0.106 0.327 88	<b>.224*</b> <b>0.036</b> <b>88</b>	0.025 0.816 88	0.068 0.534 87	0.036 0.741 88	-0.008 0.945 88	-0.036 0.740 88	0.014 0.896 88	-0.094 0.385 88	-0.192 0.073 88	0.109 0.312 88	0.066 0.541 88	-0.036 0.740 88	0.014 0.896 88	-0.094 0.385 88	-0.192 0.073 88	0.109 0.312 88			

\* Correlation is significant at the 0.05 level (2-tailed); \*\* Correlation is significant at the 0.01 level (2-tailed). Row and columns without significant correlation is deleted.

(i) Problems waking up in the morning is strongly associated positively with frequency of beans/pulse intake in the dry season, and oil and sugar intake in the rainy season. It is moderately positively associated with intake of salt in the rainy season. High consumption of oil, salt, and sugar may be a cause of problems waking up in the morning. Intake of beans are, however, is negatively correlated to (xii) having diarrhea.

(ii) Not having an appetite is negatively correlated to intake of staple food in the rainy season. Students who do not have an appetite may be having less meals. Similarly, students tend (iv) not feeling like doing anything with less frequent staple food, but have (vii) constipation or (v) stomachache with frequent intake of staple food and nuts. Lack of fruit intake have correlation with (iv) not feeling like doing anything and (vii) constipation.

(iii) Body feeling tired is positively associated with frequent intake of beans, vegetable, and oil. Frequent intake of oil is correlated to (viii) having a headache.

### Summary and conclusions

The research indicated that children had very low intake of staple food of less than once a day in average both seasons, which would be alarming if the children have answered precisely. However, a variety of wild food were eaten by primary school children, in spite of the fact that the school is situated in town. The wild foods may be further investigated to understand its potentials. Children had relatively high intake of salt and sugar, which may have negative effects on health.

In relation to the health evaluation, not a few children had problems such as (i) difficulty waking up, or feeling ill in the morning, (ii) not having an appetite, and (iii) body feeling tired. Some of these problems were correlated to food intake. Problem (i) was strongly related to intake of beans: those with higher intake had the problem. Negative influence of the intake of beans, or the situations of children who have high intake of beans need to be further investigated. Problem (i) was also strongly related to the high intake of oil and sugar: those with high

intake of oil or sugar had problem (i). Intake of fruits preventing constipation was also prevailed, and children's intake of fruits can also be promoted.

These findings are based on a preliminary questionnaire and analysis. The finding needs to be further investigated to conclude which can be applicable for concrete action. Further identification of the wild food eaten is also necessary to explore its potentials and benefits.

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<sup>1</sup> Tanzania (2015), p.33.

<sup>2</sup> TFNC (2014), pp.10-11.

<sup>3</sup> Tanzania (2011), p.10.

<sup>4</sup> TFNC (2014), pp.10, 39.

<sup>5</sup> TFNC (2014), pp.10-11, 43.

<sup>6</sup> TFNC (2014), pp.47-48.

<sup>7</sup> Teblich et al. (2017).

<sup>8</sup> Kulwa et al. (2006).

<sup>9</sup> WHO (2004), Munisi et al. (2016).

<sup>10</sup> Munisi et al. (2017).

<sup>11</sup> Shorter et al. (2010).

<sup>12</sup> Muhihi et al. (2013, 2018).

<sup>13</sup> Tsunoda et al. (2015) and Mizoguchi et al. (2004).

<sup>14</sup> Tanzania (2008).

<sup>15</sup> Local names (Swahili and Mwera) are indicated in **bold**, and scientific names are indicated in *italics*.

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## **Food Intake and Health of School Children in Southeast Tanzania:**

### **Preliminary Questionnaire in Raha Leo Elementary School, Lindi Municipal**

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Key words: food intake, school children, wild food, East Africa, Tanzania

#### **Abstract**

Nutrition and health of under-five children have been well researched, but of primary school children have not been extensively researched. Despite past researches on different public health issues and geographical settings, no research on the health of primary school children has been done in small coastal towns. Understanding the relationship between the student's subjective health evaluation and food group intake will enable relevant nutrient advices for improving their health. This is a preliminary research to evaluate the subjective health situation through a questionnaire in an elementary school in Lindi Town.

The study indicated that children had very low intake of staple food of less than once a day in average both seasons, which would be alarming if the children have answered precisely. However, a variety of wild food have been eaten by primary school children, in spite of the fact that the school is situated in town. The wild foods may be further investigated to understand its potentials. Children had relatively high intake of salt and sugar, which may have negative effects on health.

In relation to the health evaluation, not a few children had problems such as (i) difficulty waking up, or feeling ill in the morning, (ii) not having an appetite, and (iii) body feeling tired. Some of these problems were correlated to food intake. Problems (i) has strong relation with intake of beans: those with higher intake had the problems. Negative influence of the intake of beans, or the situations of children who have high intake of beans need to be further investigated. Problem (i) was also strongly related to the high intake of oil and sugar: those with high intake of oil or sugar had the problem.

These findings are based on a preliminary questionnaire and analysis. The finding needs to be further investigated to conclude which can be applicable for concrete action. Identifying wild food will also be necessary to understand its potentials.

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