

Fruit and vegetable consumption among young school children in Pokhara, Kaski: A cross-sectional study

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ABSTRACT

Introduction: Low intake of fruit and vegetable (F&V) increased the risk of non-communicable diseases, followed by disability and death. The fact that many diseases in adulthood have their origins in habits formed during childhood is undeniable. Therefore, the study assessed the prevalence of fruit and vegetable consumption among young school children aged 5 to 9 years. **Methods:** A cross-sectional study was carried out among 352 children from March 8 to September 4, 2020. The multistage sampling method was used to select samples. A face-to-face interview was done with one of the parents at their home. Univariate and bivariate analyses were computed at a 5% level of significance. Ethical approval was obtained from the Nepal Health Research Council. **Results:** Out of 352 children, none of the children met the WHO recommendation of F&V of ≥ 5 servings per day. Around two percentage (2.30%) of children consumed neither fruits nor vegetables, while only 46(13%) had taken F&V at least three servings per day. Children's higher F&V intake was found to be associated with family monthly income, parents' higher education, the presence of a fruit and vegetable shop nearby, and giving money to children. **Conclusions:** Intake of F&V as compared to the recommendation was very low in the study area. This requires an immediate response including nutrition education for parents, teachers, and decision-makers and increasing easy access to F&V.

Keywords: Fruit and vegetable consumption, Pokhara, young children.

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INTRODUCTION

Fruits and Vegetables (F&V) are important sources of vitamins, minerals, dietary fiber, plant protein, and antioxidants. There is convincing evidence that adequate consumption of fruits and vegetables lowers the risk of chronic non-communicable disease, obesity, diabetes, and different types of cancers.¹ According to World Health Organization (WHO), approximately 16 million (1.0%) disability-adjusted life year (DALY) and 17 million (2.8%) death worldwide are attributable to inadequate consumption of fruits and vegetables.² Furthermore, 31% of ischaemic heart disease, 20% of oesophageal cancer, 19% of ischemic stroke, 19% of gastric cancer, and 12% of lung cancer worldwide could be prevented by increasing dietary intake of fruits and vegetables to the recommended minimum of 5 servings daily (or 400 gm) established by the WHO.^{3,4} However, the result from a world health survey that compared fruit and vegetable consumption across 52 low- and middle-income countries showed that more than three-fourths population (77.6% of men and 78.4% of women) did not meet the WHO recommendation.⁵

The proportion of fruits and vegetables in a healthy diet for Nepali people, recommended by the Food and Agriculture Organization and Government of Nepal is 40% (25% vegetables, 15% fruits).⁶

In 2017, Nepal's per capita intake of fruits and vegetable were estimated to be 68 g/day and 214 g/day respectively. When combined, an intake of 282g/day is 30% less than the minimum recommendation (400g/day).⁷ Similarly, the findings from the WHO step survey Nepal 2019 showed a majority (96.7%) of Nepalese adults aged 16-69 years had insufficient fruits and vegetables daily. Moreover, only 10% of adults reported the correct number of servings for recommended intake of fruits and vegetables.⁸

Early childhood is considered the most critical period in a child's life,⁹ as many serious diseases in adulthood have their roots in behaviors initiated during childhood and adolescence.¹⁰ It is crucial for parents to help their children establish healthy eating habits for the best start in their lives that may significantly track into adulthood.^{9,11} Moreover, children's adequate fruit and vegetable consumption may be protective against childhood and adult cancer.¹² Very few studies are found to be conducted on F&V consumption in this group of children in Nepal. Therefore, this study aims to find out the prevalence of fruit and vegetable consumption among schoolchildren aged 5 to 9 years in Pokhara, a metropolitan city in Nepal.

METHODS

A cross-sectional study was conducted among children of 5 to 9 years of Pokhara Metropolitan. The more illustration of the study area, study population, study duration, and sampling techniques are available in our previous published article.¹³ A structured questionnaire was prepared using questions used in other studies^{14,15} Parent's information (age, sex, ethnicity, religion, education level, occupation, types of family, types of home, family monthly income), children's information (age, sex, grade, type of school), environmental factors (fruit and vegetable shop near home, fast food shop near home, taking a child for shopping, giving money to a child, snacks at home after school) were independent variables. F&V consumption (servings per day) was a dependent variable. Parents were asked how frequently their children consumed F&V in a typical week. Ten fruit and vegetable items (apple, orange, grapes, banana, and other fruits; carrot, broccoli, peas, and other vegetables) were stated in the questions to minimize the confusion. The responses were measured as follows: never (0 per day); one to two days a week; three to four days a week; five to six days a week; once a day; twice a day; three or more a day; as was done in the previous study.¹⁴

Since none of the children met the WHO recommendation of ≥ 5 servings of F&V per day, at least two servings of vegetables and one serving of fruits per day combined to at least three servings of fruit and vegetables were used as

a cut-off point for categorization. In the study, "inadequate" and "adequate consumption" of F&V were defined as less than three servings per day and at least three servings per day, respectively.

Six enumerators have trained adequately. The pretested Nepali questionnaire was used. A house-to-house visit was done to collect data. A face-to-face interview was conducted with one of the parents of children aged 5 to 9 years after taking informed consent. Supervision was done by the team members. The data were entered in Excel and analyzed using Statistical Package for social science (SPSS) version 21. Descriptive statistical tools like frequency, percentage mean, and standard deviation were used to express the result. Chi-square was applied at the significance level of 5% (p -value <0.05)

The study was approved by the ethical review board of the Nepal Health Research Council (Reference number:1892). Written informed consent was taken from the parents. The objective of the study and the statements of confidentiality and autonomy was declared before interviewing them.

RESULTS

A total of 352 children were included in the study. The information on socio-demographic characteristics of respondents, characteristics of children, and proportion of F&V consumptions (combined) have also been shared in our previously published article.¹³

Fruit and vegetable consumption among children

About 2.30% of children consumed neither fruits nor vegetables, while 13.07% did not consume fruits at all. Only 12(3.4%) of children had taken fruit at least two servings per day while 60(16.75%) consumed fruit once a day in the last week preceding the survey.

Nearly one-fifth of the children 65(18.47%) did not consume vegetables at all. Only one child had taken three servings of vegetables daily while nearly half 166(47.15%) had taken vegetables twice a day in the last week preceding the survey. In our study population, none of the children were consuming recommended five servings of fruit and vegetable combined. Only 46(13%) had taken fruits and vegetables combined at least three servings per day (Table 1).

Table 1: Fruit and vegetable consumption among children (N=352)

Con-sump-tion be-haviour	Vegetable intake in last 1 week							Total n(%)
	Never n(%)	1-2 days n(%)	3-4 days n(%)	5-6 days n(%)	Once a day n(%)	Twice a day n(%)	Thrice day n(%)	
Never	8 (2.30)	5 (1.42)	2 (0.56)	4 (1.13)	11 (3.12)	16 (4.54)	0	46 (13.07)
1-2 days	26 (7.37)	7 (1.97)	8 (2.30)	17 (4.82)	31 (8.80)	45 (12.77)	0	134 (38.03)
3-4days	9 (2.55)	4 (1.13)	3 (0.85)	7 (1.97)	5 (1.42)	54 (15.34)	0	82 (23.26)
5-6 days	4 (1.13)	0	3 (0.85)	1 (0.30)	2 (0.56)	8 (2.30)	0	18 (5.14)
Once/day	17 (4.82)	0	1 (0.30)	4 (1.13)	3 (0.85)	34 (9.65)	1 (0.3)	60 (16.75)
Twice/day	0	1 (0.30)	0	0	0	9 (2.55)	0	10 (2.85)
Thrice/day	1 (0.30)	0	1 (0.30)	0	0	0	0	2 (0.60)
Total	65 (18.47)	17 (4.82)	18 (5.16)	33 (9.35)	52 (14.75)	166 (47.15)	1 (0.3)	352 (100)

Children belonging to the upper caste (19.60%) were consuming ≥ 3 servings of F&V more than Janjati (13.0%) and dalit/non-dalit (3.85%). The difference was statistically significant ($p=0.001$). Similarly, the education level of the parents had a significant influence on the F&V intake of the children. The proportion of children taking ≥ 3 servings of F&V was higher among the parents with education level bachelor and above (28.13%) than secondary level (20.71%), or basic/no formal education (4.45%) ($p=0.001$). The proportion of adequate F&V intake families with monthly income \geq NRs 40000 and < NRs 40,000 were 20.78% and 7.11% respectively, which was statistically significant ($p=0.001$) (Table 2.1).

Table 2.1: Association between F&V consumption and independent variables (N=352)

Variables	F&V consumptions (servings/day)		Chi-square value	P value
	<3	≥ 3		
Respondents' Age				
20-30	130(86.09)	21 (13.91)	0.16	0.68
>30	176 (87.56)	25(12.44)		
Children's' Age				
5-7	129(87.75)	18(12.25)	0.15	0.69
8-9	177 (86.34)	28 (13.66)		
Gender (of Children)				
Male	162(85.26)	28(14.74)	1.01	0.31
Female	144(88.88)	18(11.12)		
Caste				
Upper Caste	119 (80.40)	29(19.60)	13.33	0.001
Janjati	87(87.00)	13(13.00)		
Dalit/Nondalit	100(96.15)	4(3.85)		
Religion				
Hindu	265(87.45)	38(12.55)	0.53	0.46
Buddhist/ Christian	41(83.67)	8(16.33)		

Parents' Education				
No formal education/Basic	172(95.55)	8(4.45)	25.37	0.001
Secondary	111(79.28)	29(20.71)		
Bachelor and above	23(71.87)	9(28.13)		
Family monthly income				
< NRs 40,000	157 (92.89)	12 (7.11)	12.81	0.001
\geq NRs 40,000	122(79.22)	32 (20.78)		
Parents' occupation				
Housewife	132(88.00)	18 (12.00)	NA	NA
Farmer	58 (96.66)	2 (3.34)		
Own Business	51(69.86)	22 (30.14)		
Service	31 (91.17)	3(8.83)		
Other	34 (97.14)	1(2.86)		

p-value significant at <0.05

The children who live near a fruit/vegetable shop consume more F&V (presence of shop nearby- 20%; absence of shop nearby- 9.26%). The difference is statistically significant (p -value 0.004). The findings also revealed a significant influence on children's adequate F&V intake of who receives money from their parents (16.46%) and who does not (6.62%) (p -value 0.009). There were no significant differences across other demographic parameters and environmental factors (Table 2.2).

Table 2.2: Association between F&V consumption and independent variables (N=352)

Variables	F&V consumptions (servings/day)		Chi-square value	P-value
	<3	≥ 3		
Family type				
Nuclear	199(86.52)	31(13.48)	0.09	0.75
Joint/Extended	107(87.70)	15(12.30)		
Types of home				
Own Home	17(37.77)	28(62.23)	0.15	0.69
Rented Home	129(87.75)	18(12.25)		
Snacks at home (after school)				
Home cooked	227(86.64)	35(13.36)	0.07	0.78
Fast food/Packed food	79(87.77)	11(12.23)		
Fruits/vegetable shop near home				
Yes	100(80.00)	25(20.00)	8.19	0.004
No	206 (90.74)	21(9.26)		
Fast food shop near home				
Yes	155(86.59)	24(13.41)	0.03	0.84
No	151(87.28)	22(12.72)		
Taking child for shopping				
No	109(86.50)	17(13.50)	0.03	0.86
Yes	197(87.16)	29(12.83)		
Giving money to child				
No	193(83.54)	38(16.46)	6.76	0.009
Yes	113(93.38)	8(6.62)		

p-value significant at <0.05

DISCUSSION

The aim of the present study was to assess the prevalence of daily F&V intake among school-going children aged 5 to 9 years and its associated factors. There was limited research on children, so the comparison of our results and

findings is also made with studies done in the adolescent and adult age groups.

The result of this study is quite alarming. None of the children met the WHO recommendation of \geq five servings of F&V per day. The WHO NCD-STEP survey 2019⁸ and a study conducted in the peri-urban area of Bhaktapur, Nepal¹⁶ both discovered the lower prevalence of F&V consumption among adults: 3.3% and 2.3%, respectively. A cross-sectional study conducted in Pokhara metropolitan city in 2020¹⁷ reported that only ten percent of adults consumed F&V in a quantity recommended by WHO, which is relatively higher than the two previous studies. These findings highlight the serious issue of Nepalese people's unhealthy eating habits. Similarly, a couple of studies from Bangladesh reported only 20%¹⁸ and 13%¹⁹ of the adolescent people met WHO recommendation of F&V consumption. Based on 162 countries, vegetable intake was low globally.²⁰ This suggests that low F&V consumption has become a global problem.

Since none of the children ate adequate F&V daily, for bivariate analysis, adequate fruit consumption was at least one serving a day and adequate vegetable consumption was at least two servings a day. When combined, adequate F&V intake would be at least three servings a day. The prospective cohort study conducted in 18 countries adopted the same classification and concluded that intake of 3 to 4 servings of F&V a day significantly reduced cardiovascular disease.²¹

This study showed that males were consuming more F&V than females but the difference was not statistically significant. Similar findings were observed from other studies conducted in Nepal,¹⁷ Bangladesh,¹⁸ and United Kingdom²². In contrast to our findings, a study that examined gender differences in F&V intake reported that men had a lower intake of F&V than women. A more favourable attitude toward F&V intake was observed among women. These gender differences could be explained by men's lower belief in the importance of F&V intake for health.²³

A systematic review reported a positive association between Parent's education and F&V intake among adolescents.¹¹ This study showed children whose parent's education level was bachelor's and above significantly consumed adequate F&V. Similar findings were reported from a study done in Pokhara, Nepal, among an adult population that showed a statistically significant association between participants' education and F&V intake.¹⁷ A cross-sectional study done on American adults came to the conclusion that not only educational attainment, but high income also promotes FV intake.²⁴ The reason could be that educated parents

demand their children to have F&V because they believe good nutrition is important. This proves how crucial education is to achieve good health.

According to this study's findings, having a family income of more than NRs 40,000 and having a fruit/vegetable shop nearby has a statistically significant influence on children's F&V intake. In support of our findings, a few studies examined the relationship between economic status, Accessibility/availability with children's F&V intake. Socioeconomic position, and home availability/accessibility were all consistently positively associated with F&V intake among young and older children.^{11,24,25}

In a large population-based cohort study, home-cooked food was linked to higher dietary quality, with participants consuming 62.3 g more fruit and 97.8 g more vegetables daily.²⁶ In contrast with this research, our study also showed no differences in F&V consumption among children who were given home-cooked food and packed food or fast food after school. However, children who were given money to spend had a lower proportion of F&V intake (6.62%) than those who were not given money (16.46%).

Our study had some limitations. First, as the information was taken from parents, they may not have truthfully reported children's F&V consumption behaviour. Second, the findings may not be generalized to other areas as children only from Pokhara metropolitan were included. As a face-to-face interview was the method of data collection, interviewer bias also might have occurred. Fourth, as the study used a cross-sectional design, inferences about causality are limited. The focus of this study was on school children. Therefore, the study sampling could have missed a portion of children who have never attended schools, and who might have different F&V intake behaviour.

CONCLUSIONS

None of the children met the WHO recommendation of \geq 5 servings of fruit and vegetables a day. Only 13% of children consumed \geq 3 servings of vegetables. Parents' education, economic status, the presence of a fruit and vegetable shop nearby, and not giving them money to spend have a significant influence on the consumption of fruit and vegetables. Comprehensive nutrition education targeting parents, school, and the community; and increasing easy access to fruits and vegetables may improve F&V consumption among children.

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CONFLICTS OF INTEREST: None declared

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AUTHORS CONTRIBUTION

NS designed the research concept, performed statistical analysis, interpretation of result and prepared the first draft of the manuscript. BS contributed on research concept, statistical analysis and prepare the draft of manuscript. SB contributed on draft preparation of the manuscript. All the authors contributed on reviewing the manuscript critically, provided intellectual input and approved the version to be published.

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