PRELIMINARY STUDY ON RELATIONSHIP BETWEEN FOOD AND NUTRITION INDICES AND COVID-19 DURING LOCKDOWN IN SAGAMU TOWNSHIP

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ABSTRACT

Nutrition and COVID -19 are intrinsically related. The roles of some micronutrients and normal nutritional status in reducing the risk of infections by viruses leading to mortality have been suggested. It is important to document how the lockdown has impacted the nutritional indices like living circumstances and loss of jobs, supply, purchase, storage, preparation, and consumption of food in our environment. Five hundred and Fifty (550) questionnaires were administered to eleven-wards in the local government using non- probability quota-convenient sampling. A total of 550 participated in the study. The majority were females (60.20%) with most of them within the age range of 21-30 years (27.64%). 94.7% of the respondents indicated that the prices of food increased during the lockdown. Similarly, 91.5% said they spent more on feeding and were unable to store meat, fish, and fresh produce (69.6%). There was a strong positive correlation ($P<0.05$, $r = 0.813$) between the COVID-19 lockdown and the eating habits of respondents. Similarly, there was a strong impact of respondent's occupation on change in the number of meals consumed during this period. ($p< 0.05$, $r = 0.789$). A lot of socioeconomic activities were largely affected the respondent's businesses were affected by the lockdown in different ways (66.9%) Most of the respondents had to turn to their Extended family (42.7%), Churches/Mosques (10.2 %), friends and neighbors' (21.3%) for financial assistance to cope with expenses during the lockdown. COVID -19 partial lockdown in Sagamu town has strongly affected the nutritional indices of people living in Sagamu Township. This study therefore recommends government intervention in the provision of certain nutritional supplements to residents of Sagamu coupled with public seminars to educate the residents of Sagamu township on the benefits of the intake nutritional supplements in ensuring their general health, wellbeing and improved immunity to the COVID-19 disease.

Key words: Nutrition, COVID- 19, Sagamu Township, food,

Accepted Date: 2*0 Nov., 2020*

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is a respiratory syndrome caused by the corona virus. The disease was first identified in Wuhan, China, and has spread around the world. At first in its outbreak, this disease was identified as the 2019 novel coronavirus or 2019-nCoV by some scientist and as SARS-CoV-2 by some others (Wang et al., 2020). This virus belongs to the family of the virus responsible for Severe Acute Respiratory Syndrome (SARS). These viruses are known to cause illnesses ranging from the common cold to more severe diseases such as Middle-east Respiratory syndrome (Hawryluck *et al.*, 2004). In three months, the pandemic has escalated and spread nearly exponentially to all continents and approximately 20,279,705 cases have been confirmed, with 13,204,265 recoveries and 739,750 deaths globally have been reported; as of 11th August 2020. To date, there is no proven clinically approved antiviral drug or vaccine available to be used against the virus (WHO, 2020). The first person known to be infected with the novel COVID-19 in Nigeria was identified as Italian citizen who on arrival in Lagos, Nigeria tested positive and was reported on the 27th of February

2020. The second individual infected was a Nigerian citizen who had contact with the Italian and was reported on the 9th of March 2020. As of today,11th 0f August, a total of 47,157 cases have been confirmed with 33506 recoveries and 955 deaths (Adepoju, 2020; WHO, 2020).

Nutrition and COVID -19 are intrinsically linked. Malnutrition may worsen the symptoms of COVID-19. In European countries, significant negative correlation ($p = 0.033$) has been observed between COVID-19 cases per one million population and mean vitamin D levels. However, the correlation of vitamin D with COVID-19 deaths of these countries were not significant (Ali, 2020). Three possible mechanisms have been suggested for Vitamin D roles in reducing the predisposition to viral infection to include provisionof cellular natural immunity, creation of physical barrier and ensuring adaptive immunity (Rondanelli *et al.,* 2018). Similarly, the roles of vitamin C and Zinc have also been suggested to help in the treatment of COVID-19. Vitamin C, when administered intravenously is thought to help reverse some of the negative impacts of COVID-19. However, there is no proof it can treat or cure coronavirus.

In the bid to control the high rate of transmission of the virus, many countries have introduced drastic measures limiting drastically limiting daily activities. In many countries, this resulted in a complete shut-down of various sectors of the economy. In Nigeria for instance, the effect of these lockdowns on working hours, living circumstances, and loss of jobs have had a huge impact on how food are produced, supplied, purchased, stored, transported, sold, prepared and ultimately consumed. The prices of eggs in the sub-orbs of Sagamu town came down to 500 naira from 850 during the lockdown because of transportation disruptions. There have been predictions that the pandemic is likely to result in the fall of Nigeria's GDP (World Bank, 2020). This will, in turn, disrupts the livelihoods of people working in the formal and informal sector. It is predicted that the informal sector which comprises people like traders, transporters, SMEs which make up more than half of the Nigerian labor force will be most affected (Adesoji, 2019). All these directly or indirectly affect nutrition. Furthermore, the presence of poor nutritional status and pre-existing nutritionally related non-communicable diseases (NCDs) such as diabetes mellitus, chronic lung diseases, cardiovascular diseases (CVD), obesity, and various other diseases render the patient immune-compromised and make these category of people susceptible to COVID- 19 and also affecting patient outcomes against COVID-19 (Dietz & Burgoa, 2020).

In view of all these, the study was carried with the following objectives:

- To determine food availability during the lockdown period
- To evaluate the effect of COVID-19 on the income of respondents.
- To assess the dietary habit of respondents during lockdown
- To determine the effect of lockdown on weight assessment of respondents

METHOD AND MATERIALS

Study Design and Population

This study was designed as a cross-sectional survey conducted among the residents of Sagamu Township, Ogun state.

Sagamu is popular town in Ogun State, bounded in the East by Ikenne Local Government, in the North by Remo North Local Government, in the West and South Obafemi Owode Local Government in Ogun State, and Ikorodu Local Government in Lagos State. Sagamu has a latitude of 6°49'55.92"N and a longitude of 3°37'54.89"E. Sagamu consists of fifteen wards with an area of 68.03sq km (Adam, et al. 1998, Di Renzo et al., 2020). A non-probability quota-conveniencesampling technique was used. Of the fifteen wards in Sagamu, samplings were carried out in eleven wards for convenience sake as the other four wards were hard to reach and are in the sub hub of Sagamu Local Government.

Inclusion criterion

The study was carried out among the residents of Sagamu Township Ogun state; hence the inclusion criterion was those that currently reside in eleven selected wards (Oko, Ijoku, Epe & Itunla 1, Epe & Itunla II, Itunsokun-Oyebajo, Aiyegbami, Sabo 1, Sabo II, , Ijagba, Latawa, Isote, Agbowa,).

Procedure

Fifty (50) samples were taken from each of the eleven-ward making a total of Five hundred and fifty (550) respondents. The authors were assigned to different wards for data collection. The questionnaires were shared among residents of each ward, Researchers protected themselves by wearing protective gargets while collecting data to prevent the transmission of COVID-19. After data collection, the questionnaires were left unattended for a minimum of two days to allow the death of any accompanied micro-organism.

The instruments

Data were obtained using structured self-administered questionnaire. The questionnaire was prepared in the English language; it contained questions organized into four sections. Section A, Section B, Section C and Section D respectively. While section A sought for Socio-demographic information; Section B answered questions on dietary habit; Section C was for weight assessment and section D determined food availability in the study area.

Statistical Analysis

A descriptive statistical methods of frequency count and simple percentages were used to summarize data on socio-demographic characteristics and responses to questions. The research hypotheses were tested using the Pearsons' Product Moment Correlation (PPMC). All data analyses were performed using Statistical Package for the Social Sciences (SPSS) software, version 21.

RESULTS

TABLE 1: Socio-demographic data of respondents

Variables	Frequency n=550	Percentage
Age		
= 20 years	79	14.36
21-30	152	27.64
31-40	135	24.55
41-50	108	19.64
51-60	37	6.73
61-70	23	4.18
71-80	8	1.45
=80	1	0.18
No response	71	1.27
Gender		
Male	198	36.00
Female	331	60.20
No response	21	3.80
Education level		
None	40	7.30
Primary	23	4.20
Secondary	177	32.20
University/polytechnic	216	39.30
Postgraduate	73	13.30
No response	21	3.80

Religion		
Christianity	338	61.50
Islam	172	31.30
Traditional	18	3.30
Others	2	0.40
No response	20	3.50
Occupation		
Student	124	22.50
Unemployed	80	14.50
Government	105	19.10
Non-government	197	35.80
Retired	20	3.60
No response	24	4.40
Marital status		
Single	181	32.90
Married	311	56.50
Divorced/Separated	26	4.70
Widow/Widower	25	4.50
No response	7	1.30

Table 1 on the respondents' socio-demographic information indicated that the study samples were quite younger, mostly females, highly educated, mostly Christians and were mostly married with non-government jobs as their sources of income.

TABLE 2: Dietary habit of respondents during lockdown

Variables	Frequency n=550	Percentage %
Food supplement intake		
Yes	149	27.00
No	386	70.20
No response	15	2.70
Was there a change in eating habit?		
Yes, it improved	105	19.10
No, it didn't	176	32.00
No, it got worse	243	44.20
No response	25	4.50
Change in number of daily meals during this period		
Yes, I skipped 1 or more of the main meals (breakfast, lunch, dinner)	260	47.30
Yes, I skipped 1 or more snacks between meals	43	7.80
Yes, I added 1 or more main meals	34	6.20
Yes, I added 1 or more snacks between meals	14	2.50
No, I didn't	159	29.00
No response	40	7.20

Change in hunger for food during the lockdown		
Yes, less appetite	108	19.6
Yes, more appetite	333	60.5
No	92	16.7
No response	17	3.1

Table 2 on the dietary habit of the respondents during the lockdown indicated that most of the respondents did not take food supplements and that their eating habits got worse having to skip 1 or more main meals, reflecting in their increased appetite. Most of them consumed adequate water.

TABLE 3: Job status and monthly income of respondents during the lockdown

Variables	Frequency n =550	Percentage %
Monthly income		
= #30,000	176	32.00
#30,001 - #50,000	93	16.90
#50,001 - #70,000	50	9.10
#70,001 - #90,000	42	7.60
= #90,001	45	8.20
No response	144	26.20
Are you still on the job with regular payment		
Yes	199	36.20
No	231	42.00
No response	119	21.60
Still on the job with no payment		
Yes	91	16.50
No	335	60.90
No response	124	22.50
Loss of job		
Yes	76	13.80
No	350	63.60
No response	124	22.50
Reduced pay		
Yes	126	22.90
No	297	54.00
No response	127	23.10
Means of coping with finances		
Church/mosque assistance	56	10.20
Extended family assistance	235	42.70
Friends	85	15.50
Neighbors	32	5.80
Begging	24	4.40
No response	117	21.30
Do you have unpaid bills		
Yes	358	65.10
No	162	29.50
No response	29	5.40

Type of unpaid bills		
Electricity bills	89	16.20
House rent	201	36.50
Grocery bills	40	7.30
No response	220	40.00
Is business affected by covid-19?		
Yes	368	66.90
No	108	19.60
No response	74	13.50
Did income increase		
Yes	55	10.00
No	380	69.10
No response	115	20.90

Table 3 on Job Status and monthly income indicated that most of them lost their job, while fewer were still on their job with regular pay. Most of the respondents were earning between #30,001 - #50,000. Most of the respondents coped with finances with the help of extended family assistance. Most of them had businesses affected by COVID-19 lockdown with a reduction in income.

TABLE 4: Food availability to respondents during the lockdown

		Frequency n=550	Percentage %
Where did you buy food items during this period?			
Supermarket	Yes	111	20.20
	No	426	77.50
	No response	13	2.40
Street market	Yes	289	52.50
	No	249	45.30
	No response	12	2.20
Farmers' market	Yes	81	14.70
	No	456	82.90
	No response	13	2.40
Regular open market	Yes	350	63.60
	No	186	33.80
	No response	14	2.60
Were you able to store meat, fish and fresh produce?			
Yes		153	27.80
No		383	69.60
No response		14	2.50
Did the prices of foodstuffs changed during the lockdown?			
Yes, it increased		521	94.7
No, the price is the same		19	3.5
No response		10	1.8
Do you spend more on feeding during the lockdown?			
Yes		503	91.5
No		37	6.7
No response		10	1.8

Table 4 on Food availability to respondents during lockdown showed that most of them purchased their foodstuffs from the regular open market. Most of them did not store foods as prices of foodstuffs increased during the lockdown and had to spend more on feeding during the lockdown.

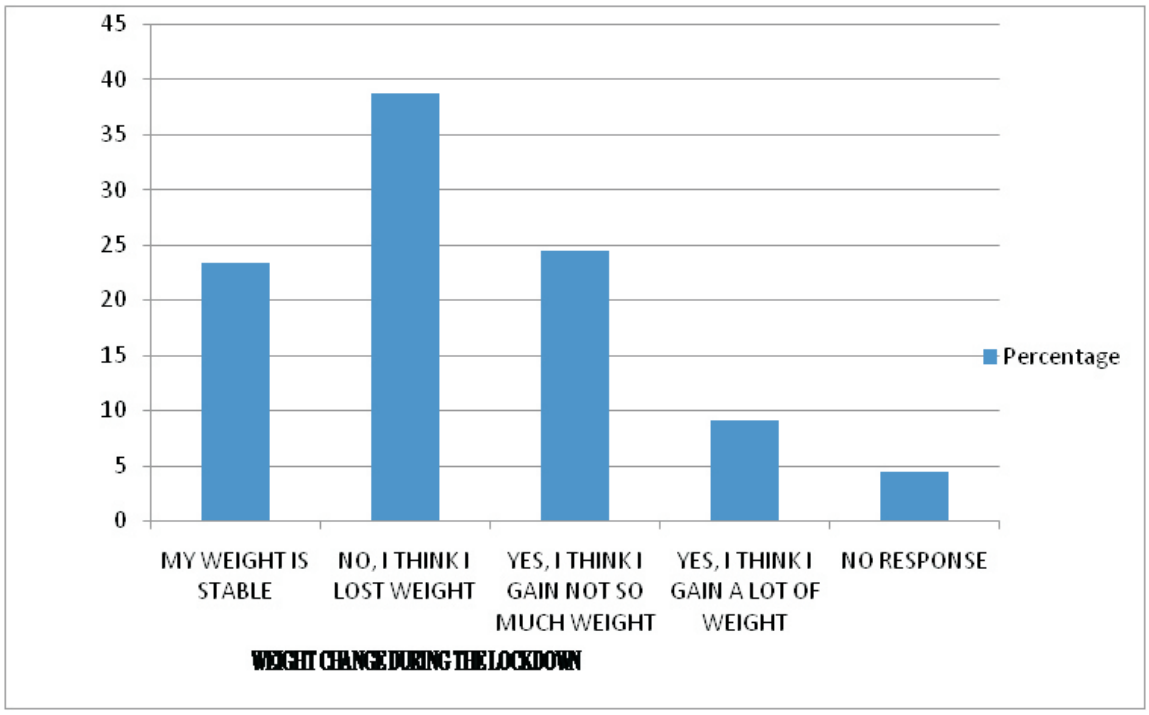

Figure 1: Weight Change During The Lockdown

Weight change of the respondents during the lockdown indicated that most of the respondents lost weight with a fewer number gained weight.

RESEARCH HYPOTHESES

Hypothesis One: There is no significant effect of COVID-19 lockdown socio-economic difficulties on the eating habits of respondents.

Table 5: Pearson Moment correlation, testing for a relationship between COVID-19socio-economic difficulties and the eating habits of respondents.

Variables	Mean	Standard Deviation	N	Df	r	Sig	Decision
COVID-19 socio-economic difficulties	1.0618	.57244	550	448	.813**	0.01	Reject the null hypothesis
Was there a change in eating habit	.8273	.72754					

** Correlation is significant at the 0.01 level (2-tailed).

Results on Table 5 shows that ($p<0.01$, $r = .813$) there is a positive correlation between COVID-19 socio-economic meltdown difficulties and change in respondents' eating habits. The result indicates that the slope is significantly different from zero. In other words, there is a very strong impact on COVID-19 socio-

economic meltdown difficulties on change in respondents' eating habit.

Hypothesis Two: There is no significant effect of gender on the eating habit of respondents.

Table 6: Pearson Moment correlation, testing for a relationship between gender and the eating habits of respondents.

Variables	Mean	Standard Deviation	n	Df	r	Sig	Decision
Gender	1.2618	.51268	550	448	.732**	0.01	Reject the null hypothesis
Was There A Change In Eating Habit	.8273	.72754					

** Correlation is significant at the 0.01 level (2-tailed).

Results in Table 6 shows that ($p<0.01$, $r= .732$) there is a positive correlation between gender and change in respondents' eating habits. The result indicates that the slope is significantly different from zero. In other words, there is a strong impact of gender on change in respondents' eating habits.

Hypothesis Three: There is no significant effect of respondents' occupation status on the number of meals they consumed.

Table 7: Pearson Moment correlation, testing for a relationship between respondents' occupation and the number of meals they consumed

Variables	Mean	Standard Deviation	n	Df	r	Sig	Decision
Respondents' occupation	2.7036	1.36352	550	448	.789**	0.01	Reject the null hypothesis
Change in number of daily meals during this period	.9217	.96246					

** Correlation is significant at the 0.01 level (2-tailed).

Results in Table 7 shows that ($p<0.01$, $r= .789$) there is a positive correlation between respondents' occupation and change in the number of meals consumed during this period. The result indicates that the slope is significantly different from zero. In other words, there is a strong impact on respondents' occupation on change in the number of meals consumed during this period.

Hypothesis Four: There is no significant effect of respondents' monthly income on the number of meals they consumed.

Table 8: Pearson Moment correlation, testing for a relationship between respondents' monthly income and the number of meals they consumed.

Variables	Mean	Standard Deviation	n	Df	r	Sig	Decision
Monthly income	1.6455	1.54228	550	448	.907**	0.01	Reject the null hypothesis
Change in number of daily meals during this period	.9217	.96246					

** Correlation is significant at the 0.01 level (2-tailed).

Results in Table 8 shows that ($p<0.01$, $r= .907$) there is a positive correlation between respondents' occupation and change in the number of meals consumed during this period. The result indicates that the slope is significantly different from zero. In other words, there is a very strong impact on respondents' monthly income on change in the number of meals consumed during this period.

Hypothesis Five: There is no significant effect of respondents' monthly income on the respondents' weight change during the COVID-19 lockdown.

Table 9: Pearson Moment correlation, testing for a relationship between respondents' monthly income and weight change during the COVID-19 lockdown.

Variables	Mean	Standard Deviation	n	Df	r	Sig	Decision
Monthly income	1.6455	1.54228	550	448	.911**	0.01	Reject the null hypothesis
Weight change during the lockdown	1.9618	1.08492					

** Correlation is significant at the 0.01 level (2-tailed).

Results in Table 9 shows that ($p<0.01$, $r= .911$) there is a positive correlation between respondents' occupation and weight change during the lockdown. The result indicates that the slope is significantly different from zero. In other words, there is a very strong impact of respondents' monthly income on weight change during the COVID-19 lockdown.

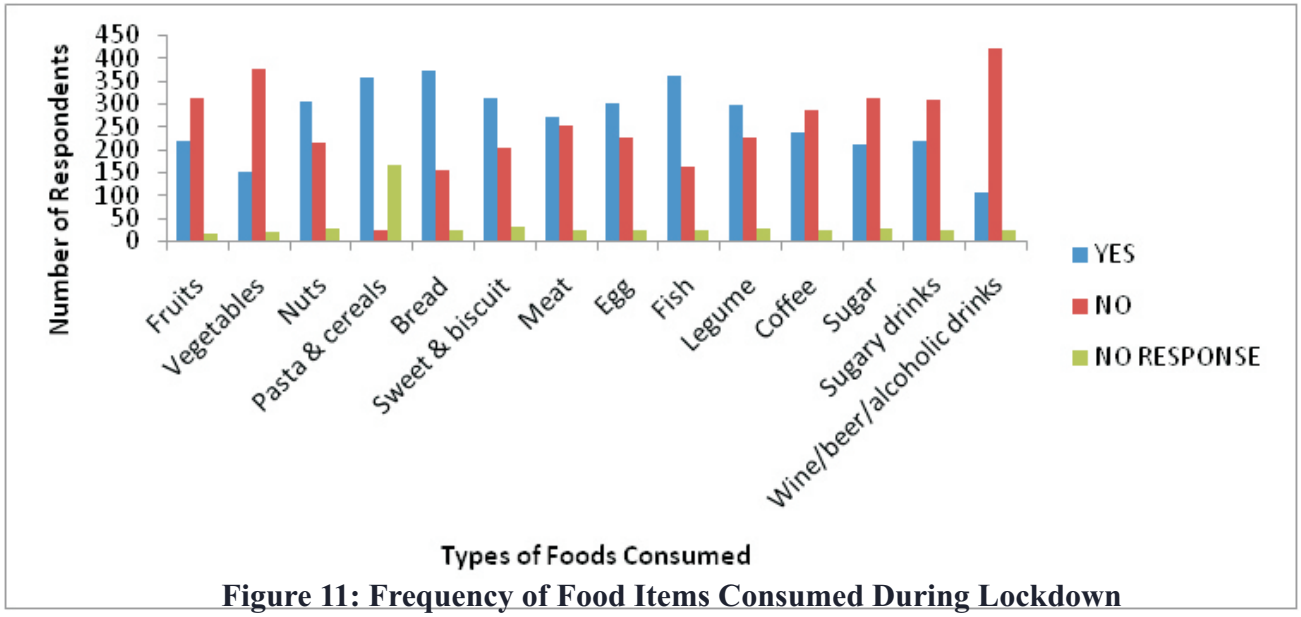

Figure 11: Frequency of Food Items Consumed During Lockdown

DISCUSSION

The measures to limit and control the spread of COVID-19 and their implications have had a profound effect on how food is supplied, the number of times food is consumed and the quality as whereas quantity and quality of food consumed. The effect of COVID-19 on eating pattern and dietary tendencies as evident in this study is seen in the strong impact positive correlation between COVID-19 lockdown difficulties in the respondents eating habits. The eating habits of some of the respondents got worse and some did not change. To the best of our knowledge, this study is the first in examining the impact of lockdown during COVID-19 pandemic on food and nutrition.

A cursory look at the socio-demographic information of the respondents in Sagamu which is the study area indicates that they were mostly females (60.20%) with most of them within the age range of 21-30 years (27.64%). Most of the respondents also had university/polytechnic education (39.30%) with very few having no (7.30%) or primary education (4.20%). This suggests therefore that the education level of the respondents in Sagamu is quite high. Most of the respondents in the study area are employed (58.50%) with a larger percentage working with non-governmental organizations (35.80). likewise, most of the respondents are married (56.50%). These findings are similar to findings from a study in Poland on Dietary Choices and Habits during COVID-19 Lockdown (Sidor & Rzymski, 2020) where most of the respondents are females within the age bracket of 18-25 years whose education levels were at the tertiary levels.

According to International Labor Organization (ILO), almost 25 million people around the globe could lose their jobs (loss of workers' income of as much as USD 3.4 trillion). A more recent report of ILO shows that lockdowns either full or partial measures are influencing 81% (around 2.7 billion workers) of the total global workers (ILO, 2020a). "It is the worst global crisis since the Second World War" (ILO, 2020b). The same was revealed in this study as 16.50% reported that they are still on their job with no pay, and several others (66.90%) said to have lesser income from their daily businesses as there were lockdown with a lot of socioeconomic activities largely affected. Activities of daily life have to continue despite the lockdown; hence people depended on various means of coping with finances, such as Church/mosque assistance, Extended family assistance, Friends, Neighbours, and begging.

With regards to the daily meal consumption during this period majority of the respondents skipped at least a meal daily while few did not change the number of meals consumed daily during the lockdown period 47.30% and 29.0% respectively. However, 6.20% added more meals to the normal daily meal consumption per day, and a few of the respondents 2.5% added snacks to the daily meal consumption. This denotes that most of the respondent's daily meal consumption was adjusted;

this is corroborated with a study conducted in Italy where more than half of the subjects did not change the number of their daily meals (57.8%), while 17.5% and 23.5% declare to skip or introduce a break or a main meal, respectively (Di Renzo *et al.,* 2020).Socioeconomic difficulties have been a strong impact for change in the daily eating habits of respondents the Pearson Moment correlation showed $p<0.01$, $r = .813$ which indicates that the slope is significantly different from zero.

The respondents consumed more of vegetables, bread, fish, pasta and cereals where as they eat less of egg, legumes, fruit, vegetables and meat, this revealed that the study population fed lesser on healthy proteinous food that is supposed to aid their immunity and also provide a natural source of ascorbic acid (Vitamin C) which helps reverse some of the damage that COVID-19 could cause. This result is similar to the study carried out among Italians during lockdown where 37.4% and 35.8% fruit, vegetables, nuts, and legumes respectively.

This study observed that a total of 27.1% of the respondentstook supplements likeginger, turmeric, honey, garlic herbal mixture and vitamin C to combat COVID-19. According to a study by Zhao *et al*. (2020) about 38% of the respondents took nutritional supplements to combat COVID-19, which included vitamin C, probiotics, alcohol, vinegar etc. (Zhao *et al.,* 2020)

Nutrition is one of the important factors in managing weight loss and in health maintenance. Weight changes can result due to decreased physical activity, increase or decrease in the quantity and quality of food consumed and the socio-economic difficulties attributed to a lockdown. This assumption conformed to the finding gotten from this study as over one-third (38.7%) of the respondents declared to have lost weight during the lockdown while 23.3% stated to have not gained additional weight, which is in line with a study carried out in Italy where 37.4% of the study population declares a stable weight, 13.9% believed to have lost weight, 40.3% feels to have a slight weight gain and 8.3% to have gained a lot of weight (Di Renzo *et al.,* 2020). Occupation has been revealed from this study to have a positive correlation with weight change during the lockdown. The low, reduced or no pay at all significantly affected the weight of the respondents ($P<0.05$, $r = 0.911$).

CONCLUSION

This preliminary study indicates a negative effect of lockdown on the dietary habit, weight assessment and socio-economic stability of the respondents. COVID -19 partial lockdown in Sagamu town has strongly affected the nutritional indices of people living in Sagamu Township, hence Sagamu township could be predisposed to the outbreak of the novel COVID-19 disease. This study therefore recommends government intervention in the provision of certain nutritional supplements to residents of Sagamu coupled with public seminars to educate the residents of Sagamu township on the benefits of the intake nutritional supplements in ensuring their general health, well being and improved immunity to the COVID-19 disease. This study also recommends an extension of this research effort to determine the nutritional indices of residents in the epicentres of the COVID-19 disease.

FUNDING: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CONFLICT OF INTEREST STATEMENT:

None

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