

Socio Economic Profile and Nutritional Status of the Rickshaw Pullers of Dhaka City Along with their Energy Intake Gap

Tasnima Mahjabin¹, Ahmed Jubayer^{2,*}, Md. Hafizul Islam², Kazi Abul Kalam¹, Abira Nowar², Md. Nazrul Islam Khan²

¹Bangladesh Institute of Research and Training on applied Nutrition (BIRTAN), Dhaka, Bangladesh

²Institute of Nutrition and Food Science, University of Dhaka, Dhaka-1000, Bangladesh

Abstract

Background: This study focused on nutritional status of the rickshaw pullers, their dietary energy and nutrients consumption along with their energy intake gap as compared to expenditure.

Methods: A cross sectional study was carried out at 15 different important locations of Dhaka city during December-January 2018. In total, 670 rickshaw pullers from these locations were randomly selected. Printed predesigned and validated semi structured questionnaire was used to record necessary information. Nutritional status was determined according to Asia specific BMI cut- off values. Energy expenditure was calculated using their Basal Metabolic Rate (BMR) and Physical Activity Level (PAL) value. 24-hour dietary recall method was administered for dietary analysis.

Results: About 65.4% of them were found within normal BMI range. About 11.5% were underweight and about 23.1% were found having more than normal BMI. Percentage of both underweight (39.0%) and overweight (35.8%) were found higher among those who were between 25 and 35 years. Average daily dietary energy consumption was 2391 kcal and energy expenditure were found 4608 kcal. Their energy consumption was found 2217 kcal less compared to their energy expenditure.

Conclusion: The current study revealed the nutritional status, dietary intake of the rickshaw pullers of Dhaka city and found energy gap in their dietary intake compared to their expenditure. For their better health and nutrition outcome integrated approach should be taken by the responsible authorities.

Corresponding author: Ahmed Jubayer, Institute of Nutrition and Food Science, University of Dhaka, Dhaka-1000, Bangladesh, Phone: +8801941232064; ORCID id: <https://orcid.org/0000-0001-8369-8413>

Keywords: Nutritional status, energy intake, energy intake gap, rickshaw puller, Dhaka city, Bangladesh

Running title: Socio economic profile and nutritional status of the rickshaw pullers of Dhaka City along with their energy gap

Received: Dec 26, 2020

Accepted: Jan 09, 2021

Published: Jan 11, 2021

Editor: Sasho Stoleski, Institute of Occupational Health of R. Macedonia, WHO CC and Ga2len CC, Macedonia.

Introduction

Rickshaw is a popular transportation device for carrying passengers, luggage and various goods in different cities, towns and villages throughout Bangladesh as well as many other South-East Asian countries such as India, China, Vietnam, Singapore and Hong Kong. In Dhaka city, about 60 percent of the residents use rickshaw for commuting every day and only Dhaka City Corporation (DCC) authority issued 79,554 rickshaw licenses until 1986¹. But nowadays it is estimated that nearly 1.5 million rickshaw pullers of Dhaka city and their family members are dependent on rickshaw pulling². Thus, this sector employs a large number of unskilled labors as it is characterized by small investment, easy entry, cash income, no special skill needed, available everywhere and simple rules of engagement.

Rickshaw pulling is an arduous work and it requires both huge mental and physical efforts, but they are neglected and harassed by the law enforcing agencies, passengers and workers of motorized vehicles and, in some cases, rickshaw owners³. The vulnerability of rickshaw pullers further accentuated by the fact that the majority of those who ride rickshaws are not owners as well as there is constant struggle and increased competition among the rickshaw pullers. Moreover, they live a substandard life in Dhaka city and majority of them are being deprived of basic facilities as well as their labor rights⁴. Several studies demonstrated that low BMI is associated with low income and low quality of life which eventually hampers both the physical and mental wellbeing of an individual^{5,6}.

In spite of being a dominating working class people a little work has been done on the life and health status of the rickshaw pullers living in Dhaka city. The objective of our study was to investigate the socio-economic status as well as nutritional status of the rickshaw pullers along with their energy gap. These deprived and exploited sections are not explicitly recognized in policy documents by the government⁷ and very little attention has been paid in humanizing the livelihood of the rickshaw pullers⁸ and therefore, the results of this study may bring their actual situation before the society and appropriate policies may be framed to solve their problems.

Materials and Method

A community based cross sectional study was conducted among 670 rickshaw pullers at 15 randomly selected areas in Dhaka city of Bangladesh. Mohammadpur, Mirpur, Tejgaon, Kamrangirchar, Jatrabari, Shyamoli, Nilkhet, Azimpur, Uttara, Panthapath, Sayedabad, Adabor, Hazaribag, Darussalam and Babubazar in Dhaka city were randomly selected for data collection sites.

Structured and Pre-tested questionnaire was used for collecting both quantitative and qualitative data from the samples. Quantitative data included age, education level, income, expenditure, dietary intake and data on physical activity level. The anthropometric data were collected using calibrated instruments for evaluating their nutritional status. Dietary data was collected by means of 24hour recall method and raw weight of each food item was recorded. From raw food consumption data, energy and nutrient intake status of respondents was estimated using food composition table of Bangladesh^{9,10}.

Nutritional status was assessed using body mass index (BMI). Asian specific Body Mass Index (BMI) cut-offs were used to define underweight ($<18.5 \text{ kg/m}^2$), overweight ($23.0 \text{ to } <27.5 \text{ kg/m}^2$) and obese ($\geq 27.5 \text{ kg/m}^2$)¹¹.

Duration of each activity performed preceding the survey day was noted and Physical Activity Level (PAL) was classified into 3 categories as proposed by FAO/WHO/UNU expert consultation¹²: sedentary or light physical activity (PAL 1.4 to 1.69), active or moderately active (PAL 1.7 to 1.99), vigorous or vigorously active lifestyle (2 to 2.4). Basal Metabolic Rate (BMR) was calculated using Harris benedict equation prior to estimate total Energy Requirement (TEE). After then, TEE was calculated using the formula: $TEE = BMR \times PAL$. Data entry and analysis were done using SPSS version 25.

Results

Table 1 shows the demographic and socio-economic profile of the rickshaw pullers of Dhaka city. These people came to Dhaka from different parts of the country mostly (53.6%) from the northern part (Rajshahi and Rangpur). Most of them (93.3%) were at their active working ages and the rests were at old age.

Table 1. Demographic and socio-economic characteristics of Dhaka city rickshaw pullers

Characteristics	n (%)
Age in year	
18 to 24	35 (5.2)
25 to 35	278 (41.5)
36 to 45	193 (28.8)
46 to 55	119 (17.8)
56 and above	45 (6.7)
Family size	
< 4	173 (25.8)
4 to 5	406 (60.5)
6 to 7	91 (13.7)
Education level	
Illiterate	360 (53.7)
Can read & write	21 (3.1)
Primary Pass	136 (20.3)
Below SSC	121 (18.1)
SSC Pass and above	32 (4.8)
Home town	
Dhaka	76 (11.3)
Mymensingh	116 (17.3)
Chittagong	15 (2.2)
Khulna	20 (3.0)
Rajshahi	125 (18.7)
Rangpur	234 (34.9)
Sylhet	4 (0.6)
Barisal	80 (11.9)
Marital status	
Married	629 (93.9)
Unmarried	32 (4.8)
Others	9 (1.2)
Religion	
Muslim	648 (96.7)
Hindu	22 (3.3)
Per day income by pulling rickshaw	
< 8 USD	335 (50.0)
8-12 USD	316 (47.2)
>12 USD	19 (2.8)
Type of rickshaw	
Paddle rickshaw	612 (91.3)
Motor pulled rickshaw	58 (8.7)
Number of days pulling rickshaw in a month	
<13 days	5 (0.7)
13 – 17 days	44 (6.6)
18 – 22 days	157 (23.4)
>22 days	464 (69.3)

Source of drinking water	
Tube well/tap	552(82.4)
Hotel	118(17.6)
Toilet facility	
Sanitary/slab	611(91.2)
Unhygienic	59(8.8)
Washing hand before taking meal	
Yes	282(42.1)
No	83(12.4)

More than half (53.7%) of the respondents were illiterate and only about 4.8% of them could complete their secondary education. Almost all (91.3%) the rickshaw pullers pulled paddle rickshaw and they had to work hard almost in every day (>22 days for 69.3%). But only 2.8% of them could earn 12 USD in a day and half of them could manage less than 8 USD. Most of them (91.2%) used sanitary toilet but 12.4% did not wash their hands before taking meals.

Table 2 depicts the nutritional status of the rickshaw pullers. About 65.4% of them were found within normal BMI range. About 11.5% were underweight and about 23.1% were found having more than normal BMI. Percentage of both underweight (39.0%) and overweight (35.8%) were found higher among those who were between 25 and 35 years and among the normal mostly (44.1%) were at this age range.

Table 3 describes the distribution of dietary energy and various nutrients intake by their age groups. Dietary intake of energy (2407.1 kcal) and micronutrients were found higher among those who were between 25 and 35 years. Energy (2347.1 kcal), macronutrients and most micronutrients (vitamin-C, zinc and carotene) intake were comparatively lower among the older rickshaw pullers. Iron, Calcium and Retinol intake were lower who were comparatively younger (<25 years). Those who were between 36 and 45 years were found to intake more vitamin-C (46.8 mg), calcium (397.2 mg), carotene (2428.7 µg) and retinol (663.4 µg).

Table 4 describes physical activity level among different age groups. The PAL values were classified according to Food and Agriculture Organization (FAO 2004). Among all the respondents about 94.9% of the

rickshaw pullers had high physical activity level (PAL>2.40) and only 4 of them had active or moderate activity level. And the rest 4.5% had vigorous activity level.

Table 5 shows that every age group had high energy gap and on average they consumed 2217kcal less than their expenditure. Among them, respondents in the age group of 36 to 45 years had the highest energy gap of -2269 kcal. Although energy consumption was lower among the older group (56 and above), their energy gap was comparatively lower (-2116 kcal). The energy expenditure of the rickshaw pullers was incredibly higher than their energy consumption leading them to negative energy balance.

Discussion

The study mainly aimed to assess the nutritional status of the rickshaw pullers of the Dhaka city, their dietary energy and nutrients consumption and energy gap compared to expenditure. From the study we found out that half of the rickshaw pullers are in the age range of 25 to 45 years and only 25% of them are 46 and above clearly indicates that young people comprise lion's share of the rickshaw pullers total number. Around 47.2% of the rickshaw pullers earned 8 to 12 USD and 50% earned 4 to 7 USD respectively per day. The JICA study suggested that a rickshaw puller in Dhaka can earn up to 14,000 BDT (approximately US\$ 178) per month, which is almost five times higher than the minimum wage set in the country's booming garments sector¹³. Another study focusing on rickshaw pullers life in Dhaka city revealed that rickshaw pullers cannot continue their work because of physical weakness and exhaustion as they grow older¹⁴. One of the noticeable findings of our study was that about 91.3% of the rickshaw pullers pull paddle rickshaws

Table 2. Nutritional status of the rickshaw pullers based on BMI status

Age in year	Underweight n(%)	Normal n(%)	Overweight n(%)	Obese n(%)	Total n(%)
18 to 24	7(9.1)	24(5.5)	4(2.7)	0(0.0)	35(5.2)
25 to 35	30(39.0)	193(44.1)	53(35.8)	2(28.6)	278(41.5)
36 to 45	23(29.9)	127(29.0)	42(28.4)	1(14.3)	193(28.8)
46 to 55	13(16.9)	65(14.8)	37(25.0)	4(57.1)	119(17.8)
56 and above	4(5.2)	29(6.6)	12(8.1)	0(0.0)	45(6.7)
Total	77(100.0)	438(100.0)	148(100.0)	7(100.0)	670(100.0)

Table 3. Energy and other important nutrients intake (Per capita per day) by age group

Age group	Energy (kcal)	Protein (gm)	Fat (gm)	Carbohydrate (gm)	Vitamin-C (mg)	Zinc (µg)	Iron (mg)	Calcium (mg)	Carotene (µg)	Retinol (µg)
18 to 24	2362.6	63.0	28.7	462.9	42.4	5614.7	13.8	328.4	2138.1	551.8
25 to 35	2407.1	64.7	28.4	473.7	40.8	5756.1	15.4	368.5	1854.3	604.8
36 to 45	2406.6	63.8	28.3	474.7	46.8	5659.3	15.0	397.2	2428.7	663.4
46 to 55	2358.1	63.0	28.1	463.9	37.8	5686.5	15.7	391.4	1720.2	591.8
56 and above	2347.1	66.3	26.7	460.9	34.7	5571.2	15.2	354.3	1546.3	556.5
Total	2391.5	64.2	28.2	470.7	41.6	5695.1	15.2	377.9	1987.7	613.1

Table 4. Distribution of Physical activity level of the respondents with their age

Age group	Active or moderate PAL (1.70-1.99) n(%)	Vigorous PAL (2.00-2.40) n(%)	High PAL (>2.40) n(%)	Total n(%)
18 to 24	0(0.0)	2(5.9)	32(94.1)	34(100.0)
25 to 35	3(1.1)	12(4.4)	258(94.5)	273(100.0)
36 to 45	1(0.5)	8(4.2)	184(95.3)	193(100.0)
46 to 55	0(0.0)	7(5.7)	115(94.3)	122(100.0)
56 and above	0.(0.0)	1(2.1)	47(97.9)	48(100.0)
Total	4(0.6)	30(4.5)	636(94.9)	670(100.0)

Table 5. Estimation of energy gap of the respondents

Age Group (years)	Energy Consumption (EC)	Energy Expenditure (EE)	Energy Gap (EC-EE)
18 to 24	2367	4485	-2118
25 to 35	2410	4623	-2213
36 to 45	2407	4676	-2269
46 to 55	2354	4563	-2209
56 and above	2330	4445	-2116
Total	2391	4608	-2217

though now a day's motor pulled rickshaws are quite famous in our country. All the samples were asked about the number of days they pulled rickshaw and 69.3% of them pulled rickshaw for 22-27 days in a month whereas 6.6% of them pulled rickshaw for 12-17 days only. Most rickshaw pullers who worked five to seven days a week reported an incapability to continue rickshaw pulling every day because of arduous labor required for the work¹³.

In our study, we assessed the physical activity level of the manual labors and found that about 95% of the rickshaw pullers had high physical activity level. A study conducted on the dietary pattern and nutritional status of the rickshaw pullers revealed that the major source portion of their daily diet came from cereals and the least portion of food came from fats and oils group¹⁵ which showed a similar trend as The National Nutrition Survey conducted on rural population (INFS, 1983). The food consumption data revealed that rickshaw pullers consumed carbohydrates in large amounts in their daily diet and the respondents in the age range of 25 to 35 years consumed around 65 grams of protein every day which is in the range of Recommended Dietary Allowance (RDA) of protein for adults¹⁶. The per day intake of micronutrients such as retinol, vitamin C and carotenes was highest in the age group of 25 to 35 years but with the increase of age the consumption of micronutrient decreased. As a result, our study observed that older rickshaw pullers consumed less vitamins and minerals than younger ones which may be due to their less days of rickshaw pulling which affected their income and dietary pattern. We calculated the energy gap from the difference of energy intake and energy gap and divided the energy gaps on the basis of the age groups. The energy gap was highest in the age group of 35 to 45 years which was -2269 kcal. The exceptionally higher physical activity level led to this large energy gap that not only damages the health of the rickshaw pullers but also the whole family.

The reason behind being underweight may be due to low energy intake with a diet that is more dependent on cereal-based foods with less incorporation of fats and oils and this finding is similar to a study conducted on Indian rickshaw pullers¹⁷. For assessing the hygiene practices and nutritional knowledge of the rickshaw pullers, we recorded their responses and found

that 64.5% of the rickshaw pullers had no idea about what nutrition is and 43.1% of the respondents did not know about foods that prevent different diseases. But the significant finding is that 93.7% of the respondents consumed open salt instead of packet salt. Other major findings are that still 2.7% rickshaw pullers use hanging or open latrines in Dhaka city and about 70% of them drink unfiltered water.

The findings of the present study revealed that the physical activity level of the rickshaw pullers was unusually high and their usual dietary pattern was more or less unvaried and grossly deficient in micronutrients. Very high physical activity led them to huge energy gap and negative energy balance. Taking into consideration of the socio-economic conditions of the participants, it may be concluded that the economic constraint seemed to be the major factor for their negative energy balance and poor nutritional status. However, efforts should be taken to educate the working population groups of the society regarding the rudiments of nutrition emphasizing the role of good nutrition in improving working capacity.

Conclusion

The study demonstrates the socioeconomic status, nutritional status as well as nutritional and hygiene knowledge of the rickshaw pullers of Dhaka city. Most of the rickshaw pullers pulled rickshaw for more than 22 days in a month but in accordance with the very high physical activity level they could not maintain their diet and fell into negative energy balance. A large portion of their expenditure goes on rickshaw deposits which drive them to work more and as a result they end up having deteriorated health conditions. Moreover, they had little knowledge about nutrition and the alarming finding is that almost all of them consume open salt and unfiltered water. Despite their contribution to the economy, the contributions and livelihood conditions of rickshaw pullers in Bangladesh received little attention from researchers, development planners and policymakers. As they comprise one of the largest portions of the working population of Dhaka city more interventions should be taken to give them a better life and better working opportunities. The government and the NGOs should organize different campaigning to aware them about health, hygiene and sanitation issues to lead them a healthy life. Local nutrition colleges and health institutes can adopt this

population and can work for their nutritional upliftment.

Conflict of Interest

There is no conflict among the authors to be declared.

Funding

Bangladesh Institute of Research and Training on Applied Nutrition (BIRTAN) funded this study only for data collection.

References

1. Karim R. *Organising the Informal Economy Workers: A Study of Rickshaw Pullers in Dhaka City*. Dhaka; 2019. <http://bilsbd.org/wp-content/uploads/2019/06/A-Study-of-Rickshaw-Pullers-in-Dhaka-City.pdf>.
2. Naimul S, Tehsum M. Munich Personal RePEc Archive Examining Vulnerabilities: the Cycle Rickshaw Pullers of Dhaka City. *Int J Dev Res*. 2018;8(83995):1. https://mpr.aub.uni-muenchen.de/83995/1/MPRA_paper_83959.pdf.
3. Kamruzzaman M, Hakim MA. Socio-economic Status of Slum Dwellers: An Empirical Study on the Capital City of Bangladesh. *Am J Bus Soc*. 2016;1(2):13-18. <http://www.aiscience.org/journal/ajbs>.
4. Pryer JA, Rogers S. Epidemiology of undernutrition in adults in Dhaka slum households, Bangladesh. *Eur J Clin Nutr*. 2006;60(7):815-822. doi:10.1038/sj.ejcn.1602385
5. Delpeuch F, Traissac P, Martin-Prével Y, Massamba JP, Maire B. Economic crisis and malnutrition: socioeconomic determinants of anthropometric status of preschool children and their mothers in an African urban area. *Public Health Nutr*. 2000;3(1):39-47. doi:DOI: 10.1017/S1368980000000069
6. Hakeem R. Socio-economic differences in height and body mass index of children and adults living in urban areas of Karachi, Pakistan. *Eur J Clin Nutr*. 2001;55(5):400-406. doi:10.1038/sj.ejcn.1601172
7. Nutrition on malnutrition helm, nutrition policy in fool's paradise. <https://www.observerbd.com/2015/09/20/111732.php>. Accessed December 26, 2020.
8. Gillespie, S. (ed.); UNICEF K (Nepal). RO for SA eng; Malnutrition in South Asia: a regional profile [1997].
9. Nazma Shaheen, Abu Torab MA Rahim, Md. Mohiduzzaman, Cadi Parvin Banu, Md. Latiful Bari, Avonti Basak Tukun, MA Mannan, Lalita Bhattacharjee BS. *Food Composition Table for Bangladesh*; 2014. doi:10.1007/s13398-014-0173-7.2
10. Islam SN, Investigator P, Akhtaruzzaman M, Science F. *A Food Composition Database for Bangladesh with Special Reference to Selected Ethnic Foods*; 2010. <http://fpmu.gov.bd/agridrupal/content/food-composition-database-bangladesh-special-reference-selected-ethnic-foods>.
11. Corbel MJ, Tolari F, Yadava VK. Appropriate body-mass index for Asian populations and its implications. *Lancet*. 2004;363:157-163. www.thelancet.com.
12. Fao J, Consultation UNUE. Human energy requirements: report of a joint FAO/ WHO/UNU Expert Consultation. In: *Food and Nutrition Bulletin*. Vol 26. ; 2005:63-66. <https://www.who.int/nutrition/publications/nutrientrequirements/9251052123/en/>.
13. Tamanna M, Hasan MK. Life in a Megacity: Livelihood Strategies and Survival Mechanisms of Rickshaw Pullers in Dhaka City. *Millenn Asia*. 2015;6(1):44-60. doi:10.1177/0976399614563224
14. Begum S, Sen B, Dc W. Pulling rickshaws in the city of Dhaka : a way out of poverty? 2005;17(2):11-25. doi:<https://doi.org/10.1177%2F095624780501700202>
15. Ahmed F, Islam A. Dietary pattern and nutritional status of Bangladeshi manual workers (rickshaw pullers). 2015; 7486 (October). doi:10.3109/09637489709028574
16. Nahar Q, Faruque MO, Sultana SSS, Siddiquee MA. *Desirable Dietary Pattern for Bangladesh*. Dhaka; 2013. [http://fpmu.gov.bd/agridrupal/sites/default/files/ToR 15- Fial Report BIRDEM.pdf](http://fpmu.gov.bd/agridrupal/sites/default/files/ToR%2015-Fial%20Report%20BIRDEM.pdf).
17. Nirmala Bansal UM. Study of dietary pattern of manual workers (brick - kiln workers) of chicknvas village of Hisar. *Indian J Nutr Diet*. 1985;22(8). <http://www.informaticsjournals.com/index.php/ijnd/article/view/13194>.