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Original Research

Influence of the Nestlé Healthy Kids programme on the behaviour and knowledge of pupils and teachers in classes three, four, five and six in some public primary schools in Cameroon

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Abstract

Nutrition is a science that analyzes the relationship between food and health. Nutritional wellbeing, involving a healthy diet and adequate physical activity, can help to prevent certain metabolic diseases such as obesity. Early childhood education on the risks of poor nutrition is an investment in a healthier population. With this in mind, the Nestlé Healthy Kids programme (NHK) provided educational textbooks on nutritional practices to teachers and students in some public primary schools in three regions of Cameroon: Littoral, Centre and Far North. The participating pupils were in classes three, four, five and six. Of the primary schools selected to take part, five schools benefited from educational textbooks and were labelled Healthy Kids (HK); five other schools, labelled non-Healthy Kids (nHK), did not benefit from textbooks and constituted the control group. Following a year-long nutritional education programme based on the NHK programme textbooks, pupils and teachers were assessed on their nutritional knowledge and eating habits. The results were compared with an assessment of pupils and teachers in nHK schools. The study concluded that, when compared with nHK students, students in HK schools had a better knowledge of good eating habits and followed healthier eating habits. No significant difference in knowledge between teachers of the two groups was reported, however, teachers in HK schools exhibited healthier eating habits than those in nHK schools. It is therefore concluded that the implementation of the NHK programme is very useful in the prevention of malnutrition.

Keywords: Nutrition, Nestlé Healthy Kids Programme, HK schools, nHK schools

Introduction

Obesity is an accumulation of excessive body fat to a degree that it can adversely affect a person's health. It corresponds to a poor balance between food-related intakes and physical outputs [1]. According to a 2016 report by the WHO, the prevalence of obesity almost tripled between 1975 and 2016 [2]; globally, 39% of adults (aged 18 and over) were overweight and 13% of adults were classified as obese. In Africa, the prevalence of overweight and obesity among children and adolescents aged 5 to 19 increased dramatically from just 4% in 1975 to over 18% in 2016 [2]. Cameroon is no exception to this alarming crisis, with almost 9.6% of the population suffering from obesity in 2014 [3].

A lack of physical activity, a sedentary lifestyle and an energy-rich diet are the main causes of excess body fat accumulation [4]. Offering nutritional education as a solution to obesity is therefore to be considered at all age levels, but especially among school children. Children between the ages of 6 and 12 are in a period of growth and learning. This is an ideal time to educate them on the importance of following a balanced diet and leading an active life [5]. Nestlé launched the Nestlé Healthy Kids (NHK) global programme in 2009 to educate young people aged 6 to 12 years about good nutritional practices with the aim of addressing the problem of obesity and related diseases (cancers, cardiovascular diseases, osteoporosis and type 2 diabetes)[6]. In 2013, Nestlé Cameroon, through NHK, identified textbooks on nutritional education for teachers and pupils in three of Cameroon's ten regions. The schools that received these materials were named Healthy Kids (HK); the schools that did not receive the materials were named non-Healthy Kids (nHK). The aim was to train teachers in HK schools to use these textbooks to educate their students and then assess the students' knowledge of good nutritional practices compared with students in nHK schools.

Methodology

Type of study

Since the data was collected during the period from September 2017 to June 2018 our study was cross-sectional.

Ethical considerations

The following were arranged in advance of the study:

(i) At central level: Ethical Clearance was issued by the Ministry of Public Health and written authorization was obtained from the Ministry of Basic Education.

(ii) At regional level: Written authorization was obtained from the Regional Delegates of Basic Education. Similarly, each school principal gave advance authorization for the data collection team to enter the school. Informed consents, signed by each student's parents, were obtained for all minors.

Sample methods

Study sites

The three regions of the country that were the subject of our study were: The Littoral Region (Douala) the Centre (Yaounde) and the Far North (Maroua).

School selection

Ten schools were chosen with the aim of covering all geographical areas of the regions. Five HK schools, and an additional five nHK to serve as control group, were selected. Schools were chosen based on their geolocation to maintain a homogeneity according to the wider population. Therefore, two HK schools and two nHK schools were selected for the city of Douala, two HK schools and two nHK schools for the city of Yaounde and one HK school and

one nHK school for the city of Maroua. We were therefore able to extract a representative sample size of the target population. The number and type of school by region are summarized in **Table 1**.

Regions	City	Type (HK/nHK)	School
Littoral	Douala	HK	Public School of Bepanda Group 3 (OMNISPORT)
	Douala	HK	Bonassama Public School Group 1
	Douala	nHK	Public School of New Bell
	Douala	nHK	Bonendale Public School
Centre	Yaounde	HK	Public School of Biyem Assi Group 3
	Yaounde	HK	Ekoudou Public School Group 1
	Yaounde	nHK	Public School of the National Gendarmerie Group 1
	Yaounde	nHK	Public School of Biyem Assi Group 1
Far North	Maroua	HK	Zokok Public School
	Maroua	nHK	EPA carrefour PARA

HK = Healthy Kids schools; **nHK** = non-Healthy Kids schools

Table 1 Number and type of schools surveyed by region

Study population

The study population comprised students, teachers and vendors in both types of schools (HK and nHK). The criteria for inclusion and exclusion are detailed below.

Student inclusion criteria

Students selected for this study presented the following criteria:

- Informed consent signed by a parent
- Current pupil in third, fourth, fifth or sixth grade classes in selected schools
- Present on the day of the investigation.

Student exclusion criteria

Students were excluded from the study for the following reasons:

- Did not present the consent signed by a parent
- In a class other than third, fourth, fifth or sixth grade classes
- Absent on the day of the investigation.

Teacher inclusion criteria

Teachers selected for this study were required to:

- Be a current teacher of third, fourth, fifth or sixth grade classes in the selected schools
- Be present on the day of the survey

Teacher exclusion criteria

Teachers were excluded from this study for the following reasons:

- Not a current teacher of third, fourth, fifth or sixth grade classes in the selected schools
- Absent on the day of the survey

Collecting usable data and targeted information

Information on students, teachers and food sold in the participating schools was collected using a fact sheet (**see Table 2**). An observation sheet was used to record the environmental aspect of schools.

1	Student questionnaire	In addition to the socio-demographic data to be noted, this questionnaire was structured to assess students' knowledge of nutrition, portion management, hygiene, physical activity and hydration as well as the application (behaviour) of all these concepts. Question topics included what it means to eat, the different food groups, nutrients, the number of meals eaten per day, the use of soap in hand washing, the importance of keeping the kitchen clean, etc. Perception and practice of physical activity was also assessed.
2	Teacher questionnaire	Consisted of questions related to the practice of nutrition and hygiene activities in the school environment; the importance of physical and sports activities in nutrition; evaluating knowledge of nutrition, portion management, hygiene, hydration and physical activity and their application by the teacher.
3	Vendor questionnaire	Consisted of questions about the types of food sold to pupils and information about hygiene practices of different vendors.
4	Observation sheet	Included a list of parameters related to the monitoring of the school's environmental and food hygiene. For example, the presence and/or adequacy of facilities such as toilets, canteens, drinking water points, hand washing points, etc. The presence or absence of sports facilities was also noted.
5	Focus group maintenance grid	Groups of ten volunteer students were trained in HK schools only. The aim was to stimulate an open discussion structured around an interview grid defining the different themes of the study. The final objective was to collect the beneficiaries' opinions on the programme.

Table 2 Factsheet for collecting usable data and targeted information

Following the collation of information, the data was coded based on a data entry mask previously established on Excel. Data entry and processing were performed to allow for analysis on SPSS software.

Study results

The results are presented according to the information gathered from the questionnaires to meet the various specific objectives mentioned.

Pupils' survey results

Presentation of surveyed pupils

Results were obtained from a total of 1026 surveyed students from the three target regions; the results showed that the city of Douala had the largest number of staff (43%) followed by Maroua (28.1%) and Yaounde (20.2%). The schools surveyed were all part of the public type of French-language system. The Bonendale Public School, which did not have the HK programme, had the most staff.

Among the 1026 pupils surveyed aged 10 ± 2 years, the response rate was 53% male and 47% female. All the students were supervised in their respective homes either by two parents (a two-parent plan) with a response rate of 59% or supervised by one parent (single-parent plan) with a response rate of 20% or by a family member other than their parents (grandparents, uncles and aunts etc.) with a response rate of 21%.

Results of high-level questionnaires on pupils' knowledge and behaviours: the concepts of food and nutritious and varied meals

For the variable 'why do we eat', students belonging to a HK school returned a high percentage of correct answers. Indeed, 37% of HK vs 34% of nHK answered that you need to eat to have strength and energy; 49% of HK vs 29.80% of nHK students said that you need to eat to grow up well and 34.10% of HK vs 28.80% of nHKs said you need to eat to protect yourself from diseases. This showed that the NHK programme has a positive influence on students' knowledge of and behaviour around food choices.

Regarding eating habits, the most consumed meals by our respondents were rice with tomato sauce, bread and beans, Macabo Rapé with peanut sauce, couscous with okra sauce, spaghetti with tomato sauce. However, the proportion of students who consumed important foods such as fruit was higher among HK students. It is noted that the most consumed fruits were papayas (1.4% in HK vs 0% in nHK) and apples (2% in HK vs 0% in nHK). In fact, for the study in general, students consumed no more than 2% of fruit daily. These results repeat the same fact that the NHK programme in schools predisposes students to improved knowledge of nutrition compared with schools that do not have the programme.

Results of high questionnaires on student knowledge and behaviours: portion control

Regarding student knowledge and behaviours on portion control, although students benefiting from the NHK programme had higher exact response percentages, these percentages were very low. Indeed, 1.35% of students benefiting from the programme were able to give an accurate answer on the definition of the food portion variable compared with 0.48% for nHK schools.

On the behavioural issue related to the number of servings consumed per week, there was no significant difference (p>0.05) between the number of portions consumed by the two groups.

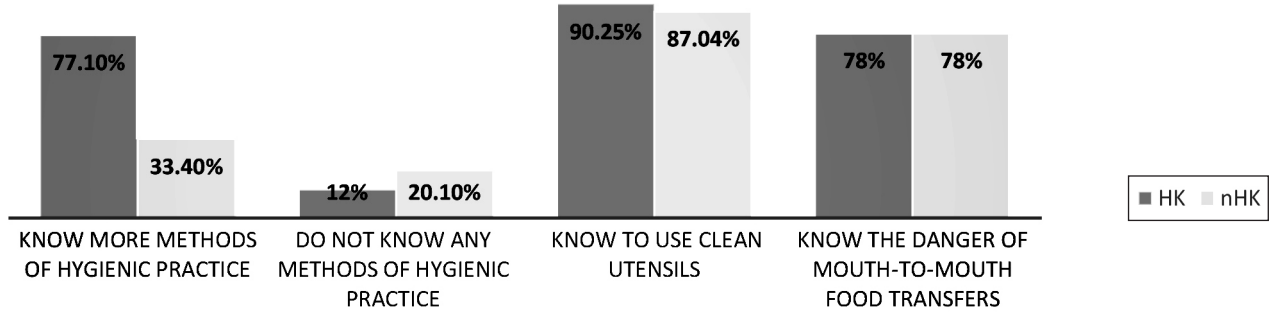
Results of high questionnaires on student knowledge and behaviours: hygiene practices

This aspect of the NHK programme teaches students how to wash their hands better and follow improved hygiene practices at home and at school. As a result, HK students were more

knowledgeable on good hygiene practices than nHK students were (77.1% vs. 33.4%: $p \leq 0.005$) (**Fig. 1**). However, both groups were equally aware of the risk of mouth-to-mouth food transfers from one person to another (78%: $p > 0.005$).

Behaviours related to hygiene practices were also assessed. It was noted that HK students were more diligent at performing certain hygiene practices such as cutting their fingernails and toenails (28% of HK students vs 10% of nHK students), washing their hands with clean water and soap (51.60 % of HK students vs 37.90% of nHK students) and brushing their teeth morning and evening (73.10% of HK students vs 61.60% of nHK students) ($p \leq 0.05$).

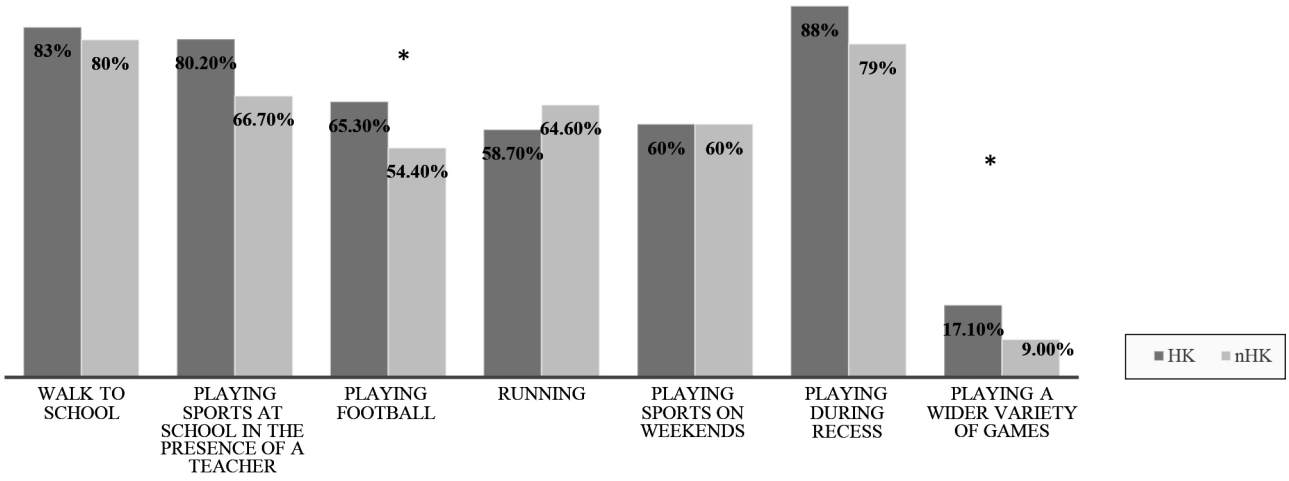
Figure 1 Overview of hygiene practice knowledge in surveyed students



Results of high questionnaires on student knowledge and behaviours: physical activity

The physical activity knowledge survey sheet focused on knowledge of the types of physical activity and the importance of sport to health. Of this, 70% of HK students vs 62.4% ($p \leq 0.05$) knew the classification of different types of physical activity. This same trend was observed in answers relating to the importance of sport to human health. Indeed, 42.40% of HK students compared with 35% of nHK students said that playing sports is beneficial for health. Similarly, 74.80% of HK students vs 59.70% of nHK students knew that football is an endurance activity. More than 80% of HK students engaged in sports with their teachers compared with 66.7% of nHK students. Football was the most practised sport by HK students, while running was the most practised sport by nHK students. However, HK students did report playing a wider variety of games (17%) (**see Fig. 2**).

Figure 2 Brief presentation of physical activity behaviours in surveyed pupils



***Represents the significant difference (that exists between the two types of schools: HK and nHK schools on the following two parameters: students who play football and students who play a wider variety of games)

Results of high questionnaires on student knowledge and behaviour: hydration

Regarding the importance of hydration, all students were able to give at least one role of water in the body. However, 87% of HK students offered more answers compared with 73% ($p \leq 0.05$) of nHK students. When asked to name water-rich foods, all HK students were able to name at least one food, compared with 6% of nHK respondents ($p \leq 0.05$). There was no significant difference in knowledge of drinking water characteristics between the two groups (95% vs 93% $p>0.05$) (**See Fig. 3**). Regarding hydration-related behaviours, apart from drinking water upon waking up (12% HK vs 0% nHK), there was no significant difference between hydration-related behaviours in the two groups ($p>0.05$).

Results of teacher investigation

Presentation of the population of teachers investigated

A total of 43 teachers were surveyed in the three different survey cities in the following proportions: Douala 42.20%; Yaounde 37.60% and Maroua 20.20%. The city of Maroua has the fewest teachers. This is because we only had two schools to investigate in the Far North.

Among the teachers surveyed, there was higher proportion of women to men (81.4% vs 18.6%).

Teacher survey results

This objective of the Nestlé HK programme for teachers did not show any major differences between the two groups. Both groups had similar dinner hours ($p>0.05$) between 8.00 pm and 9.00 pm. Nevertheless, a significant difference was observed in their knowledge of food groups (91% for HK vs 53.3% for nHK). Other concepts related to this objective such as: food groups, the number of meals per day, eating a variety of foods, etc. showed no significant differences.

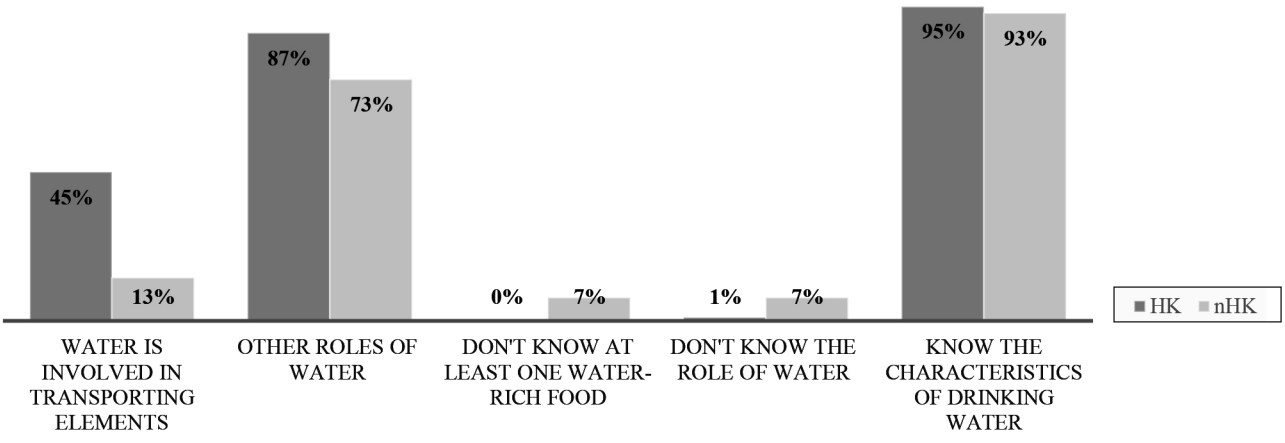
Regarding the behaviours related to this objective, the frequency of vegetable consumption by the teachers surveyed are recorded in **Table 3**. The results show that nHK teachers consume much more vegetables at a frequency of 01 times per day than HK teachers. HK teachers are at 33.3% in a frequency of 01 times/week.

	Never	1 times/ week	1 times/ day	2 times/ day	3 times/ day	More
HK	0.42%	33.3%	20.8%*	25%*	8.3%*	4.2%
nHK	0.66%	33.3%	40.0%	0%	0%	20% *

HK = Healthy Kids schools; **nHK** = non-Healthy Kids schools; ***** = Significant difference

Table 3 Frequency of vegetable consumption by teachers surveyed

Figure 3 A succinct presentation of student knowledge of hydration



Eating habits across both groups of teachers were similar. For example, all teachers reported eating a series of similar dishes for dinner (rice-bean, stir-fried spaghetti, donuts and beans, rice and tomato sauce, etc.). However, in terms of fruit consumption, significantly more HK teachers consumed fruit compared with nHK teachers. The most popular fruits were papayas (12% of HK vs 0% nHK), oranges (29.20% of HK vs 13% of nHK) and guavas (30% of HK vs 13.30% of nHK), noting a significant difference between fruit consumption by HK teachers vs nHK teachers ($p \leq 0.05$).

It could be concluded that teachers of schools who benefit from the NHK programme are predisposed to better nutritional knowledge when compared with teachers of schools that do not benefit from the programme.

Results of investigation into teachers' knowledge and behaviour of portion control

Regarding teachers' knowledge and behaviours of portion control, it is important to note that the total frequency of accurate responses did not exceed 40% for each question.

In terms of knowledge, only 1% of HK teachers did not know the definition of a food serving compared with 86.6% of nHK. Also, 70.80% of HK teachers knew why it is important to control portions compared with 20% of nHK teachers. It is noted that 100% of teachers in both groups did not know the amount of food that corresponds to one serving.

On the concept of behaviour related to the number of servings consumed per week, there was no significant difference ($p>0.05$) between the portions consumed by the two groups. However, 50% of HK teachers reported that each meal consists of a serving of fruit compared with 30% of nHK teachers ($p \leq 0.05$). Also, 58.3% of HK teachers reported that all their meals consist of one serving of meat or fish compared with 73.3% for nHK.

Results of questionnaires on teachers' knowledge and behaviour of hygiene practices

This aspect of the NHK programme focuses on, among other things, teaching students how to wash their hands better and follow good hygiene practices at home and at school. All HK teachers reported including hygiene lessons in their curriculum compared with 30% of nHK teachers who said they did not teach a hygiene lesson ($p \leq 0.005$). There were no significant differences in behaviour or knowledge between the two groups of teachers.

Results of questionnaires on teachers' knowledge and behaviours of physical activity

Questions in our teacher survey sheet on physical activity knowledge and behaviours focused on knowledge of the types of physical activity in general and on those within their school. These questions also offered information about the teachers' personal physical activities outside of school.

All teachers reported that physical activity sessions were performed in their respective schools. The different sports are presented in **Fig. 4**.

Football was the most practised sport (95.5% for HK schools and 86.6% for nHK schools).

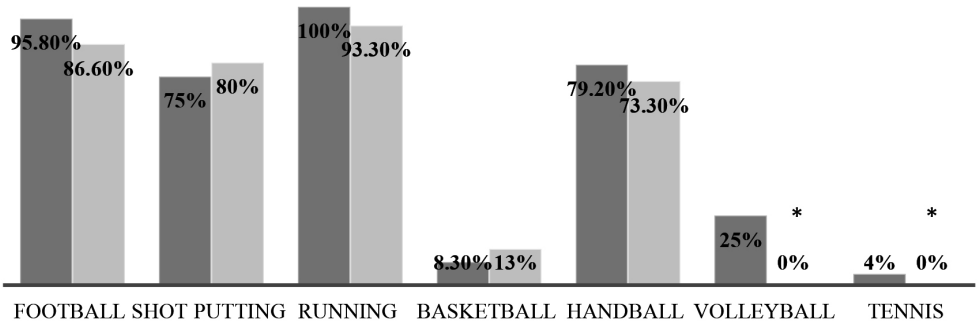


Figure 4 Presentation of the types of sports activities practised in nHK and HK schools

* = Significant difference

There were no significant differences between the two groups in terms of knowledge of sporting activities (types of sports, important health activity, etc.). Regarding physical activity-related behaviours, most activities (e.g. frequency of walking vs driving or taking the bus, etc) were equal between the two groups. However, it should be noted that 6% of nHK teachers reported not engaging in physical activity outside of school compared with 0% for HK ($p \leq 0.05$).

Results of questionnaires on teachers' knowledge and behaviours of hydration

The results showed that 100% of HK teachers knew at least three roles of water in the body compared with 66.7% of nHK teachers ($p \leq 0.05$). However, there was no significant difference in knowledge of drinking water characteristics between the two groups (100% HK vs 98% nHK $p > 0.05$). Water-rich foods could be named by 100% of HK teachers compared with 94% of nHK teachers ($p \leq 0.05$).

Regarding hydration behaviours, there was no significant difference between respondents' responses. However, 81% of respondents reported drinking water upon waking and during the day and 53.5% reported hydrating at night.

Results of observation sheets and focus group

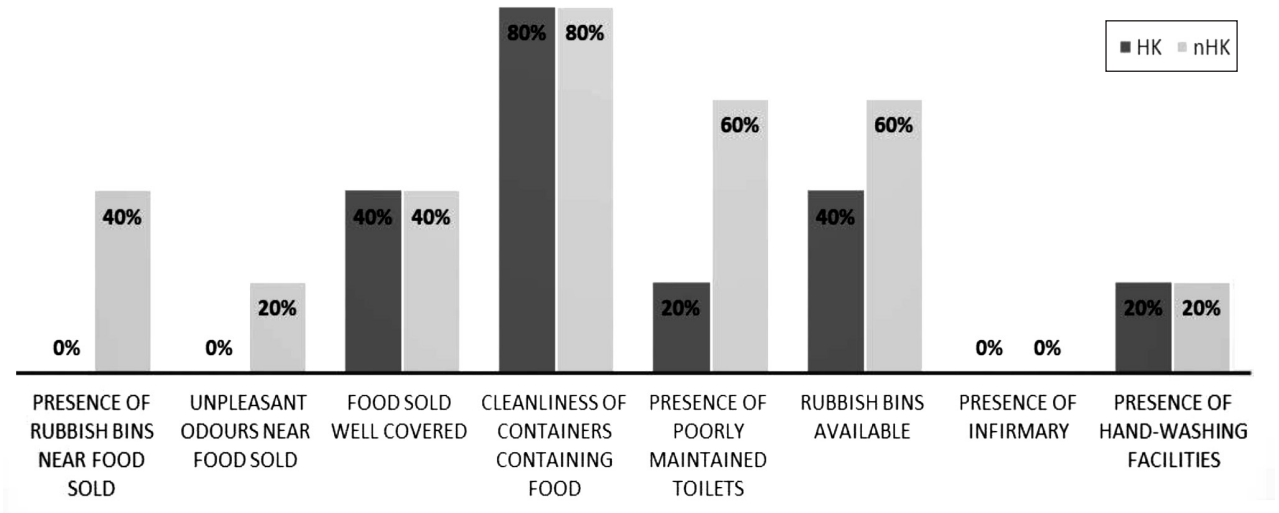
Observation sheet results

Information on hygiene, safety, sport and health infrastructure, as well as the presence or absence of sports equipment was recorded on observation sheets. Results showed that 40% of nHK schools have rubbish bins near the area where food is sold to students ($p \leq 0.05$) compared with 0% of HK schools. However, 80% of all food vendors had clean containers for selling their food. Neither HK nor nHK schools had canteens or infirmaries. All schools had playgrounds for students, but sports-friendly fields were not always present. (**See Fig. 5**) As for the source of the sports equipment, two of the five (40%) HK schools surveyed reported receiving this material from Nestlé; one school received 100% of their sports equipment from Nestlé and the other received approximately 60%.

We developed observation sheets to record information relating to hygiene, sanitation, sports and sanitary facilities as well as the presence or absence of sports equipment.

It emerged that 40% of nHK schools had bins full of rubbish near where food was sold to students ($p \leq 0.05$) compared with 0% of HK schools.

Figure 5 Hygiene, sanitation and hygiene infrastructure in the schools surveyed



Focus group results:

Only students who benefited from the NHK programme were asked these questions. Of those surveyed, 80% of students think the programme is to be encouraged (**see Fig. 6**).

Discussion

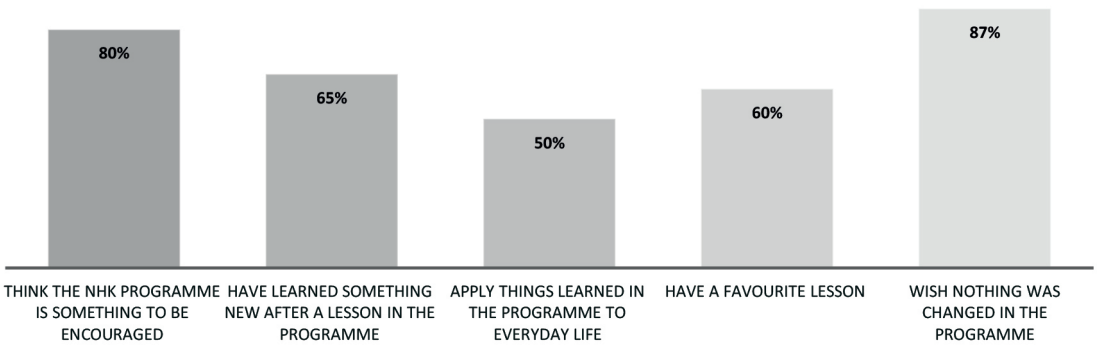
The aim of this study was to evaluate the impact of the Nestlé Healthy Kids programme. This involved distributing textbooks on nutrition, good eating habits, portion awareness and food hygiene practices etc, to some public primary schools, referred to as Healthy Kids schools (HK), at the beginning of the new school year. The children participating in this study were aged 10±2 years in grade classes three, four, five and six. The study analyzed whether educating children and teachers with these textbooks could improve their knowledge and application of good food practices.

Our study assessed the knowledge and behaviour of teachers and students on good eating practices using questionnaire sheets. The results of the questionnaires were compared with those of students in primary schools who had not received the textbooks, which we referred to as non-Healthy Kids schools (nHK).

The results of the student questionnaire showed that students in HK schools were more informed about the concepts of food, balanced and varied meals, hygiene practices and the importance of physical activities and hydration. The question on portion awareness was the only question that returned a higher number of positive results among nHK students than among HK students. The student questionnaire results showed the importance of the NHK programme. Indeed, knowledge of good nutrition practices followed by the application of this knowledge, could already limit the number of adults suffering from metabolic diseases such as obesity in the future. According to Lamerz *et al.*, (2005), a low level of education leads to less awareness of the factors that can prevent obesity, including non-participation in physical activities [7] because a sedentary lifestyle contributes to a higher risk of obesity. Many studies have also shown that children of school-going age frequently consume fastfood [8,9]. These foods are associated with an increased BMI and a high energy density [10]. In addition, according to Lobstein *et al.* (2004), obesity is the most common metabolic disorder in children and adolescents around the world [11]. The NHK programme, by teaching children about good eating practices, can help children to maintain a healthy BMI.

Regarding the results of the teacher questionnaire, a higher percentage of positive responses was observed among teachers in HK schools than among teachers in nHK schools. Although a significant difference between the responses of the teachers in HK schools vs teachers in nHK schools was not always evi-

Figure 6 Students' personal opinions on the NHK programme



dent, the influence of the NHK programme was noted. While physical activity levels (such as the frequency of travelling to school on foot, by car or by bus) between the two groups were equal, 6% of nHK teachers declared that they were not physically active outside of school, while all teachers in HK schools ($p \leq 0.05$) reported that they engaged in physical activity outside of school. An increase the level of daily physical activity outside of school would reduce periods of inactivity and help prevent an accumulation of adipose tissue in the body [12,13]. Butryn and Wadden (2005) state that 160 to 180 minutes per week of moderate to elevated intensity exercise has effective results on the reduction of fat mass but has no effect on BMI and abdominal fat mass [14].

Regarding the results of the school observation sheets and focus group sheets, we noted regarding the observation sheets that 40% of nHK schools sell food near rubbish bins. Indeed, more good hygiene practices were applied in HK schools than in nHK schools. This reflects the influence of the NHK programme as lack of food hygiene knowledge may be the reason why vendors sell food near rubbish bins; for example the possibility of air contamination of these foods by microbes, which may affect the health of the consumer [15] potentially causing diseases such as food poisoning and food infections are the two main categories of diseases linked to poor food hygiene [16].

As for the focus group results sheet, many of the students reported being satisfied with the NHK programme and would not want it to be changed. This may be because the students are aware of the positive impact of this programme on their lives.

Conclusion

At the end of this work, which consisted of carrying out an evaluation of the Nestlé HK programme since its implementation, we can draw the following conclusions in this first phase of the study:

- Student surveys

The implementation of the NHK programme is very useful in the prevention of metabolic diseases such as obesity. Indeed, in view of the information collected from students in HK schools, there is an improvement in the knowledge and application of good food practices.

- Teacher surveys

The implementation of the NHK programme does not reveal a significant difference in knowledge between teachers in HK and those in nHK schools. However, teachers benefiting from the programme have better eating habits than teachers who did not benefit from the programme. From a behavioural point of view, better hydration is recommended as of all respondents (HK and nHK) reported hydrating during the day.

- Observation sheets and focus group

Observations made in the schools surveyed generally show a poor quality of health and hygiene infrastructures. Poor rubbish management, especially in nHK schools, which had rubbish bins near food outlets.

According to the general opinion of the students following the NHK programme, 80% think that the programme is to be encouraged and 87% would not change anything in the programme.

Acknowledgments

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Conflict of interest

The various authors of this manuscript and this work declare that they have no conflicts of interest.

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