

**AN ASSESSMENT OF NUTRITION KNOWLEDGE LEVELS AND BEHAVIOUR
AMONG CLASSES ONE TO FOUR PUPILS IN THE NESTLÉ HEALTHY KIDS
PROGRAM IN SELECTED COUNTIES OF KENYA**

Wambo CM¹ and JO Otieno^{1*}



Chris Masila Wambo



Jack Onyango Otieno

*Corresponding author email: info@pemascientifics.co.ke

¹Researcher at Pema Scientifics Limited, Kenya



ABSTRACT

Nearly 30% of Kenya's children are currently classified as undernourished. One of the policy objectives of the Government of Kenya is to improve nutrition for optimum health for all Kenyans. Concerning school nutrition, the policy focuses on improved nutrition education in schools with an emphasis on developing good nutrition practices and positive food eating habits among pupils. Most Governments in Africa, however, have not acknowledged the importance of nutrition education in children. Healthy Kids Program (HKP) is Nestlé's global initiative that focuses on raising awareness on nutrition among school-age children in primary schools around the world. The objective of this study was to assess and compare nutrition knowledge levels and behavioural indicators among pupils in classes one to four in HKP-intervention and non-intervention schools in five counties of Kenya using a cross-sectional comparative design. Structured questionnaires were used to assess pupils' nutrition knowledge levels and behaviour. Study results indicated significant differences in nutrition knowledge levels among pupils in HKP schools compared to those in non-HKP schools ($p < 0.05$) with higher percentages of pupils in HKP schools recording high nutrition knowledge scores of more than 70% compared to those in non-program schools. In class one, program schools had a higher percentage of pupils with high levels of knowledge (75.4%) compared to those in non-program schools (58.9%). Class two HKP schools had a higher percentage of pupils (84%) with high knowledge levels compared to non-program schools (81%) while in class three a higher percentage of pupils in HKP schools had high (13.8%) and average (67.9%) nutrition knowledge levels compared to those in non-HKP schools (high, 4.5% and average, 58%). In class four a higher percentage of pupils in HKP schools (68.9%) had high nutrition knowledge levels compared to 47.7% in non-program schools. The program improved pupils' attitudes around some aspects of nutrition-related hygiene practices like washing hands before and after eating food, cleaning utensils before and after using them to cook and eat food, good eating behaviour, portion management and eating balanced diets. However, the program did not appear to impact dietary practices as this is a long-term goal that the program will hopefully achieve on a longitudinal basis. The results will hopefully inform Nestlé and other stakeholders on the role of the program in raising nutrition awareness levels of pupils and helping them grow into healthy and productive adults.

Key words: Healthy Kids Program, Nutrition knowledge levels, Behavioural indicators



INTRODUCTION

Currently, over 10 million people in Kenya suffer from chronic food insecurity and poor nutrition while between two and four million people require emergency food assistance at any given time [1]. Nearly 30% of Kenya's children are classified as undernourished and micronutrient deficiencies are widespread [1]. One of the policy objectives of the Government is to improve nutrition for optimum health for all Kenyans by enhancing food access, providing special nutrition interventions for specific vulnerable groups and creating awareness to provision of nutritious foods for all family members and especially children. With regard to school nutrition, the policy focuses efforts to improve nutrition education in schools with an emphasis on good nutrition practice and positive food eating habits [1].

The National Food and Nutrition Security policy [1] addresses diet-related non-communicable diseases (NCDs) associated with excessive energy intake of purchased meals and processed foods. It also addresses the challenge of decreasing levels of physical activity in urban settings. Indeed, the large scale and increasing global health and development burden posed by NCDs is a concern to healthcare authorities, communities, Governments and all stakeholders. In sub-Sahara Africa, the double burden of childhood under nutrition and obesity puts both its current and future generations at risk. Kenya, like many other countries in Africa faces this problem. Getting regular physical activity and establishing healthy eating habits help children attain and maintain a healthy body weight which will enable them to grow into healthy and productive adults [2]. Education is one of the tools for ensuring that children understand the value of nutrition and physical activity to their health throughout the course of their lives [1, 2].

Nutrition education when introduced at an early stage of a child's development process has the potential to positively impact in the long term. At a young age, children are more receptive to new information and learning experiences [3]. Therefore, promoting nutrition knowledge at this stage increases the likelihood of nutrition behavior and habits being retained through adulthood. A captive environment like a school setting provides a great opportunity for this kind of program.

Healthy eating habits among children should be promoted as one of the actions targeted at preventing overweight and obesity in future generations. The most common place for health promotion among children has been in the school setting mostly with children aged six to 12 years old [4].

The school environment provides an opportunity to create change in dietary behavior, adopt good hygiene practices and physical activity practices. Nutrition education is conducted with the aim of providing pupils with the knowledge, skills as well as motivation to adopt healthy practices that promote good nutrition and health. This can be achieved when nutrition education is implemented within a classroom program that is delivered by a trained teacher [5].

Nutrition knowledge may be a pre-requisite to improving nutrition habits. Children can adopt and maintain health-enhancing practices when they attain the relevant knowledge acquire the right attitudes and possess the necessary skills to assume health-enhancing



behavior [6]. Behavior change should encompass actions that point towards healthy eating as well as promoting active lifestyles [7].

Therefore, nutrition education activities conducted in schools using trained teachers are an effective and efficient investment that governments and other stakeholders should be encouraged to adopt and support in addressing both long- and short-term nutrition challenges [8]. However, most governments in Africa have not acknowledged the importance of nutrition education in children [9].

Healthy Kids Program (HKP) is Nestlé's global initiative that focuses on raising nutrition, health and wellness awareness and promotes physical activity among school-age children in primary schools around the world. This program was launched in 2009 and by 2014 it was in 73 countries worldwide reaching 7.3 million children [2].

The program builds on existing base of nutrition education and/or physical activity programs developed by Nestlé in the last 10-15 years in several countries. New pilot programs were started in 2012 in many countries such as Bosnia-Herzegovina, Bulgaria, Paraguay, Sweden, Trinidad and Tobago, Democratic Republic of Congo, Kenya, South Africa, United Arab Emirates and Zimbabwe.

The program was launched in Kenya in June 2012 by the Ministry of Education in collaboration with Nestlé Kenya Limited. By the end of 2015, there were over 200 schools participating in the program within the five counties of Nairobi, Kiambu, Kirinyaga, Embu and Kakamega. The program provides essential teaching materials including posters and interactive manuals that help teachers involve the pupils in interactive lessons about healthy eating, physical exercise, hygiene and sanitation [2].

These creative educational class materials for standard one to four are distributed in the primary schools and teachers are trained on how to use them to integrate nutrition education into the class lessons. These materials were developed by the Kenya Institute for Curriculum Development (KICD) in line with school syllabus. The cost of development, production and distribution of these class materials and overall running of the program in schools was borne by Nestlé Kenya Limited [2].

The objective of the program is to raise nutrition awareness and promote healthy physical activity among school-age children in primary schools, who are likely to continue practicing good habits into adulthood and grow into healthy productive adults [2].

This study evaluated the role of the program in raising nutrition knowledge levels of primary school pupils in classes one to four by assessing the difference in nutrition knowledge levels among pupils in HKP-intervention schools and those in non-program schools. It also assessed and compared associations between nutrition knowledge and behavioural indicators among class one to four pupils in HKP-intervention schools and non-program schools.



MATERIALS AND METHODS

Research design, study site and study population

This was a cross-sectional study that was conducted in primary schools within the five counties of Nairobi, Kiambu, Kirinyaga, Embu and Kakamega. Primary school pupils in class one, two, three and four in both public and private primary schools formed the study population.

Sample design

Random sampling of HKP schools was done from the list of all program schools in the five counties provided by Nestlé to determine the schools to be included in the study in each county. Comparable non-HKP schools were then identified and matched with the program schools in each county. In each county, five HKP schools were randomly selected and matched to five non-HKP schools. To determine the number of pupils to be included in each arm of the study that is, HKP intervention and non-intervention, the following formula was used:

$$n = z^2 / 2 [P1 (1-P1) + P2 (1-P2)] d^2$$

where n is the sample size, z is the confidence level at 95% (1.96), P1 and P2 are the anticipated proportions of pupils in the five counties with knowledge on nutrition (50%), d is significance level (5%) of absolute difference between the two groups. A total of 1586 pupils were enrolled into the study. The HKP schools arm had 801 pupils while the non-HKP schools arm had 783 pupils. Two pupils had their data missing. The total number of pupils (1586) was divided by the total number of schools in the five counties (50) giving an average of about 30 pupils per school. Since the intervention covered pupils from classes one to four, this was then divided by four to get the number of pupils to be selected from each class, which gave an average of about eight pupils per class who were then randomly selected for inclusion into the study.

Inclusion/Exclusion criteria

The study included students of primary public and private schools in standards one, two, three and four in each of the five counties and who assented to participate in the study after obtaining informed consent from their parents/guardians. Those whose assent/consent was not obtained were excluded from the study.

Data collection

Structured schedules containing questions based on the training modules for each class level were administered to the pupils. Triangulation methods were applied to enhance credibility of the research findings.

Data management and analysis

Collected data were categorized through editing and coding into HKP and non-HKP schools, rural and urban schools, public and private schools. Summary statistics (mean, SD) were calculated. Statistical tests of significance were used to determine the difference between the two groups of schools, that is HKP intervention and non-intervention schools



and associations between nutrition knowledge and behavioural indicators. Statistical inference was then made based on these test scores.

RESULTS AND DISCUSSION

Nutrition knowledge levels

Class one

The results in Table 1 show that there was a significant difference in nutrition knowledge levels among class one pupils in HKP schools compared to those in non-program schools ($p < 0.05$). Healthy Kids Program schools had a higher percentage of pupils with high levels of knowledge (75.4%) compared to those in non-program schools (58.9%). A higher percentage of pupils in non-program schools (36%) had average levels of nutrition knowledge compared to those in HKP schools (23.1%). Similarly, more pupils in non-program schools (5.1%) had low levels of nutrition knowledge compared to those in HKP schools (1.5%). Nairobi and Embu county schools showed higher differences between HKP schools and non-HKP schools compared to the other counties.

Class two

The results in Table 1 show a significant difference in nutrition knowledge levels among class two pupils in HKP schools compared to those in non-program schools ($p < 0.05$). HKP schools had a higher percentage of pupils (84%) with high knowledge levels compared to non-program schools (81%). Non-program schools on the other hand had a higher percentage of pupils with average nutrition knowledge levels (17.9%) compared to program schools (11.1%). Kakamega county schools showed the highest difference in nutrition knowledge levels between HKP schools and non-HKP schools.

Class three

The results in Table 1 show that there was a significant difference in nutrition knowledge levels among class three pupils in HKP schools compared to non-HKP schools ($p < 0.05$) with Kiambu and Embu county schools contributing more than the other counties to this difference ($p = 0.011$ and 0.002 respectively). A higher percentage of pupils in HKP schools had high (13.8%) and average (67.9%) nutrition knowledge levels compared to those in non-HKP schools (high, 4.5% and average, 58%) while a higher percentage of pupils in non-HKP schools (37%) compared to those in HKP schools (18.4%) had low levels in nutrition knowledge.

Class four

According to results in Table 1 there was a significant difference in nutrition knowledge levels among class four pupils in HKP schools compared to non-HKP schools ($p < 0.05$). Kiambu and Kakamega county schools contributed significantly to this difference ($p = 0.00$, $p = 0.001$, respectively). A higher percentage of pupils in HKP schools (68.9%) had high nutrition knowledge levels compared to 47.7% of pupils in non-program schools whereas non-program schools had a higher percentage of pupils with low levels of nutrition knowledge (39%) compared to 17.8% in HKP schools.

The results of this study compare with those of other workers who found that nutrition education interventions in schools improve nutrition knowledge levels among school pupils



while their impact on dietary practices may be long term. For instance, in the post-intervention study conducted in primary schools in Machakos, Kenya, results showed that there was a significant difference in nutrition knowledge between experimental and control groups. The experimental schools performed better than the control schools [8]. A similar study to examine the effects of a nutrition intervention on nutrition knowledge, behaviour and efficacy expectations in middle school children found that the use of trained teachers to conduct nutrition education through the Michigan Model Curriculum resulted in significant positive changes in nutrition knowledge of middle schoolchildren [5]. Other workers have observed that children in primary schools are able to learn faster and retain the knowledge learned than those in higher levels of learning [7]. The study results showed that the HKP intervention improved nutrition knowledge levels among primary school pupils.

Nutrition attitudes

Class 2

Table 2 shows nutrition attitudes around hygiene of class two pupils in HKP schools and non-program schools. The proportion of pupils who felt that washing fruits and vegetables before eating or cooking them (AT1) was very important was 55.3% compared to 35.9% who felt that it was important while 48.4% in non-HKP schools felt that it was very important compared to 43.5% who felt that it was important. There was, however no statistical difference between pupils in HKP program schools compared to those in non-HKP program schools ($p>0.05$).

The proportion of pupils in HKP schools who felt that having clean hands before handling any food (AT2) was very important at 62% compared to 30.6% who felt that it was important. Proportion of pupils in non-program schools who felt that it was important to have clean hands before handling any food was 44% while 46.2% felt that it was very important. There was a statistically significant difference between pupils in HKP schools and those in non-program schools ($p=0.000$). Embu and Kakamega county schools contributed significantly to this difference with p values of 0.002 and 0.016, respectively. The proportion of pupils in HKP schools who felt that it was very important to have clean utensils for cooking or eating food (AT3) was 59.5% while 30.2% felt that it was important compared to 48.9% of pupils in non-HKP schools who felt that it was very important to have clean utensils before cooking or eating food and 38.6% felt that it was important ($p=0.016$). This showed a statistically significant difference between HKP schools and non-program schools in terms of this particular attitude. Kirinyaga county schools were the major contributors to this difference with a p value of 0.003.

Class three

Table 3 shows nutrition attitudes of class three pupils in HKP schools and non-program schools on having good eating behaviour. The proportion of pupils in HKP schools who felt that having good eating behavior (AT1) was very important was 56.1% while 39.8% felt it was important. In non-HKP schools 41% of pupils felt that it was very important while 47% felt that it was important. There was a statistically significant difference between HKP schools and non-program schools ($p=0.003$) with Kiambu and Embu showing the largest differences ($p=0.032$, $p=0.07$, respectively).



In non-program schools 53% of pupils felt that eating the right amounts of a balanced diet (AT2) was important compared to 41.8% in HKP schools, while 51.5% in HKP schools felt that it was very important compared to 36% in non-program schools. There was a statistically significant difference between HKP and non-HKP schools ($p=0.017$) with Kakamega county schools showing the largest difference ($p=0.001$).

Class four

Tale 4 shows nutrition attitudes of class 4 pupils in both HKP schools and non-program schools about balanced diets. In HKP schools 63% of pupils felt that a balanced diet was very important compared to 36% who felt that it was important whereas 53.7% in non-program schools felt that it was very important compared to 36.3% who felt that it was important. There was a significant difference between program schools and non-program schools in terms of attitudes around the importance of balanced diets ($p=0.002$) with Kiambu ($p=0.001$) and Kakamega ($p=0.001$) contributing most significantly to this observed difference.

Majority of the pupils in HKP schools (53.4%) compared to 43.9% felt that protective foods are very important while in non-program schools, 45.3% felt that they are very important compared to 40.8% who felt that they are important. Here also there was a significant difference between HKP schools and non-HKP schools ($p=0.001$) with Kiambu ($p=0.005$) contributing significantly to this difference compared to the other counties.

In HKP schools, 54.5% of pupils felt that energy-giving foods are very important while 41.8% felt that they are important. In non-HKP schools, 45.8% felt that they are very important while 39.8% felt that they are important. There was a statistically significant difference between HKP schools and non-program schools ($p<0.05$). Again Kiambu ($p=0.005$) county schools contributed significantly to this observed difference.

In terms of body-building foods, 54% of pupils in HKP schools felt that they are very important while 48% felt that they are important. In non-HKP schools, 45.8% felt that they are very important while 40.3% felt that they are important. There was a significant difference between HKP schools and non-HKP schools ($p=0.003$) with Kiambu ($p=0.006$) showing the largest difference.

The results demonstrated that the Nestlé Healthy Kids Program (HKP) improved attitudes of pupils around some aspects of nutrition including nutrition-related hygiene practices like washing hands before and after eating food, cleaning utensils before and after using them to cook and eat food, good eating behaviour, portion management and eating balanced diets. A similar study by Walls *et al.* [10] found that nutrition education interventions improve certain attitudes of pupils around nutrition including self-efficacy. The study also found that such interventions focusing on school-age children tend to impact behaviour in the long term. The results of this study demonstrated the effectiveness of HKP in impacting certain attitudes on nutrition among pupils.

Dietary practices

As shown by results of figures one, two, three and four below there appears to be a common pattern of dietary practices across the five counties and among pupils in all classes between



HKP and non-HKP schools. Cereals, different types of vegetables, legumes, milk and sweetened foods appear to be consumed more than other types of foods like meat, fish, eggs and fruits. This could be a reflection of the types of foods that are available and accessible to households within these counties.

Class one

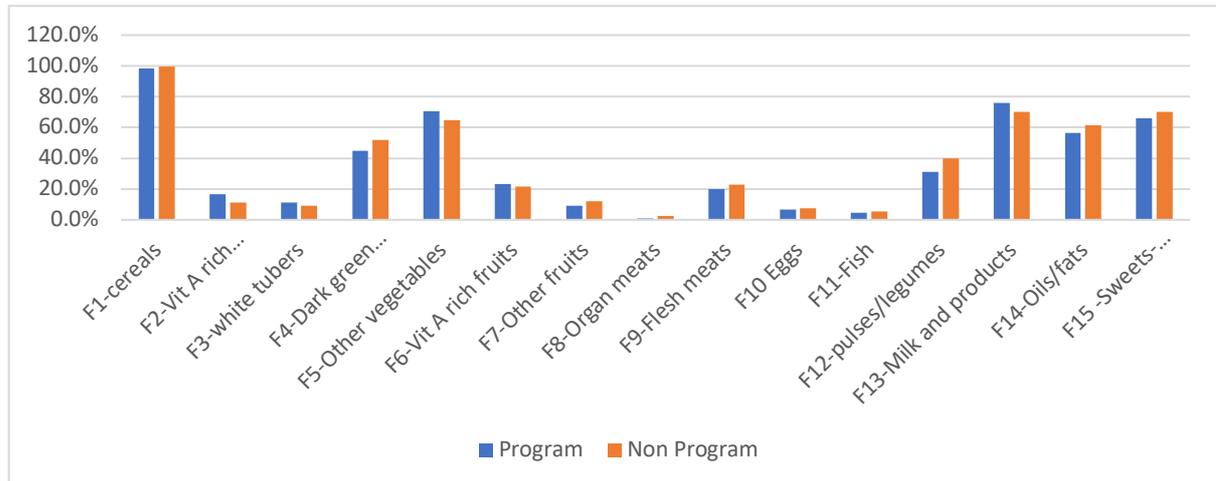


Figure 1: Class one food consumption patterns by program

Class two

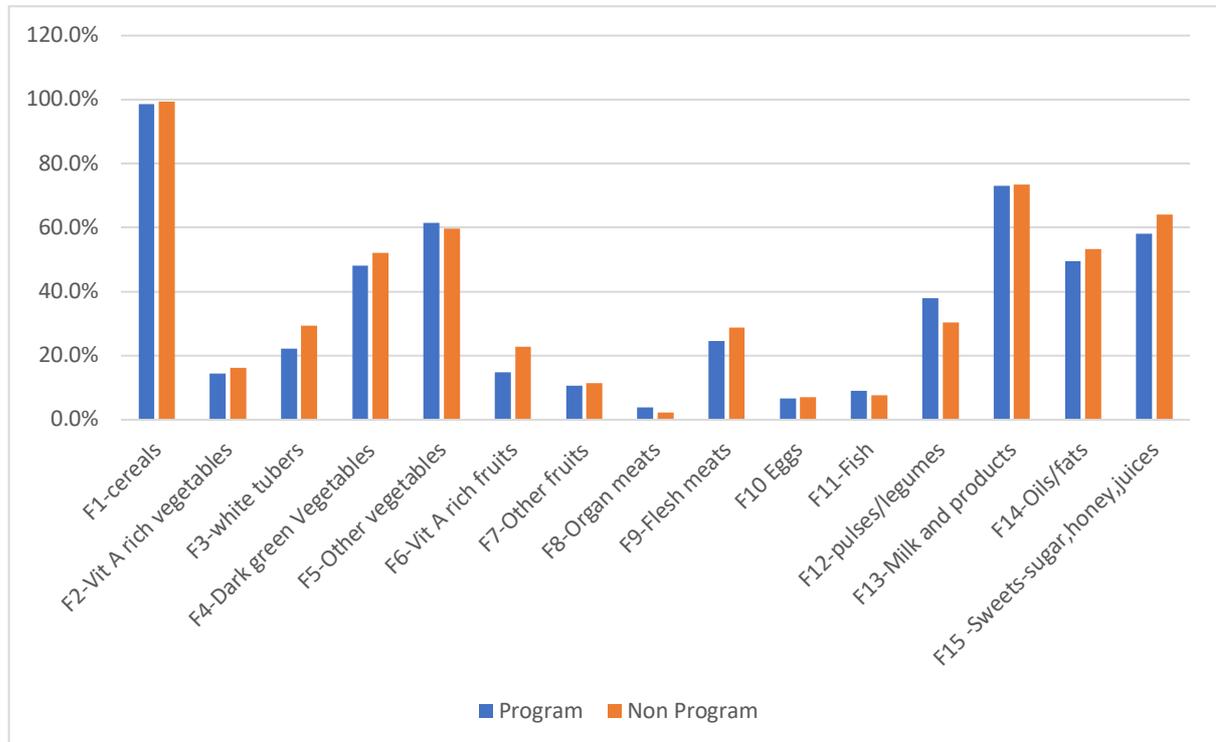


Figure 2: Class two food consumption patterns by program

Class three

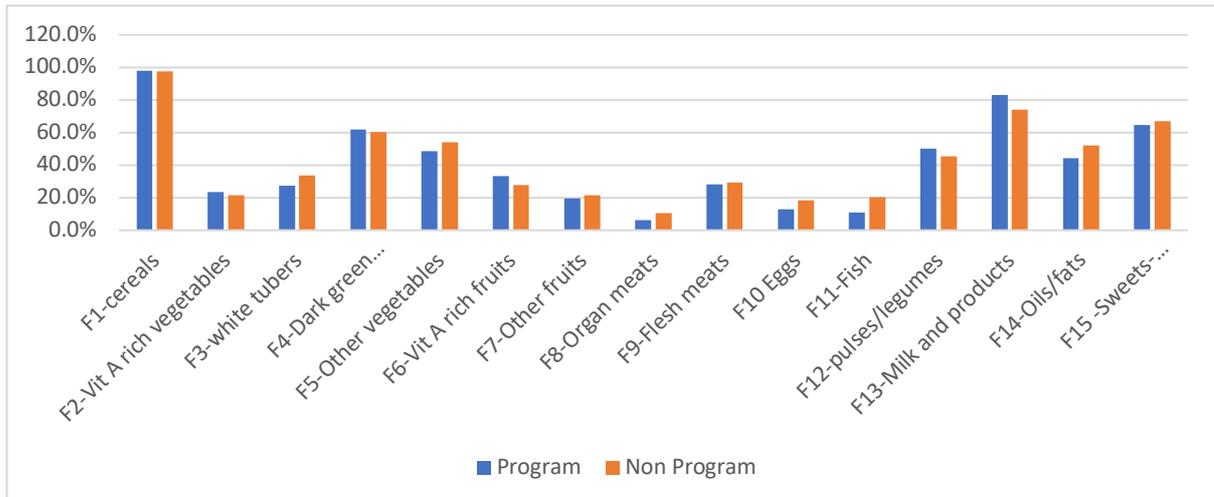


Figure 3: Class three food consumption patterns by program

Class four

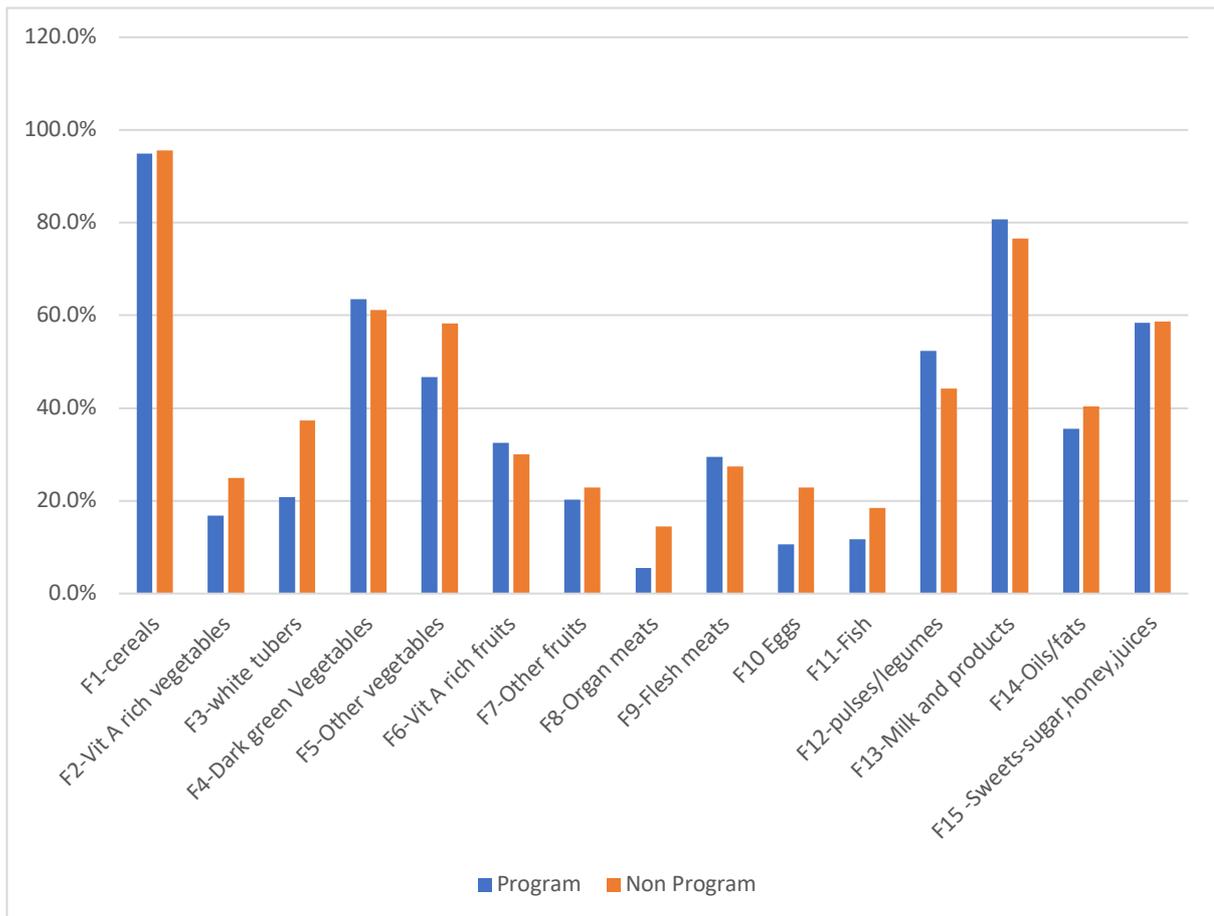


Figure 4: Class four food consumption patterns by program

The study showed that HKP did not appear to impact dietary practices of pupils in the short term. Impacting dietary practices and ultimately behaviour may be a long-term goal of the program as shown by similar studies which have demonstrated on a long-term basis the impact of nutrition education interventions on nutrition behaviour and habits. A study conducted in the Phillipines on the Nestlé Healthy Kids program found that there was a significant difference in mean scores ($p < 0.05$) on knowledge, attitudes and behaviours of school pupils in intervention schools and non-intervention schools [11]. This study and another by Vivas *et al.* [3] have demonstrated the effectiveness of such interventions on impacting nutrition behaviour of pupils in the long term. Although the school provides a critical setting to improve the knowledge of pupils around nutrition, appropriate supporting factors like availability of a school garden, presence of health and nutrition clubs are essential to promote behaviour change in schools in the long term [8]. The study results, therefore, demonstrate that although HKP does not appear to impact dietary practice and nutrition behaviour in the short term, evidence from other similar interventions point to effective contributions in the long term. Therefore, impacting dietary practices may be a long-term goal of the program as it aims at addressing some of the factors that contribute to nutrition behaviour and habits of different communities.

Association between nutrition knowledge levels and dietary practices

The study results showed that there was no association between nutrition knowledge levels and dietary practices among pupils in classes one to four in both HKP and non-HKP schools except for a few food types including flesh meat, white tubers, legumes, fats and oils, dark green vegetables and vitamin A rich foods.

CONCLUSION

The results of this study suggest that the Nestlé Healthy Kids Program (HKP) appears to raise nutrition knowledge levels and improve nutrition attitudes of pupils in primary schools. Impacting dietary behaviour and habits, however, appears to be a long-term goal that the program may achieve progressively on a longitudinal basis.

One of the recommendations of our study is that the program should consolidate the gains achieved in classes one to four by developing a seamless integration of its content and instructional methods into the school curriculum beyond class four. This in our view will enable proper follow-up of different cohorts of pupils as they progress to higher classes, thereby facilitating an evaluation of the program's impact on dietary behaviour and habits in the long term.

Because nutrition behaviour and habits are affected by the varieties of foods that are available and accessible within a given community, another recommendation of our study is that the program, with the help of other partners should engage with local host communities of targeted schools so as to help with innovative farming techniques and practices. This will enhance food variety and availability within these communities thereby enabling the program to achieve its objective of impacting nutrition behaviour/habits and general health and wellbeing of targeted communities in the long term.



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Table 1: Nutrition knowledge levels of pupils from class one to four by category and school HKP status

Class level	Knowledge category	Proportion of pupils (%) in HKP schools	Proportion of pupils (%) in non-HKP schools	P value
Class one	>70%	75.4	58.9	0.001
	41-69%	23.1	36	
	0-40%	1.5	5.1	
Class two	>70%	84	81	0.02
	41-69%	11.1	17.9	
	0-40%	4.8	1.1	
Class three	>70%	13.8	4.5	0.00
	41-69%	67.9	58	
	0-40%	18.4	37	
Class four	>70%	68.9	47.7	0.00
	41-69%	13.3	13.3	
	0-40%	17.8	39	

Table 2: Nutrition attitudes of class two pupils by program status

Attitude	School Program Status	Very Important	Important	P value
AT1	HKP	55.3%	35.9%	0.3
	Non-HKP	48.4%	43.5%	
AT2	HKP	62.1%	30.6%	0.00
	Non-HKP	46.2%	44%	
AT3	HKP	59.5%	30.2%	0.016
	Non-HKP	48.9%	38.6%	

AT1; how important do you think it is to wash fruits and raw vegetables before eating or cooking them?

AT2; how important do you think it is to have clean hands before handling food?

AT3; how important do you think it is to have clean utensils for using while eating or cooking food?

Table 3: Nutrition attitudes on good eating behaviours of class three pupils by program status

Attitude	School Program Status	Very Important	Important	P value
AT1	HKP	56.1%	39.8%	0.003
	Non-HKP	41%	47%	
AT2	HKP	51.5%	41.8%	0.017
	Non-HKP	36.1%	53%	

AT1: how important do you think it is to have good eating behavior?

AT2: how important do you think it is to eat the right amount of balanced food

Table 4: Nutrition attitudes on balanced diets of class four pupils by HKP status

Attitude	School Program Status	Very Important	Important	P value
AT1	HKP	63%	36%	0.002
	Non-HKP	53.7%	36.3%	
AT2	HKP	53.4%	43.9%	0.001
	Non-HKP	45.3%	40.8%	
AT3	HKP	54.5%	41.8%	0.003
	Non-HKP	45.8%	39.8%	
AT4	HKP	54%	48%	0.003
	Non-HKP	45.8%	40.3%	

AT1: how important do you think it is to eat a balanced diet?

AT2: how important do you think protective foods are to your body?

AT3: how important do you think energy-giving foods are to your body?

AT4: how important do you think body building foods are to your body?

Table 5: Food Consumption Patterns by Class and Program

	F1-cereals	F2-Vit A rich vegetables	F3-white tubers	F4-Dark green Vegetables	F5-Other vegetables	F6-Vit A rich fruits	F7-Other fruits	F8-Organ meats	F9-Flesh meats	F10-Eggs	F11-Fish	F12-pulses/legumes	F13-Milk and products	F14-Oils/fats	F15 -Sweets -sugar, honey, juices
Class one															
Program	98.5%	16.6%	11.1%	44.7%	70.4%	23.2%	9.0%	1.0%	20.1%	6.5%	4.5%	31.2%	75.9%	56.3%	65.8%
Non-program	99.5%	11.1%	9.1%	52.0%	64.6%	21.7%	12.1%	2.5%	22.7%	7.6%	5.6%	39.9%	70.2%	61.6%	70.2%
Class Two															
Program	98.6%	14.4%	22.1%	48.1%	61.5%	14.9%	10.6%	3.8%	24.5%	6.7%	9.1%	38.0%	73.1%	49.5%	58.2%
Non-Program	99.5%	16.3%	29.3%	52.2%	59.8%	22.8%	11.4%	2.2%	28.8%	7.1%	7.6%	30.4%	73.4%	53.3%	64.1%
Class Three															
Program	98.0%	23.5%	27.6%	61.7%	48.5%	33.2%	19.4%	6.1%	28.1%	12.8%	10.7%	50.0%	83.2%	44.4%	64.8%
Non-Program	97.5%	21.5%	33.5%	60.5%	54.0%	27.6%	21.5%	10.5%	29.5%	18.5%	20.5%	45.5%	74.0%	52.0%	67.0%
Class Four															
Program	94.9%	16.8%	20.8%	63.5%	46.7%	32.5%	20.3%	5.6%	29.4%	10.7%	11.7%	52.3%	80.7%	35.5%	58.4%
Non-Program	95.5%	24.9%	37.3%	61.2%	58.2%	30.0%	22.9%	14.4%	27.4%	22.9%	18.4%	44.3%	76.6%	40.3%	58.7%



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