

Physical activity levels and sociodemographic factors associated with meeting recommended levels among shop attendants in Mbarara municipality, Uganda

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Background: Shop attendants are urban dwellers who may spend significant periods in sedentary lifestyles exposing them to non-communicable diseases. This study assessed the physical activity levels and sociodemographic factors associated with meeting the WHO recommended physical activity levels among shop attendants in Mbarara municipality, Uganda.

Methods: We conducted a cross-sectional study among 301 shop attendants. We used the global physical activity questionnaire to assess participants' physical activity levels. Modified Poisson regression was used to assess the sociodemographic factors associated with meeting recommended physical activity levels.

Results: Of the 301 participants, 234 (77.7%) met the WHO physical activity recommendations, especially through work-related physical activity of moderate intensity 194 (64.5%). The median weekly duration of all moderate-intensity physical activity was 180 min (IQR=90 to 360). The median daily sedentary time was 300 min (IQR=300 to 360). Being male (adjusted prevalence ratio=1.33, 95% CI 1.17 to 1.51) was significantly associated with meeting recommended physical activity levels.

Conclusion: The physical activity levels among shop attendants were high and were mostly achieved through work-related activities of moderate intensity, with males being more likely to meet recommended physical activity levels. Findings suggest a need for gender-sensitive initiatives to increase physical activity levels, especially among female shop attendants.

Keywords: Mbarara, physical activity, shop attendants, Uganda, WHO physical activity recommendations.

Introduction

Frequent physical activity is a well-established preventive and treatment remedy for some non-communicable diseases (NCDs) such as heart disease, diabetes, stroke and depression, as well as colon and breast cancer.¹ Physical activity is also important for the prevention of NCD risk factors such as hypertension, overweight and obesity and is associated with a 20–30% reduction in the risk of NCD-related mortality.^{1,2}

The WHO recognises the importance of physical activity in the control of NCDs and targets a 15% relative reduction in global prevalence of physical inactivity in adults by 2030.³ Despite such efforts, an estimated 27.5% of the world's adults do not meet

recommended physical activity levels.⁴ The WHO categorises physical activity into vigorous-intensity, moderate-intensity and sedentary behaviour.⁵ Accordingly, it recommends that adults aged 18–64 y should undertake 150 to 300 min of moderate-intensity aerobic physical activity or 75 to 150 min of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate and vigorous intensity activity each week.⁶ A recent national survey in Uganda indicated that 94.3% of the adult population met global physical activity recommendations⁷ and, indeed, Uganda is considered the most physically active country in the world⁴. In sub-Saharan African countries, there is a paucity of studies documenting physical activity levels by different

activity domains such as work, travel and recreation.⁸ Previous studies conducted in Uganda have indicated that physical activity may be influenced by factors such as gender, age, peri-urban residence, level of education,⁹ overweight and obesity.^{7,9} These studies were, however, conducted among the general population and there are limited data on specific population subgroups such as shop attendants.

In many places, shop attendants are urban dwellers, and they are usually busy with less time to exercise, thus making them a susceptible subpopulation to NCDs.⁹ It is therefore important to understand physical activity levels among such subpopulations to guide efforts to prevent NCDs and inform self-sustaining interventions. In this study, we report shop attendants' physical activity levels by intensity-specific domains, the proportion meeting physical activity-recommended levels and the sociodemographic factors associated with meeting these recommendations.

Methods

Study area

The study was conducted in the central business area of Mbarara district. Mbarara town is the largest urban centre and main business capital of western Uganda and is located about 290 km from Kampala, Uganda's capital. Mbarara has an area of 1846 km² and is composed of 14 subcounties and 3 divisions. The district has a total population of 472 625 with 195 318 living in Mbarara municipality¹⁰ and the annual population growth rate is 2.84%.¹¹ The municipality has many small- and large-scale trading businesses.

Study design and population

This was a cross-sectional study using quantitative data collection methods. The study population consisted of shop attendants within Mbarara town and the study units were shops. All shop attendants in the town were eligible for inclusion in the study. The sample size of 385 shop attendants was estimated using the Kish Leslie formula¹² with the following assumptions: Z score, $Z(1 - \alpha/2) = 1.96$; prevalence, P of 50% because there was no published literature about physical activity among shop attendants and a precision, σ , of 5%.

Data collection and sampling

Data were collected using a semistructured interviewer-administered questionnaire developed in English and translated into Runyakitara, the local language mostly spoken in Mbarara town. The questions on physical activity levels were extracted from the WHO global physical activity questionnaire (GPAQ) included in the STEPwise approach to surveillance.¹³ The GPAQ was previously used in a Ugandan countrywide survey.⁷ Additionally, the GPAQ tool has been rated to have moderate to high validity and reliability in 12 countries.¹⁴ The questionnaire was pretested among 16 shop attendants in Bwaise, an urban area in Kampala city, after which it was refined for use by trained research assistants during actual data collection. Proportionate sampling was used to determine the number of shops to select on each of the 10 major streets in Mbarara town. Systematic sampling was used to select the specific shops whose attendants were

interviewed. The sampling interval was determined by dividing the total number of shops on a street by the number of shops to be selected on that street. From each of the selected shops, only one adult shop attendant was asked to participate in the study. In scenarios where a selected shop had more than one adult attendant, simple random sampling was used to select only one participant by the ballot method.

The shop attendants were asked about their sociodemographic characteristics and participation in intensity-specific physical activity types and sedentary behaviour. Physical activity levels were assessed on three major domains (i.e. work, travel and recreation), which were divided into five subdomains: vigorous work-related, moderate work-related, travel-related, vigorous recreational and moderate recreational physical activities. The shop attendants were asked to reflect on their work and identify any work-related activities that required substantial physical effort and resulted in large increases in breathing. The number of days and minutes taken on a given activity were recorded. Zero was assigned for activities participants did not report engaging in. Vigorous intensity was defined as any activity that causes large increases in breathing and heart rate for at least 10 min continuously. On the other hand, moderate intensity activity was defined as one which causes small increases in breathing and heart rate for at least 10 min continuously. Travel-related physical activity was considered a moderate intensity physical activity if the subject pedalled or walked for 10 min continuously in line with previous studies.^{7,15} Participants were also asked to estimate the amount of time they were sedentary (i.e. engaged in activities such as sitting at work or at home, including time spent sitting with friends, at the desk, travelling, playing cards and watching television, but excluding time spent sleeping) in a typical day, information which was then recorded.

Data entry and analysis

Data were entered in EpiData v. 3.02 (EpiData Association, Denmark), then cleaned and analysed using Stata 14.0 statistical software (StataCorp., Texas, United States). Analysis was conducted at three levels: univariate, bivariate and multivariable. At the univariate level, the frequencies and proportions of study variables such as sociodemographic characteristics and physical activity patterns were computed.

Guidelines for analysis of GPAQ were followed.¹⁶ To calculate time spent on each intensity-specific physical activity per week, the number of days in a week on which physical activity was performed was multiplied by the average minutes taken on each day of activity. The median duration per week was also calculated for each of the five intensity-specific physical activity domains. The minutes per week under each domain were compared with the WHO physical activity recommendations. An equivalent combination across all domains (work, travel and recreation) was calculated to assess overall adherence to WHO physical activity recommendations by shop attendants. For the calculations, 1 min of vigorous activity was equated to 2 min of moderate intensity activity.¹⁷ To assess the time engaged in an intensity-specific physical activity, we calculated the median weekly duration and the respective IQR for every physical activity in each category. We also obtained the median daily sedentary time and its IQR.

The outcome variable was meeting the WHO recommendations, which was coded as 1 for those who met the recommendations and as 0 for those who did not. To identify sociodemographic factors associated with meeting WHO physical activity recommendations, a modified Poisson regression model with robust error variance was used to estimate the crude and adjusted prevalence ratios (PRs) and their 95% CIs. PRs were preferred to ORs because ORs tend to overestimate the standard errors for the estimated relative risks when the probability of obtaining the outcome is >10%.^{18,19} Basic models consisting of the outcome variable and one predictor variable were used to obtain the crude PRs. All variables that were found to be statistically significant at $\alpha=5\%$ in basic models and those that had general plausibility were entered into a multivariable regression model to identify independent predictors of meeting the WHO physical activity recommendations. The adjusted PRs, their 95% CIs and p values are presented.

Results

Characteristics of study participants

A total of 301 sampled shop attendants out of 385 participated in the study, representing a 78.2% response rate. The main reasons for non-participation included 'lack of time to respond to the interview', 'considering it timewasting' and need of approval from the boss before consenting, while others declined without giving a reason. Of those who participated, more than half (162; 53.8%) of the shop attendants were females, had secondary education (165; 54.8%) as their highest level of education and a mean age of 41.1 ± 8.1 y. The majority of participants were married (248; 82.4%), Christians (207; 68.8%) and had a monthly household income of at least 30 US\$ (217; 72.1%) (Table 1).

Table 1. Sociodemographic characteristics of respondents

Characteristics	Frequencies (n=301)	(%)
Gender		
Male	139	46.2
Female	162	53.8
Age (y)		
18–30	41	13.6
31–45	158	52.5
46–60	102	33.9
Mean (SD)	41.1 (8.1)	
Marital status		
Single	27	9.0
Married	248	82.4
Widow/divorced	26	8.6
Education		
None or primary	100	33.2
Secondary	165	54.8
Tertiary	36	12.0
Religion		
Christian	207	68.8
Muslims	94	31.3
Ethnicity		
Bakiga	41	13.6
Banyankole	226	75.1
Other ^a	34	11.3
Monthly personal income (US\$)		
<30	84	27.9
≥30	217	72.1

^aincludes Baganda, Batoro and Banywaranda.

Physical activity levels of shop attendants

Number of days of engagement in intensity-specific physical activities

Moderate work-related physical activity was reported to have the most days of engagement in a week with an average of 4.8 (4.81 ± 2.0) d. This was followed by travel-related physical activity

with an average of 1.8 (1.8 ± 2.1) d. The average number of days of engagement in recreational activities (vigorous and moderate) and vigorous work-related physical activity was less than 1 per week (Figure 1).

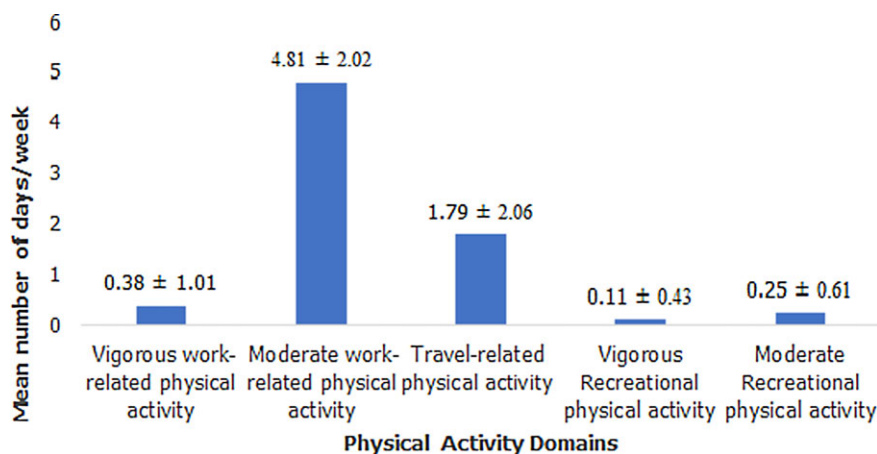


Figure 1. Average number of days per week performed for each intensity-specific physical activity.

Table 2. Duration of physical activity per intensity-specific domain and sedentary time for shop attendants (N=301)

Type of intensity-specific physical activities	Median duration in min (IQR)
Work-related vigorous/week	0 (0–0)
Work-related moderate/week	180 (90–360)
Vigorous recreational/week	0 (0–0)
Moderate recreational/week	0 (0–0)
Travel-related/week	0 (0–60)
Combined vigorous/week	0 (0–0)
Combined moderate/week	230 (120–390)
Sedentary time/day	300 (300–360)

Duration of physical activity and sedentary time

Shop attendants were engaged for the longest time in work-related moderate physical activity with a median time per week of 180 min (IQR=90–360). The remaining intensity-specific physical activities had very low median times of 0 min per week. The median sedentary time per day for shop attendants was 300 min (IQR=300–360) (Table 2).

Meeting WHO-recommended physical activity levels

Of the 301 shop attendants, 194 (64.5%) met the WHO physical activity recommendations through moderate work-related physical activity alone, while only 14 (4.7%) did so through either travel-related or vigorous recreational physical activity. The majority (216; 71.7%) of shop attendants met the WHO physical activity recommendations through one of the five types of intensity-specific physical activity domains and 234 (77.7%) by equivalent combinations across all domains (Table 3).

Sociodemographic factors associated with meeting the WHO physical activity recommendations

Upon bivariate analysis, being male (crude PR=1.31, 95% CI 1.16 to 1.48) and having a personal monthly income of at least 30 US\$ (crude PR=1.17, 95% CI 1.00 to 1.37) were positively associated with meeting recommended levels of physical activity. After adjusting for all variables in the multivariable model, only gender maintained a significant association, with a 33% higher proportion of male shop attendants meeting the physical activity recommendations compared with their female counterparts (adjusted PR=1.33, 95% CI 1.17 to 1.51). Regarding income, the prevalence of meeting the recommended levels was 15% higher among shop attendants who earned at least 30 US\$ monthly (adjusted PR=1.15, 95% CI 0.99 to 1.34) compared with those who did not earn at least 30 US\$ monthly, although this was not statistically significant for a 5% level of significance (Table 4).

Discussion

This study assessed physical activity levels and sociodemographic factors associated with meeting WHO-recommended levels among shop attendants in Mbarara municipality, Uganda. The results of this study indicate that a high proportion of shop attendants met the WHO physical activity recommendations, mostly through work-related moderate intensity physical activity. Only gender (being male) was significantly associated with meeting recommended levels of physical activity among shop attendants.

The greatest contributor to shop attendants meeting WHO-recommended physical activity levels was work-related moderate intensity activities. This could be due to the nature of their work, which necessitates repeated movements, including stocking shelves and lifting items. The reported physical activity levels in this study (77.7%) are, however, lower than those of the general population in Uganda at 94.3%.⁷ Moreover, the mean sedentary time per day of 300 min in this study was also higher

Table 3. Shop attendants meeting the WHO physical activity recommendations by different intensity-specific physical activity domains

Type of intensity-specific physical activities and/or equivalent combinations	Number meeting the WHO physical activity recommendations ^a	% of shop attendants meeting WHO physical activity recommendations (95% CI)
Work-related vigorous	13	4.3 (2.5 to 7.3)
Work-related moderate	194	64.5 (58.8 to 69.7)
Vigorous recreational	14	4.7 (2.8 to 7.7)
Moderate recreational	09	3.0 (1.6 to 5.7)
Travel-related	14	4.7 (2.8 to 7.7)
All work-related combined	203	67.4 (61.9 to 72.5)
All recreational combined	23	7.6 (5.1 to 11.3)
Vigorous across all the domains	28	9.3 (6.5 to 13.2)
Moderate across all the domains	221	73.4 (68.1 to 78.1)
Equivalent of combination across all the intensity-specific domains	234	77.7 (72.7 to 82.1)
Meeting WHO physical activity recommendations by any of the domains	216	71.7 (66.4 to 76.6)

^aAt least 75 min of vigorous activity or 150 min of moderate activity or an equivalent combination of both.

Table 4. Independent predictors of meeting the WHO physical activity recommendations among shop attendants

Characteristic	N	Number meeting WHO physical activity recommendations (%)	Crude PR (95% CI)	p	Adjusted PR (95% CI)	p
Gender						
Female	162	110 (67.9)	1		1	
Male	139	124 (89.2)	1.31 (1.16 to 1.48)	0.001	1.33 (1.17 to 1.51)	0.001
Age (y)						
46–60	102	83 (81.4)	1		1	
31–45	158	117 (74.0)	0.91 (0.80 to 1.04)	0.159	0.96 (0.84 to 1.10)	0.536
18–30	41	34 (82.9)	1.02 (0.86 to 1.20)	0.825	1.15 (0.97 to 1.36)	0.118
Marital status						
Married	248	194 (78.2)	1			
Single	27	21 (77.8)	0.99 (0.80 to 1.23)	0.958		
Widow/divorced	26	19 (73.1)	0.93 (0.73 to 1.19)	0.583		
Education						
None or primary	100	76 (76.0)	1		1	
Secondary	165	131 (79.4)	1.04 (0.91 to 1.20)	0.526	0.99 (0.86 to 1.13)	0.857
Tertiary	36	27 (75.0)	0.99 (0.79 to 1.23)	0.906	0.92 (0.74 to 1.14)	0.424
Religion						
Christian	207	162 (78.3)	1			
Muslim	94	72 (76.6)	0.98 (0.86 to 1.12)	0.751		
Personal monthly income (US\$)						
<30	84	58 (69.1)	1		1	
≥30	217	176 (81.1)	1.17 (1.00 to 1.37)	0.045	1.15 (0.99 to 1.34)	0.067

Variables with p values bolded are statistically significant

than the 120 min reported in the national population survey, probably because shop attendants spend a significant time of their work being sedentary while waiting for customers. Less than 10% of shop attendants met the WHO physical activity recommendations through recreation activities, similar to the findings in the countrywide survey, which reported only 17.0%.⁷ The busy nature of shop attendants' work may deter them from engaging in recreation activities. However, broader factors may be related to the enabling environment for recreation, such as the availability of recreational spaces like leisure parks, swimming pools and playgrounds.²⁰ Cognitive approaches and behavioural interventions such as self-monitoring, stimuli to increase physical activity, rewards and goal-setting delivered to individuals involving interactive education sessions can be effective in increasing physical activity levels^{21,22} and these should be tested among shop attendants.

We found that males were more likely to meet recommended physical activity levels compared with female shop attendants, consistent with previous studies.^{23–25} Unlike women, who tend to be more involved in activities that are characterised by light-

to-moderate intensity, men tend to engage in moderate to vigorously intense activities.²⁵ This may partly explain why males were more likely to meet recommended physical activity levels. In fact, in our study, females were more likely to be sedentary than males. Similarly, in studies in the general population, females and those living in urban areas usually have lower physical activity levels.^{7,26} Interventions to increase physical activity levels are warranted among shop attendants if the WHO recommendation of a 15% reduction in the global prevalence of physical inactivity by 2030 is to be met.³ Moreover, such interventions should utilise innovative strategies targeting females to reduce sedentariness and further increase their physical activity levels.

Study limitations

Physical activity levels were ascertained using GPAQ through self-reporting. This may subject our findings to recall bias and issues of social desirability. Also, we did not factor in a non-response rate when calculating our sample size, which limited our final sample. Nonetheless, the current study highlights patterns of physical

activity and sociodemographic factors associated with meeting WHO-recommended physical activity levels among shop attendants, a key population subgroup.

Conclusions

Most shop attendants in Mbarara town met the WHO physical activity recommendations, mainly through moderate intensity work-related activities, although the level was lower than that for the general population. Meeting recommended physical activity levels was significantly higher in males compared with females, highlighting the need for innovative gender-sensitive strategies to increase physical activity levels among this population subgroup, especially for females.

Authors' contributions: EN and EA conceptualised and designed the study and participated in writing the original full draft of the manuscript. STW participated in writing the methodology, performing data analysis and in writing the original full draft of the manuscript. HM participated in data analysis and in writing the original full draft of the manuscript. RN participated in data analysis, critical review and by editing the manuscript. All the authors read and approved the final draft of the manuscript.

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Data availability: The data that support the findings of this study are available from the corresponding author upon reasonable request.

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