Behavioral Risk Factors for NCDs among School Children in the National Capital Region (NCR), Philippines

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The Philippines is experiencing rapid nutrition transition found to be associated with increased rates of non-communicable diseases (NCDs) attributed to “modifiable” risk behaviors i.e., tobacco use, unhealthy diet, insufficient physical activity, and the harmful use of alcohol. NCDs have not spared the young people, especially the urban residents. This cross-sectional study was conducted to establish baseline data on NCD related behavioral risk factors and consumption of ultra-processed foods (UPF) among school children aged 10–17 years old in the Philippine Red Cross’ (PRC) selected pilot schools in Manila and Quezon City (QC), National Capital Region (NCR). It also aims to determine the students’ awareness of the main causes of NCDs, source of information on NCDs, awareness of school policies, and participation in activities on NCD prevention. Qualitative methods using structured and food frequency questionnaires were employed to obtain information from 1665 randomly selected students in the study schools. NCD risk behaviors were noted among the students – with 74% of 31 students already smoking more than 3 sticks of cigarettes daily, 55% of 94 students already drinking alcohol once a month, and only 27–38% of 1665 students engaged in daily physical activity. High proportions of students have consumed fatty foods (83%), sugary foods (75%), and salty foods (57%) in the past 7 days at the time of the interview. NCD information were obtained from TV (90%), social media (78%), and peers (41%). Sixty percent (60%) were aware of NCD related school policies and 32.5% have received NCD related materials. The prevalence of NCD behavioral risk factors warrants a strong partnership between the school and the community to promote healthy diet and lifestyle practices.

Key words: food consumption, NCD, NCD risk behaviors, nutrition transition, ultra-processed foods

INTRODUCTION

Almost half of all deaths in Asia are now attributable to NCDs, accounting for 47% of global burden of disease (WHO 2010). Eighty percent (80%) of NCDs are occurring in low- and middle-income countries (LMICs) – including the Philippines – as a result of economic development that transitioned from traditional foods to affordable ultra-processed food (UPF) products (Monteiro & Cannon 2012) and decreased physical activity and sedentary lifestyles (WHO 2010; Hancock et al. 2011).

UPF products are made from processed substances extracted or refined from whole foods e.g., oils, hydrogenated oils and fats, flours and starches, variants of sugar, and cheap parts or remnants of animal foods. Burgers, frozen pizza, pasta dishes, nuggets and sticks, crisps, biscuits, confectionery, cereal bars, carbonated
and sugared drinks, and various snack products – being typically energy dense with high glycemic load; low levels of dietary fiber, micronutrients, and phytochemicals; and high levels of unhealthy types of dietary fat, free sugars, and salt/sodium – are popular examples of UPF products (Monteiro et al. 2013).

UPF products have been dominating the global food systems and have contributed significantly to the present dietary changes and food consumption habits of young children (Monteiro et al. 2011; Arcan et al. 2013). The drivers for the proliferation of UPF in LMICs include: globalization, urbanization, income growth, trade liberalization, and foreign direct investments (GLOPAN 2016).

UPF products are widely available and relatively cheaper compared to whole and unprocessed food items. This situation has accelerated the growing burden of NCDs that have been associated with high consumption of UPF products, resulting from aggressive marketing of UPF products as energy-dense, ready-to-consume, affordable, and hyper-palatable in LMICs (Kearney 2010; Ludwig 2011; Aguayo-Patrón & Calderón de la Barca 2017).

The increased demand for UPF products have changed the food system with concomitant increase in the production and distribution of said products worldwide, with sale in LMICs growing fast. (Monteiro & Cannon 2012; Stucker & Nestle 2012). In the Philippines, the retail sales value of frozen processed food was projected to reach approximately 1.32 billion U.S. dollars in 2018 from 1.1 billion U.S. dollars in 2014 (Statista 2018).

Exploring the health impact of UPF products consumption, a study in Guatemala demonstrated that a 10% point increase in the share of highly processed food items increases the BMI of individuals by 4.25%. This finding suggests that increasing shares of highly processed foods from the total consumption expenditure could be one of the major risk factors for the high prevalence of overweight/obesity (Asfaw 2011). Similar result was obtained in a study which showed that the intake of UPF was attributed to obesity epidemic among adolescents in Brazil (Louzada et al. 2015).

NCDs are attributed to behavioral risk factors that are largely modifiable. The WHO has quantified these behavioral risk factors to include unhealthy lifestyle practices such as: a) smoking of 1–3 sticks per day; b) drinking of alcohol once a month; c) inadequate consumption of high fiber rich foods; d) high consumption of fatty, sugary, and salty foods every day; and e) lack of daily physical activity that lasts for at least 30 min (WHO 2003).

In the Philippines, the National Nutrition Survey (NNS) has estimated the NCD risk behaviors as follows: tobacco use among children and adolescents 10.0–19.9 years old was found to be higher among boys (12.1%) than girls (1.2%); alcohol drinking among the youth was highest in urban areas (20.6%), in the richest wealth quintile (21.8%), and in the NCR (23.5%); and the physical inactivity was more common among females (52.9%) and those residing in urban areas (49.8%) (DOST–FNRI 2013). The prevalence of overweight and obesity children aged 10–19 years old in the Philippines has increased by 3.4% after a decade. It is now 8.3% (DOST–FNRI 2013) from 4.9% (DOST–FNRI 2003).

Consumption of unhealthy diet that are rich in sugar, fats, and sodium from UPF products and inadequate consumption of leafy vegetable and whole grain cereals – coupled with sedentary lifestyle – have led to an upward surge in overweight and obesity among school children and studies have documented these as risk factors for NCDs (Popkin et al. 2012, DOST–FNRI 2013). However, the understanding of the factors associated with consumption of UPF products among school children in lower income settings is still limited.

This commissioned study was conducted in the PRC pilot schools to primarily assess the prevalence of behavioral risk factors for NCDs and the level of consumption of UPF products among school children aged 10–17 years old prior to the conduct of NCD health education interventions.

METHODS

Study Design and Setting
This cross-sectional study was conducted to establish baseline information on NCD behavioral risk factors among school children enrolled in primary and secondary schools in the NCR. The study schools – located in Manila and Quezon City – are both considered as highly populous and urbanized areas. NCR is the seat of government in the Philippines. It has a population of 12,877,253 and is the second most populous region in the Philippines – as well as the 9th most populous metropolitan area in Asia. It ranked as the 5th most populous urban area in the world. It is the center of culture, economy, education, and government of the Philippines. NCR exerts a significant impact on commerce, finance, media, art, fashion, research, technology, education, and entertainment, both locally and internationally (Wikipedia).

Sampling
A total of 4 primary (n=2) and secondary (n=2) public schools were included in the study. These schools have high population of 10–17 year-old students. A total of
1665 students were randomly selected from all sections and shifts (i.e., AM, PM, and evening) from 4 to 9 grade levels. The response rate was good as almost all the selected students agreed to participate in the study. There were no reports of any debilitating illnesses that prevented the students from participating in the study.

Data Collection
The data collection was done in Feb–Apr 2015. The face to face interview, which lasted for almost an hour, was carried out by the trained Red Cross Youth volunteers using a structured questionnaire patterned after the WHO STEPS (2003) questionnaire on surveillance of NCDs among adolescents. The questionnaire consisted of three parts: a) socio-demographic characteristics (i.e., age, gender, grade level, religion, dialect used at home, and civil status); b) qualitative information on behavioral risk factors, school policies on prevention of NCDs, and school programs directed to prevent NCDs; and c) food frequency intake of UPF products for the past 7 days. The Food Frequency Questionnaire (FFQ) was patterned from the DOST–FNRI FFQ. It was modified to include UPF products as defined by Monteiro et al. (2013).

Respondent’s informed consent was obtained prior to the interview and anonymity of responses was assured.

Documents on school policies on NCDs and on-going health education initiatives were obtained from the school officials.

The BMI record of respondents measured during the opening of classes in Jun 2014 was secured from the school nurse.

Data Analysis
Descriptive analyses were used to describe the demographic characteristics of the students, the BMI classification, behavioral risk factors for NCDs, consumption of UPF products, student’s awareness of the main causes of NCDs, sources of information on NCDs, school policies on prevention of NCDs, and participation in NCD health education activities. The students’ response on school initiated programs were validated from the data obtained from the school officials, while the result on behavioral risk factors were validated against the WHO criteria of risk factors that increases the person’s risk of developing NCDs. The WHO definition of physical activity (i.e., moderate or vigorous intensity enough to increase heart rate and makes the person get out of breath at some point in time) was used a reference in determining whether the reported physical activities may be classified as such. All analyses were performed using Excel Program.

RESULTS

Description of the Study Subjects
The profile of the students from the four schools is shown in Table 1. Fifty-three percent (53%) were female, predominantly Catholics (79%), Tagalog-speaking (97.7%), and single (96.5%). The mean age was 12.6 years with minimum and maximum ages of 10 and 17 years old, respectively.

Based on the result of BMI classification (Figure 1), 56.8% (946 of 1665) of the students have normal weight while 24.9% (414 of 1665) were overweight (data not shown). High prevalence of overweight was noted among primary level students from P1 (40.7%) and P2 (35.6%).

NCDs Risk Behaviors

Cigarette Use. The prevalence of current daily smoking among the students in the study schools was 13.4% (31 of 232, data not shown), with the highest proportion observed among secondary level students (15.9%) from S2 (Figure 2). The majority (74.2%) of those who admitted smoking were already smoking at most 3 sticks per day.

Alcohol Consumption. More than half of the students (58.7% of 469) shared that they had their first drink of alcohol at home, and more than half (55.3%) of those who reported to have regular alcohol consumption (n=94) drink alcohol on a monthly basis (Figure 3).

Physical Activity. There were a number of physical activities that were mentioned by the students. It was worth noting that the top three activities that they were engaged in for at least 1 hour per day include basketball (36.6%), dancing (29.9%), and biking (28%).

Consumption of UPFs. Students’ consumption of fatty and oily food items for the past 7 days is shown in Figure 4. Among the popular chosen processed food products with high fat content were the following: hotdog (83%), hamburger sandwich (71.6%), and potato chips (64.5%).

Topping the list of commonly consumed sugary food items was ice cream and 75% of the students reported to have consumed it in the past 7 days at the time of the interview. More than 60% of the students on the same period had consumed food items that are loaded with high amount of sugar such as chocolate candy (69%) and cakes (61.3%).

Shown in Figure 6 is the consumption level of processed food items that contain high amount of salt/sodium. Sixty one percent (61%) of the students consumed cracker and “Kornik” (roasted corn kernel) within the last 7 days at the time of the interview. Other consumed food items belonging to this category were cookies (57.10%), chips & curls (45.9%), and roasted peanuts (31.70%).
Table 1. Demographic characteristics of the students by school, Manila & Quezon City, 2015.

<table>
<thead>
<tr>
<th>Demographic characteristic</th>
<th>School</th>
<th>P1 n=162</th>
<th>S1 n=271</th>
<th>P2 n=669</th>
<th>S2 n=563</th>
<th>Total n=1665</th>
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<tr>
<td>Gender</td>
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<td>100</td>
<td>146</td>
<td>369</td>
<td>268</td>
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<tr>
<td></td>
<td>Male</td>
<td>62</td>
<td>125</td>
<td>300</td>
<td>295</td>
<td>782</td>
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<td>Grade Level</td>
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<td></td>
<td>5</td>
<td>87</td>
<td>53.7</td>
<td>321</td>
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<td>7</td>
<td>-</td>
<td>-</td>
<td>92</td>
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<tr>
<td></td>
<td>8</td>
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<td>94</td>
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<td></td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>85</td>
<td>31.4</td>
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<td>Religion</td>
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<td>82.7</td>
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<td></td>
<td>Christian</td>
<td>18</td>
<td>11.15</td>
<td>30</td>
<td>11.1</td>
<td>62</td>
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<tr>
<td></td>
<td>INC</td>
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<td>4.9</td>
<td>8</td>
<td>3.0</td>
<td>68</td>
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<tr>
<td></td>
<td>Other religions</td>
<td>4</td>
<td>2.5</td>
<td>9</td>
<td>3.3</td>
<td>18</td>
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<td>Dialect/s used at home*</td>
<td>Tagalog</td>
<td>161</td>
<td>99.4</td>
<td>270</td>
<td>99.6</td>
<td>649</td>
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<td>Bisaya</td>
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<td>7</td>
<td>2.6</td>
<td>46</td>
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<td>6.2</td>
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<td>5.2</td>
<td>13</td>
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<td>Civil Status</td>
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<td>Married</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td></td>
<td>No Answer</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>36</td>
</tr>
</tbody>
</table>

School P1 - primary school (Manila); School S1 - secondary school (Manila); School P2 - primary school (QC); School S2 - secondary school (QC)
*Some households use two dialects

Sources of Information on NCD
Majority (64%) of the students are aware of the main causes of NCDs i.e., CVD and its associated risk factors. They obtained information on NCD from the television (77%), radio (29.3%) from their parents 28%, social media (22.2%), and schools (22%).

School Policies on NCD Prevention
Table 2 presents information related to school policies and initiatives to prevent NCDs. Over half of the students (52.1%) were aware of a school policy that banned the sale of salty snack items and soft drinks in the school canteen. Sixty percent (60.6%) claimed that their school had health education programs on prevention of NCDs such as promoting the importance of daily exercise and avoidance of alcohol, smoking, and excessive consumption of salty, fatty, and sugary food items. Over 41% shared to have received NCD information from their social media account.

DISCUSSION
NCD Risk Behaviors
The students in the study schools are exhibiting the
risk behaviors based on the WHO criteria of assessing NCD risk factors (WHO 2003), and these behaviors can predispose the students in the study schools to early onset of NCDs.

Cigarette Smoking. The students who claimed to be “daily” smokers were mostly from the secondary schools (see Figure 2). This finding is consistent with the findings of the Global Youth Tobacco Survey (GYTS) among school children aged 13–15 years old, which showed that 8.9% (boys 12.9%, girls 5.3%) were currently smoking cigarettes (DOH 2011) – and with what was obtained in the survey of in-school Filipino adolescents done by the students for the past 7 days in the study schools, Manila and Quezon City, 2015 (n=1665). Note: only the top 6 items commonly consumed food items are shown.

Figure 6. Consumption of foods high in salt/sodium by the students in the past 7 days in the study schools, Manila and Quezon City, 2015 (n=1665). Note: only the top 5 commonly consumed food items were included.
Peltzer and Pengpid (2015), which showed that 20.4% of male and 7.4% of female adolescents were already smoking cigarettes.

The current proportion of students using tobacco is a cause for concern because, according to WHO, there are over 150 million young people who are already using tobacco and half of the regular tobacco users will die prematurely as a result of such practice (WHO-WPRO 2015).

**Drinking Alcohol.** The high proportion of students (55.3%) who are already drinking alcohol once a month (see Figure 3) is consistent with the result of the recent NNS, where it showed that the proportion of boys 10.0–19.9 years old who drink alcoholic beverages was almost twice as that of girls (24.0% vs. 12.7%). The finding in this study is also consistent with the WHO report on alcohol use, which starts at a young age – 14% of adolescent girls and 18% of boys aged 13–15 years in LMICs (WHO–WPRO 2015).

The status of alcohol consumption of the students in the study schools is another cause for concern because of the negative health impact of this practice. The result supports the WHO reports that harmful drinking is increasing among young people in many countries, particularly in LMICs. In a systematic review done by Allen et al. (2017), it was shown that low-socio-economic groups in LMICs are more likely to drink alcohol, start smoking earlier, consume more tobacco, experience more adverse effects of such practice, and die at a younger age than affluent groups.

**Prevalence of Overnutrition.** The study utilized the schools’ OPT records collected in Jun 2014 to determine the prevalence of malnutrition. Based on the BMI classification, the prevalence of over nutrition (i.e., overweight and obesity) among the students in the study schools must be addressed immediately. The nutritional situation in the study schools is consistent with latest NNS findings, where 14.7% adolescents (10–19 years old) residing in NCR are overweight/obese (DOST–FNRI 2013).

**Physical Inactivity.** Relatively, there is a small number of students (27–38%) engaged in any physical activity lasting for at least one hour every day. This finding is inconsistent with the result of the survey among in-school Filipino adolescents, which showed that 86.4% of males and 86.7% of females are engaged in physical activity less than 5 days a week for 60 min (Peltzer & Pengpid 2015).

Physical inactivity – coupled with high intake of energy dense and processed foods containing high amount of sugars, fats, and oils – are associated with overweight and obesity (Bankman 2017; Collison et al. 2010)

**Consumption of UPF.** The high proportion of students consuming UPF products for the past 7 days with duration of 3–4 times a week and their preference for fatty, salty, and sugary food items is evidence that UPF products are widely available and accessible in urbanized areas like the NCR. The result in this study confirms several reports that UPF products are affordable and cheaper compared to traditional unprocessed foods. The students in the study schools (being government-owned) most likely belong to the lower income strata, yet their consumption of UPF products can be considered as high. This present level of consumption UPF products need timely response on the part of Education Department because studies have shown that sugared beverages, baked goods, and products with high amounts of oils and fats are the most significant vectors for sugar, salt, and fat, respectively (Baker & Friel 2014; Ludwig 2011) and the effect of consumption of “western” diet, excessive consumption of processed

### Table 2. Awareness of school policies and health promotion activities on NCD prevention by school, Manila & Quezon City, 2015.

<table>
<thead>
<tr>
<th>Policies/initiatives on NCD prevention</th>
<th>School</th>
<th>Total n=1665</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Manila P1=162</td>
<td>S1 n=271</td>
</tr>
<tr>
<td>Aware school policy that bans the sale of salty snack items and soft drinks in the school canteen</td>
<td>138 85.7</td>
<td>223 82</td>
</tr>
<tr>
<td>Aware of school policy that gives emphasis on NCD prevention through health education and life skills</td>
<td>144 88.9</td>
<td>212 78</td>
</tr>
<tr>
<td>Received IEC materials (flyer, brochure, etc.) on NCD from teachers</td>
<td>51 31.5</td>
<td>100 37</td>
</tr>
<tr>
<td>Received information on NCD prevention from Facebook or any social media account</td>
<td>49 30.3</td>
<td>135 50</td>
</tr>
</tbody>
</table>
foods, intake of sugared beverages and soda, and their association with obesity and diet-related NCDs have been documented (Collison et al. 2010; Bankman 2017).

**Awareness of NCDs, School Policies, and Programs on Prevention of NCDs**

Mass media remains to be an important vehicle for information on NCDs. The identified mass media (i.e., TV and radio) can exert dual effects on the health and food consumption behavior of the students. Given the current media habits of the students in this study, it could be presumed that they are exposed to promotional strategies on UPF products, albeit unexplored when they were asked of the sources of information on NCDs. It is highly possible that their food preference is influenced by the creative and alluring messages transmitted by the identified mass media because, as demonstrated in one study, the effect of television advertising on children’s food preference is well-established (Boyland & Halford 2013).

The student’s awareness of school policies is a good sign that there are initiatives to reduce the risks of NCDs among the students in the study schools. The review of the current school policies on prevention of NCDs revealed that the study schools were compliant with the Department of Education Circular No. 17 (2017) that bans sales of highly-processed snack items and soft drinks in the school canteens, and that the students are aware of these school policies. The study schools are also compliant with the Department Circular No. 51 (2015) on healthy lifestyle, which encourages students to engage in physical activities and life skills.

The schools policies geared at preventing NCDs and promoting healthy lifestyle practices are supported and complemented by health information giving activities, which are carried out by the teachers and these were confirmed by the students (see Table 2).

**CONCLUSION AND RECOMMENDATIONS**

Based on the WHO criteria in assessing behavioral risk factors for NCDs, the students in the study schools are at risk for developing early onset of NCD. The key to address this is to intensify the health promotion and education initiatives aimed at promoting healthy behaviors and sound dietary practices at this formative stage. Because any habit formed during this stage is carried on through adulthood.

As demonstrated in this study, children aged 10–17 years are already exhibiting NCD risk behaviors, reinforcing the need for national and local policy makers to scale up policies and programs to tackle this issue.

The schools need to sustain the implementation of Department of Education circulars that promote healthy eating patterns and healthy lifestyle practices using creative and interactive approaches that appeal to the millennials.

Health education sessions must emphasize the benefits of “Pinggang Pinoy” (Healthy Plate) and 10 “Kumainments” (Nutritional Guidelines) to reduce the consumption of UPF products and promote sound dietary practices. Such initiatives should be coupled with intensive information drive that will enable the students to rationalize their action and not be blinded by the persuasive and aggressive commercial marketing of UPF products using the TV and social media. The health education sessions should not be a one shot deal but should be undertaken regularly to enhance knowledge and improve practices through participatory (i.e., demonstrating skills) and enjoyable (i.e., learning while performing) approaches that have high potential to sustain interest and encourage participation of the students in the learning sessions.

To complement the implementation of school policies designed to prevent NCDs, it is imperative that the school and community health officials collaborate to encourage healthy lifestyle practices.

Future assessment studies can look at the food environment near the primary and secondary schools to determine the food items being sold in the sari-sari or convenience stores located in close proximity to the schools. This in line with the global call to investigate and collect more data on diets and food environments, as the risk of poor diet posed to mortality and morbidity is now greater than the risk of air pollution and alcohol, drug and tobacco use combined – and amplifies the health consequences of diseases such as HIV/AIDS, malaria, and measles. The results of such study could be used to modify the existing food environment and food system near the schools, particularly those located in urban areas and should be considered as part of future interventions to address the modifiable behavioral risk factors of NCDs.

Additionally, future studies could explore the role of ambulant food vendors and how they can become partners in selling healthy snack items instead of cigarettes or sugary, fatty, and salty foodstuffs.

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NOTE ON APPENDICES

The complete appendices section of this study is accessible at http://philjounsci.dost.gov.ph

REFERENCES


