Original Article

Physical Inactivity and its Sociodemographic Determinants among Adults: A Community-Based Study

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Abstract

Introduction: Physical inactivity (PI) is the fourth leading risk factor for global mortality and is potentially modifiable. Understanding its sociodemographic correlates can contribute in planning preventive measures to reduce the same. **Aims and Objectives:** 1) To estimate the prevalence of PI among adults aged 20–60 years and 2) to identify the sociodemographic determinants of PI among adults. **Material and Methods:** A community-based cross-sectional study was done in district Aligarh, Uttar Pradesh. 304 adults aged 20–60 years, giving informed consent were selected by simple random sampling. Pregnant women and those with febrile disease and physical defect were excluded. Predesigned structured proforma and Global Physical Activity Questionnaire were used. Chi-square test and logistic regression analysis were applied using IBM SPSS 23.0. **Results:** Prevalence of PI was 47.7% (95% CI: 42.0–52.6). It was significantly higher in urban (55.3% vs 41.1%) than in rural area and among females than in males (68.7% vs 34.9%). PI during work was 74.3%, during travel 78.9%, and during recreation 88.5%. Being female increased odds of PI by almost ten times (adjusted odds atio (AOR) =9.7, 95% CI: 1.6–58.5). Unskilled workers/laborers and farmers (those involved in active occupational work) were found to have lesser odds of PI (AOR = 0.2, 95% CI: 0.1–0.5 and AOR = 0.2, 95% CI: 0.01–0.6, respectively). **Conclusion:** PI is highly prevalent among adults. Targeted interventions to increase physical activity in recreational domain are recommended, specially in urban areas and among women. Further studies to explore barriers to physical activity are needed to address this problem.

Keywords: Cross-sectional study, domain, physical inactivity, risk factors

Introduction

Physical inactivity (PI) is recognized as the fourth risk factor for global mortality according to World Health Organization.[1] It is associated with a range of chronic disease outcomes, including type 2 diabetes, coronary heart disease, some cancers, and shortened life expectancy.[2,3] PI also imposes substantial economic burden and costs international health-care systems approximately international $ 53.8 billion according to a major global analysis.[4] It is defined among adults aged more than 18 years to 60 years as a state of having less than 150 min of moderate-intensity activity per week or equivalent.[5]

In a pooled analysis of 358 surveys (population-based) with 1.9 million adult participants, Guthold *et al*.[6] reported global age standardized prevalence of insufficient physical activity in 2016 as 27.5%. The prevalence has been shown to be high in developed countries (53.1% in US)[7] as well as in developing countries, with 63.1% in China[8] and 72.6% in Pakistan.[9]

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The prevalence of PI has been reported to vary in various parts of India with 56.81% in Punjab,[10] 50.2% in Srinagar,[11] 49.7% in urban area of Pondicherry,[12] and 60.1% in Agra[13] to 22.3% in Kerala.[14] Anjana RM *et al*.[15] in nationwide survey in India as part of the Indian Council of Medical Research-India Diabetes (ICMR-INDIAB) study found that more than half of adults (54.4%) were physically inactive. Shrinking of open spaces, unplanned urban areas, sedentary occupations, and increased screen time recreations have been implicated for the high prevalence of PI.[16]

There is a scarcity of study on PI and its determinants in Uttar Pradesh, specially in small but growing cities. To fill this

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knowledge gap, a community-based study was undertaken in the field practice areas of Department of Community Medicine, JN Medical College, Aligarh, with the objectives: 1) To estimate the prevalence of PI among adults aged 20–60 years, and 2) to identify the sociodemographic determinants of PI among adults.

Material and Methods

Study population and sampling

This cross-sectional study was conducted in the field practice areas of Urban Health Training Centre (UHTC) and Rural Health Training Centre (RHTC) under Department of Community Medicine, Jawaharlal Nehru Medical College, Aligarh Muslim University, Aligarh. Area under RHTC consisted of six villages under Jawan Block, District Aligarh, with a population of 17,434 and 3,490 registered households. Area under UHTC covered three peri-urban localities with a population of 11,453 and 1,628 registered households. Registered households in the area formed the sampling frame. Households were chosen by simple random sampling using computer generated random numbers. From each household only one adult satisfying inclusion and exclusion criteria were included. In case of a household having more than one suitable adult, only one was chosen randomly by lottery method. In case, no adult was found eligible for study in that household (as per inclusion and exclusion criteria), next household in the list was approached. Adults in the age group of 20–60 years and those giving informed consent satisfied the inclusion criteria. Pregnant women and adults suffering from acute or chronic febrile diseases, asthma or chronic obstructive lung disease (COPD), mental disorder (mental retardation), and physical defect were excluded; as these conditions might limit physical activity level among adults.

Study duration

One year i.e. July 2020–July 2021

Sample size

Taking, estimated prevalence of PI, P = 49.7%[12] (taken owing to same methodology and age group of subjects) and allowable error, d = 6%, and using formula: $(n) = [(Z_{1-}\alpha_{/2})^2 P (1\text{-}p)]/d^2$, minimum required sample size was calculated as, $n = \{(1.96)^2 \times 49.7 \times 50.3\}/36 = 266.7$. After adding 10% non-response rate, n = 294. During field visits a total of 304 adults were recruited and analyzed.

Study tools

a) Pretested structured proforma: Social and demographic particulars (independent variables) taken into account included age, sex, religion, place of residence, type of family, educational status, marital status, occupation, and total family income. Social class was determined by per capita per month income using Modified B.G. Prasad Classification 2019.[17]
b) Global Physical Activity Questionnaire (GPAQ)[18] was administered by interviewer in local language to collect information about physical activities. It has 16 questions to assess physical activity performed in the three domains of work, during travel, and for recreational activities during a "typical week" (which means a week when one is engaged in his/her usual activities). Summing up the information of three domains provides the total physical activity level. It also includes a question on the total time in a typical week spent in sedentary behaviour, that is, sitting or reclining while awake with a very low energy expenditure.

For work domain, respondents were asked about work done as paid or unpaid job like household chores, manual work, harvesting food/crops, gardening, fishing, seeking employment, etc., For travel domain, respondents were asked if they walked or used bicycle for travelling to and from places (e.g. to work, for shopping, to market, to place of worship, etc.). For recreational activities domain, they were enquired about engaging in moderate-intensity sports (cricket, basketball, badminton, etc.), fitness or recreational (leisure) activities such as yoga, brisk walking, cycling, swimming, etc., or vigorous-intensity sports, fitness or recreational (leisure) activities that cause large increases in breathing or heart rate (like running or football). According to GPAQ, "vigorous-intensity activities" are activities that require hard physical effort and cause large increases in breathing or heart rate, and "moderate-intensity activities" are activities that require moderate physical effort and lead to small increases in breathing or heart rate. The participants were shown show cards and asked to only consider activities which were undertaken continuously for 10 min or more. The estimates of total and domain-specific physical activity were expressed as metabolic equivalent (MET)-minutes/week, that is, units of relative energy expenditure. One MET is defined as the energy cost of sitting quietly and was equivalent to a caloric consumption of 1 kcal/kg/hour.

MET values were applied to the time variables according to the intensity (four METs for moderate activities and also cycling and walking; and eight METs for vigorous) of the activity to calculate total physical activity in terms of MET-minutes per week.

For the calculation of a categorical indicator, the total time spent in physical activity during a typical week, the number of days, and the intensity of physical activity were taken into account. As an outcome variable, PI was defined as not meeting any of three criteria: 30 min of moderate-intensity physical activity on at least five days every week or 20 min of vigorous-intensity physical activity on at least three days every week, or an equivalent combination achieving 600 metabolic equivalent (MET)-min per week using GPAQ.

Ethical considerations

Ethical clearance was obtained from the Institutional Ethics Committee (approval no. 178/FM/IEC, dated 24-12-2019) prior to study. Written informed consent was taken from individuals. Interviews were conducted in confidential and non-judgmental manner. Appropriate health education and counseling was provided to participants and referral was done if needed.

Data management and analysis

Data were entered into MS excel, cleaned and imported to and analyzed using IBM SPSS Version 23.0. Descriptive statistics has been shown as percentages for categorical variables and median with interquartile range (IQR) for continuous variables, after checking for normality using Kolmogorov–Smirnov test. 95% confidence interval (CI) was calculated for proportion of PI using bootstrapping method. Chi-square test was applied for studying association between categorical variables. Univariate analysis was done and variables having significant association were taken into final regression model for multivariate logistic regression analysis by applying enter method. Crude odds ratio and AOR were reported. *P* value < 0.05 was considered statistically significant.

Results

Sociodemographic characteristics of study population are shown in Table 1. Majority were males (62.2%), belonged to the age group of 20–30 years (35.2%), were Muslims (57.9%), married (84.2%), and belonged to a nuclear family (57.9%). More than a quarter were illiterate (26.6%) and only 17.4% were graduates and above. Among the males, majority were involved in clerical job or were shop-owners (31.2%) followed by unskilled workers (22.2%) and 13.2% were unemployed. Among females, 91.3% (105 out of 115) were occupied in housework. Majority belonged to lower middle class (43.4%) followed by lower social class (21.1%).

The prevalence of PI in our study was 47.7% (95% CI: 42.0–52.6), as shown in Figure 1. It also shows PI in different domains. PI during work was high with 226 participants (74.3%, 95% CI: 69.6–78.8) having it. PI during travel domain was found in 240 adults (78.9%, 95% CI: 73.4–83.7) and it was highest in recreation domain with 269 adults (88.5%, 95% CI: 84.7–92.1) reporting it.

Median sitting time per day was found to be 190.5 ± 93.0 min per day. Figures 2 and 3 show median sitting time per day according to gender and area of residence, respectively. It was higher for females as compared to males [median 240.0 (IQR: 180.0–300.0) versus median 150.0 (IQR: 90.0–180.0)]. The difference was statistically significant on applying Mann–Whitney U test, U = 8778.500, $P < 0.001$. It was also found to be higher among urban area [median 180.0 (IQR: 150.0–240.0)] than in rural area [median 150.0 (IQR: 90.0–240.0)], difference being statistically significant on applying Mann–Whitney U test, U = 4800.000, $P < 0.001$.

As shown in Table 1, PI was significantly higher in urban area (55.3% vs 41.1%) than in rural area. It was double among females as compared to males (68.7% vs 34.9%), the difference being statistically significant. Statistically significant association was also found between PI and occupation of the study participants.

On univariate regression analysis [Table 1], gender, area of residence, occupation, and religion were found to be significant variables and entered into multivariate logistic regression model for analysis. As shown in Table 1, it was found that the odds of PI were almost ten times higher among females than males (AOR = 9.7, 95% CI: 1.6–58.5). Unskilled workers/ laborers and farmers (those involved in active occupational work) were found to have lesser odds of PI (AOR = 0.2, 95% CI: 0.1–0.5 and AOR = 0.2, 95% CI: 0.01–0.6, respectively) as compared to unemployed adults.

Discussion

This study reports the prevalence of PI in a small but growing city in Uttar Pradesh, the most populous state of India. The prevalence of PI was found to be high at 47.7%. Our finding is similar to those reported by Newtonraj A *et al*.[12] in urban Pondicherry (49.7%) but lower than that reported by Singh H *et al*.[10] in Punjab (56.81%) and Agrawal R *et al*.[13] in Agra (60.1%). It is also lower as compared to the findings in a nationwide survey in India by Anjana RM *et al*.[15] who reported more than half of adults (54.4%) were physically inactive. However, Sugathan TN *et al*.[14] have found a much lower prevalence in Kerala (22.3%).

Some authors from different parts of the world have also found similar prevalence of PI with 41% in Nigeria,[19] 43.7% in Malaysia,[20] and 41.1% in Brazil.[21] Whereas a higher prevalence has been reported in China (63.1%)[8] and Pakistan (60.1%).[22] However, lower prevalence rates have been reported by Medina C *et al*.[23] in their study on Mexican adults (16.5%) and Katulanda *P et al*.[24] in Sri Lanka (11.0%).

The prevalence of PI in our study was found to be high during work and during travel but was highest during recreation. With increasingly sitting jobs specially in urban areas, and increased motorized transport, PI during work and travel seems inevitable but recreation is an easily modifiable domain for decreasing PI. On the contrary it was found to contribute the most to PI among adults and may reflect the trend of increased screen-time spent on mobile or television. This finding undermines the need for taking this missed opportunity to decrease PI through active recreation and providing means and motivation for the same. Our finding is similar to Ahamed R *et al*.,[25] who have also reported 80.6% leisure time PI in their study conducted in Aligarh. But they have reported a much lower prevalence of work related PI (32%) in their study. This could reflect the change in work-related life style of adult population of Aligarh over a span of few years.

Guthold R *et al*.[26] reported through the analysis of a 51-country survey that PI was generally higher in urban area than in rural area. Researchers in India have also reported similarly.[15,27] Urbanization often goes hand-in-hand with crowding and less open spaces available for walking and other physical activities, increased motorized transport, and more sitting jobs for adults, thus, providing a built environment for PI. In our study also, PI was higher in urban area than in rural but area of residence was not found to be a significant independent risk factor on logistic regression analysis.

Table 1: Sociodemographic characteristics and their association (on applying logistic regression analysis) with physical inactivity among adults aged 20-60 years in Aligarh, Uttar Pradesh (*n*=304)

Background characteristic	Total *n* (%)	Physical inactivity		Crude odds ratio		Adjusted odds ratio	
		Absent *n* (%)	Present *n* (%)	OR (95% CI)	*P*	OR (95%CI)	*P*
Area of residence							
Urban	141 (46.4)	63 (44.7)	78 (55.3)	1.8 (1.1–2.8)	0.014	0.8 (0.5–1.6)	0.594
Rural	163 (53.6)	96 (58.9)	67 (41.1)	Ref	-	Ref	-
Gender							
Male	189 (62.2)	123 (65.1)	66 (34.9)	Ref	-	Ref	-
Female	115 (37.8)	36 (31.3)	79 (68.7)	4.1 (2.5–6.7)	0.000	9.7 (1.6–58.5)	0.013
Age Group (Years)							
20–30	107 (35.2)	51 (47.7)	56 (52.3)	Ref	-	-	-
31–40	105 (34.5)	57 (54.3)	48 (45.7)	0.8 (0.45–1.32)	0.335	-	-
41–50	60 (19.7)	32 (53.3)	28 (46.7)	0.8 (0.42–1.50)	0.482	-	-
51–60	32 (10.5)	19 (59.4)	13 (40.6)	0.6 (0.28–1.38)	0.247	-	-
Religion							
Hindu	128 (42.1)	81 (63.3)	47 (36.7)	Ref	-	Ref	-
Muslim	176 (57.9)	78 (44.3)	98 (55.7)	2.2 (1.36–3.45)	0.001	1.6 (0.9–3.0)	0.129
Marital status							
Married	256 (84.2)	134 (52.3)	122 (47.7)	Ref	-	-	-
Separated/widowed/divorced*	10 (3.3)	4 (57.1)	3 (42.9)	1.1 (0.57–2.23)	0.737	-	-
Never married	38 (12.5)	21 (55.3)	17 (44.7)	1.9 (0.45–7.65)	0.394	-	-
Type of family							
Nuclear	176 (57.9)	91 (51.7)	85 (48.3)	Ref	-	-	-
Joint	111 (36.5)	58 (52.3)	53 (47.7)	1.0 (0.61–1.57)	0.978	-	-
Three generation	17 (5.6)	10 (58.8)	7 (41.2)	0.8 (0.27–2.05)	0.749	-	-
Education							
Illiterate	81 (26.6)	36 (44.4)	45 (55.6)	1.5 (0.8–3.0)	0.246	-	-
Primary school	31 (10.2)	13 (41.9)	18 (58.1)	1.7 (0.7–4.1)	0.260	-	-
Middle school	51 (16.8)	33 (64.7)	18 (35.3)	0.7 (0.3–1.5)	0.300	-	-
High school	59 (19.4)	33 (55.9)	26 (44.1)	1.0 (0.5–2.0)	0.897	-	-
Intermediate	29 (9.5)	15 (51.7)	14 (48.3)	1.1 (0.5–2.8)	0.795	-	-
Graduate and above	53 (17.4)	29 (54.7)	24 (45.3)	Ref	-	-	-
Occupation							
Unemployed	25 (8.2)	12 (42.9)	13 (52.0)	Ref	-	Ref	-
Housework	105 (34.5)	34 (31.8)	71 (67.6)	1.9 (0.8–4.7)	0.146	0.2 (0.02–1.2)	0.071
Unskilled/Semi-skilled worker	73 (24.0)	58 (79.5)	15 (20.5)	0.2 (0.1–0.6)	0.004	0.2 (0.1–0.5)	0.001
Skilled worker	17 (5.6)	8 (47.1)	9 (52.9)	1.0 (0.3–3.6)	0.952	0.8 (0.2–2.9)	0.725
Clerical/shop owner	61 (20.1)	28 (45.9)	33 (54.1)	1.1 (0.4–2.8)	0.859	1.0 (0.4–2.7)	0.946
Semiprofessional/professional	7 (2.3)	4 (57.1)	3 (42.9)	0.7 (0.1–3.8)	0.670	0.2 (0.02–1.6)	0.125
Farmer	16 (5.3)	15 (93.8)	1 (6.3)	0.1 (0.01–0.5)	0.012	0.1 (0.01–0.6)	0.014
Social Class							
Upper class**/Upper middle class (I/II)	49 (16.2)	22 (44.9)	27 (55.1)	1.7 (0.8–3.6)	0.174	-	-
Middle class (III)	59 (19.4)	39 (66.1)	20 (33.9)	0.7 (0.3–1.5)	0.345	-	-
Lower middle class (IV)	132 (43.4)	61 (46.2)	71 (53.8)	1.6 (0.9–2.9)	0.129	-	-
Lower class (V)	64 (21.1)	37 (57.8)	27 (42.2)	Ref	-	-	-

*There were one widowed and two divorced respondents and were included with "separated" group for application of statistical analysis. **Only nine respondents (3%) belonged to upper class and were taken together with upper middle class for application of statistical analysis

In our study, PI was found to be almost double among females compared to males. Agrawal R *et al*.[13] have also reported a higher prevalence of PI among females (69.8%) than males (52.1%). Naik BN *et al*.[28] in urban Puducherry found that about 79% of the females against 70% of the males were found to be physically inactive. However, Sugathan TN *et al*.[14] in Kerala have found almost similar prevalence rates in males (22.9%) and females (21.9%). Authors in many parts of the world have also found PI to be higher among females than males.[20,29-31] Murtagh EM *et al*.[32] reported that females in Ireland were as much as twice more inactive than their male counterpart (OR 2.20 (95% CI 2.06– 2.36)). We have found odds of PI increased almost ten times among females. This finding may reflect lesser inclination or lesser opportunities to resort to physical activity among females than males. This may be specially true for females in India where they are seen as the

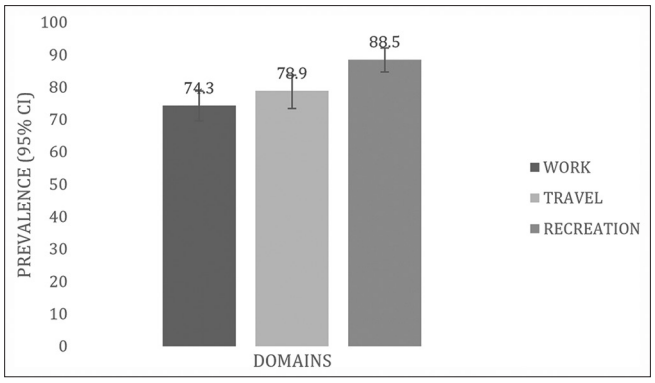

Figure 1: Prevalence of physical inactivity with 95% confidence interval (CI) in different domains among adults aged 20-60 years

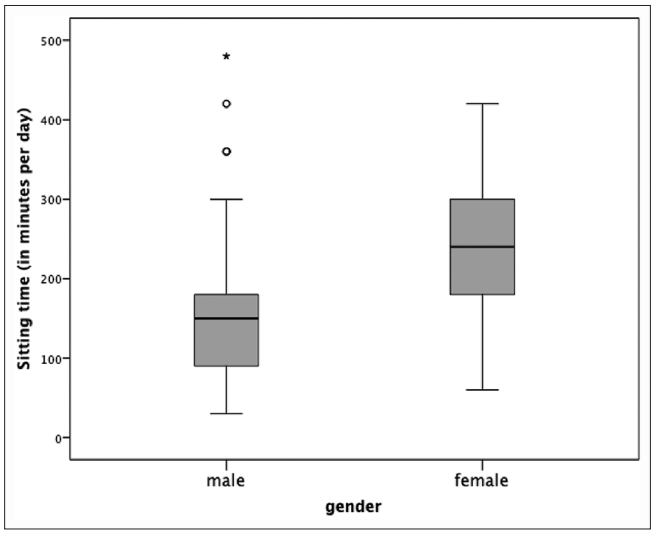

Figure 2: Sedentary behavior (sitting time per day) among adults aged 20-60 years according to gender (n=304).

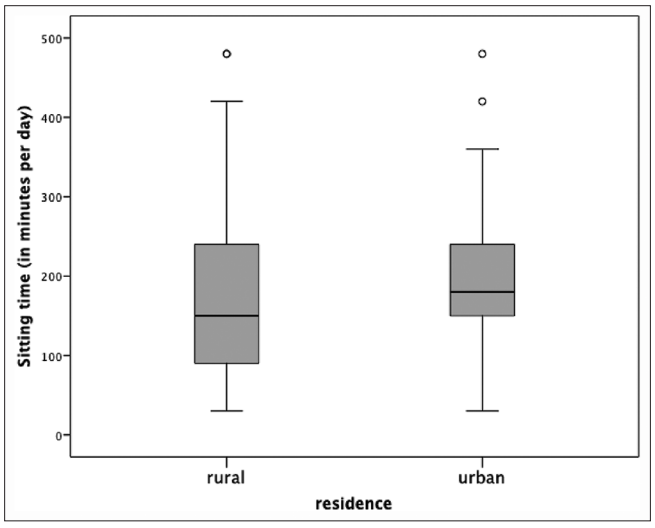

Figure 3: Sedentary behavior (sitting time per day) among adults aged 20-60 years according to area of residence (n=304).

caretaker of whole family and mostly work inside the house, with little opportunity for outdoor physical activities. It is a paradox that females are mostly involved in household chores in our settings but still have high proportions of PI. It might also reflect the fact that physical exertion done for less than 10 min continuously does not result in measured physical activity.

Many authors have reported increased PI with increasing age[12,25]) but Naik BN *et al*.[28] in a study in urban Puducherry found that PI decreased with increase in age: 30–44 years age (77.2%), 45–59 years age (75.3%), and 60 years and above (72.2%). We have also found an inverse relationship between age and PI, with 52.3% of 20–30 year olds having PI as compared to 40.6% among 50–60 years old adults. But this finding was not statistically significant. Type of family, marital status, and education status were not found to have significant association with PI in our study.

PI was found to be significantly higher in upper class and upper middle class (55.1%) than in lower class (42.2%), but social class was not found to be a significant determinant of PI on logistic regression analysis. Some researchers have also reported higher PI among high socioeconomic status group[23] but others have found an inverse relation between PI and social class.[8,21,33]

PI was found to have significant association with occupation among adults. It was highest among females who were involved in household work, followed by adults working in clerical jobs or shop-owner and skilled workers. It was lowest among farmers and unskilled or semi-skilled workers whose work often involves manual labor. Our finding is similar to that of Devamani CS *et al*.[27] who in their study in Tamil Nadu have reported that prevalence of insufficient PA was significantly higher in those who were unemployed (OR: 2.97, 95% CI: 2.59–3.39) than employed.

High prevalence of PI among females doing housework also implies that although household chores may consume much time and effort but it does not result in effective physical activity. Thus, there is a need to advocate among females the importance of accumulation of at least 10 min continuous moderate physical activity amounting to 30 min in total per day for at least five days in a week, to enable them reach the recommended physical activity levels for good health. It can go a long way in reducing prevalence of PI specially among females confined to home for cultural and personal reasons.

Limitations of study

This study provides important insights into PI and its determinants among adults but has some limitations. Study population has been taken from field practice areas of outreach centers and thus may not represent general population, and findings cannot be generalized. Sample size has been calculated using absolute error and not relative error. 95% CI for odds of PI among females is high suggesting requirement of a larger sample size for applying regression analysis.

Conclusion

The prevalence of PI among adults was found to be high, especially among those residing in urban areas and among females. Among the three domains of work, during travel

and recreation, PI was found to be highest during recreation indicating sedentary leisure persuits among adults and lost opportunity for increased physical activity during play and outdoor recreation activities. Among various sociodemographic variables, occupation was found to be the most important determinant of PI. Those who are unemployed or involved in sedentary and sitting occupation like clerical work or shopkeepers are mostly at risk of increased PI. There is an urgent need to identify those at risk of sedentary lifestyle and employ targeted interventions for reducing PI, which is one of the easily modifiable risk factors for various non-communicable diseases. These targeted interventions can include health education about recommended physical activity level and how it can be achieved in a sustainable way, tailored according to prevailing built environment of the population; and also advocacy for decreasing sitting time and using it instead for recreational activities like brisk walking, yoga which are doable in and around or at home. Further studies to explore barriers to physical activity are needed to address this problem.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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