

## Prevalence, Patterns and Predictors of Physical Inactivity in a Rural area of Goa: A Community Based Cross Sectional Study

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### Abstract:

**Introduction:** Physical inactivity significantly raises the risk of death from noncommunicable diseases and about one-third of adults fall short of recommended activity levels. In India, inactivity has surged from 22.3% in 2000 to 49.4% in 2022, prompting urgent action. This alarming trend underscores the urgent need for research to better understand and address the growing burden of inactivity and its health consequences. **Objective:** To estimate the prevalence of physical inactivity among adults residing in rural area of Goa and to study the factors associated with it. **Methods:** A Community based cross sectional study was conducted amongst individuals  $\geq 18$  years residing in field practice area of Rural health & training centre, Mandur, Goa. A semi structured questionnaire with Global Physical Activity Questionnaire (GPAQ) was used to collect data. At a proportion of 22%, 95% confidence interval and 5% absolute error the sample size was 300. Systematic random sampling was employed. **Results:** Out of 300 study participants, 158 (52.7%) were females and 142 (47.3%) were males. Prevalence of physical inactivity in the study population was 113 (37.7%). Age ( $p=0.021$ ), Sex ( $p=0.012$ ), Education ( $p=0.014$ ), Occupation ( $p=0.024$ ), Smoking ( $p=0.001$ ), Alcohol ( $p=0.001$ ) and Comorbidities ( $p=0.001$ ) were found to be significantly associated with physical inactivity. **Conclusion:** This study highlights that many adults in rural Goa lead inactive lifestyles, which can impact their health in the long run. To tackle this issue, policymakers should focus on creating more opportunities for physical activity and strengthen community health programs to promote overall well-being.

**Keywords:** Lifestyle, Physical inactivity, Rural Population

### Introduction:

The World Health Organization (WHO) defines physical activity as any body movement requiring energy, including leisure, work, transport, and household tasks. Regular activity improves health, while inactivity raises the risk of noncommunicable diseases (NCDs) and mortality by 20-30%. Globally, 31% of adults (1.8 billion people) fail to meet the recommended 150 minutes of weekly moderate-intensity activity - a 5%

increase since 2010. If trends persist, 35% may be inactive by 2030. Additionally, 80% of adolescents lack sufficient activity, with women being less active than men. WHO aims to reduce inactivity by 10% by 2025 and 15% by 2030 to mitigate rising healthcare costs, projected at \$300 billion by 2030.<sup>[1]</sup>

Physical inactivity is a major risk factor for noncommunicable diseases (NCDs) in India. Despite awareness efforts, inactivity among adults has

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significantly increased from 22.4% in 2000 to 45.4% in recent years, with projections suggesting it could reach 55% by 2030.<sup>[2]</sup> A significant gender gap exists, with 52.6% of women and 38.4% of men being physically inactive.

Several factors influence physical activity levels, including gender, socioeconomic status, financial limitations, and physical discomfort. To improve overall health and well-being, the World Health Organization (WHO) recommends at least 150 minutes of moderate-intensity physical activity per week. Recognizing the need for action, the Indian government launched the “Fit India Movement” in 2019 to encourage a more active lifestyle nationwide. However, despite these initiatives, inactivity continues to rise, highlighting the urgent need for more targeted and sustainable interventions to promote physical activity across all population groups.<sup>[2,3]</sup>

Despite its prevalence, data on physical inactivity amongst adults residing in Goa remains limited prompting the need for this study.

### Methods:

This community-based cross-sectional study was carried out over three months, from December 2024 to February 2025, in the field practice area of the Rural Health and Training Centre (RHTC) in Mandur, Goa. The study covered the villages of Mandur, Azossim, and Neura. Adults aged 18 years and above who were permanent residents and willingly provided informed consent were included in the study. However, individuals who were pregnant, acutely ill, physically disabled, or unavailable at home for three consecutive visits were excluded.

### Sample Size and Sampling Strategy

A sample size of 300 was determined using the formula  $n = Z(1-\alpha) pq/d^2$ , based on an estimated 22% prevalence of physical inactivity<sup>[4]</sup> with a 5% margin of error. The study area comprised 1,588 households with a total population of 5,812. Participants were selected using systematic random sampling, with a sampling interval ( $K$ ) of 5, obtained by dividing the total number of households (1,588) by the target sample size (300). The first household was chosen randomly within the initial interval, and every fifth household thereafter was

included. In cases where multiple eligible individuals were present in a household, one participant was selected at random through a simple lottery method.

### Ethical Considerations

The study received ethical approval from the Goa Medical College Ethics Committee (GMC IEC/2024/347). Before data collection, written informed consent was obtained from all participants, ensuring voluntary participation and maintaining confidentiality.

### Data Collection

Sociodemographic details, including age, religion, education level, and occupation, were collected through face-to-face interviews using a structured and pre-tested questionnaire. Educational status was classified according to the Modified Kuppaswamy Socioeconomic Scale (2024)<sup>[5]</sup>, while socioeconomic status was determined using the Updated BG Prasads Classification (2024).<sup>[5]</sup> Physical inactivity was assessed using the Global Physical Activity Questionnaire (GPAQ).

Global Physical Activity Questionnaire (GPAQ): The GPAQ, developed by the World Health Organization (WHO) for monitoring physical activity patterns, consists of 16 questions assessing activity levels across three domains - work, transportation, and leisure- as well as sedentary behaviour. Data were analysed by calculating the total minutes per week spent on moderate and vigorous physical activities within three domains. (1) Work-related activity: Includes tasks such as paid or unpaid labor, studying, household chores, farming, fishing, hunting, and job-seeking, (2) Transport-related activity: Covers walking, cycling, and other active modes of commuting, (3) Leisure-time activity: Encompasses sports, exercise, and other recreational activities. To quantify activity intensity, Metabolic Equivalents (METs) were used. Moderate-intensity activities were assigned a value of 4 METs, while vigorous-intensity activities were assigned 8 METs. The total MET-minutes per week were computed by multiplying the MET value by the total minutes spent in each activity category. These values reflect that moderate-intensity activities burn four times the energy of a person at rest, whereas vigorous-intensity activities burn eight times more.<sup>[6]</sup>

**Operational Definition**

Ever-smokers: Ever smokers include both current and former smokers

Current smoker: An adult who has smoked 100 cigarettes in his or her lifetime and who currently smokes cigarettes.

Former smoker: An adult who has smoked at least 100 cigarettes in his or her lifetime but who had quit smoking at the time of interview.

Never smokers: An adult who has never smoked, or who has smoked less than 100 cigarettes in his or her lifetime.<sup>[7]</sup>

Ever users of alcohol: Ever users of alcohol include both current users and former users.

Current alcohol users: Current alcohol users are defined as person who have consumed one or more standard drinks of alcohol at least once during the past 1 year preceding the time of the interview.

Former alcohol users: Former alcohol users are defined as person who have consumed one or more standard drink of alcohol at least once during their lifetime but had not done so for 1 year preceding the survey.

Never users of alcohol: Never users of alcohol are defined as person who have never consumed alcohol in his lifetime.<sup>[8]</sup>

Comorbidities: Any documented hypertension, diabetes, cardiovascular, neurological, chronic obstructive pulmonary disease, musculo-skeletal disorders, urinary incontinence or urinary retention or recurrent gastro-intestinal ailments present alone or in combination were considered as comorbidities.

Physically active: As per WHO recommendation to consider a person as physically active, an adults should do at least 75 minutes of vigorous or 150 minutes of moderate physical activity or an equivalent combination of moderate and vigorous physical activity achieving at least 600 MET-minutes throughout a week.

Physically inactive: As per WHO recommendation to consider a person as physically inactive, an adult should do < 75 minutes of vigorous or < 150 minutes of moderate physical activity or an equivalent combination of moderate and vigorous physical activity of < 600 MET-minutes throughout a week.<sup>[9]</sup>

**Statistical analysis**

Data collected was entered in MS excel and data analysis was done using IBM Corp. (2013) IBM SPSS Statistics for Windows, Version 22.0. IBM Corp., Armonk, New York, USA. Chi square test was applied to analyse the data and p value <0.05 was taken as significant.

**Results:**

As depicted in Table 1, the sociodemographic profile of the 300 study participants indicates that the majority of the study participants were 31-45 years

**Table 1 : Sociodemographic profile of study participants (n = 300)**

<b>Variables</b>	<b>Frequency (%)</b>
Age group (in years)	
18-30	92 (30.7)
31-45	112 (37.3)
46-60	68 (22.7)
>60	28 (9.3)
Gender	
Female	158 (52.7)
Male	142 (47.3)
Religion	
Hindu	209 (69.7)
Christian	48 (16)
Muslim	43 (14.3)
Education	
Illiterate	33 (11)
Primary	47 (15.7)
Middle	52 (17.3)
Secondary	86 (28.7)
Higher secondary	57 (19)
Graduate and above	25 (8.3)
Employment status	
Unemployed	98 (32.7)
Employed	202 (67.3)
Marital status	
Unmarried/single/widow/ widower/separated	103 (34.3)
Married	197 (65.7)
Socioeconomic status	
Class 1	32 (10.7)
Class 2	124 (41.3)
Class 3	95 (31.7)
Class 4	39 (13)
Class 5	10 (3.3)

(37.3%), with smaller groups in the 46-60 years (22.7%) and >60 years (9.3%) age groups. The mean age of the study participants was 38.3 ± 9.62 years. Majority of study participants [158 (52.7%)] were females. Educational attainment varied, with majority of study participants 86 (28.7%) completing secondary education, while 33 (11%) were illiterate. Regarding employment status, most participants were employed 202 (67.3%). Majority of study participants 197 (65.7%) were married while 103 (34.3%) were unmarried. Socioeconomic status distribution according to modified BG Prasad scale 2024, indicated that nearly half 124. (41.3%) of the participants belonged to Class 2 and 10 (3.3%) belonged to Class 5 socioeconomic status.

As shown in Table 2, statistically significant association was found between Physical inactivity and age, sex, education, occupation, comorbidities, smoking

and alcohol consumption. Adults ≥ 45 years were at 1.79 times higher risk of physical inactivity, Females were at 1.83 times higher risk of physical inactivity, literates were at 3 times higher risk of physical inactivity, Alcohol consumption was associated with a 4.28 times higher risk of physical inactivity and presence of comorbidities was associated with 17.9 times higher risk of physical inactivity.

Binary logistic regression for Physical inactivity (Table 3) identified age ≥45 years (OR = 2.15), Female gender (OR = 2.9501), being literate (OR = 2.11), alcohol use (OR = 2.45), and presence of comorbidities (OR = 20.09) as significant independent risk factors for physical inactivity. The regression model was statistically significant ( $\chi^2 = 142, P < 0.001$ ), explaining 51.4% of the variance (Nagelkerke  $R^2 = 0.514$ ), with a prediction accuracy of 81.7%.

**Table 2: Association of selected factors with physical inactivity amongst adults residing in rural Goa (n=300)**

Variable	Physical Activity		$\chi^2$	OR(95% CI)	p value
	Inactive, n (%)	Active, n (%)			
Age (in years)					
≥ 45	44 (47.3)	49 (52.7)	5.34	1.79 (1.090-2.958)	0.021
<45	69 (33.3)	138 (66.7)			
Gender					
Female	70 (44.3)	88 (55.7)	6.26	1.83 (1.137-2.948)	0.012
Male	43 (30.3)	99 (69.7)			
Education					
Literate	107 (40.1)	160 (59.9)	6.00	3.00 (1.201-7.535)	0.014
Illiterate	6 (18.2)	27 (81.8)			
Occupation					
Unemployed	28 (28.6)	70 (71.4)	5.13	0.55 (0.327-0.925)	0.024
Employed	85 (42.1)	117 (57.9)			
Marital status					
Unmarried	36 (35)	67 (65)	0.493	0.837 (0.510-1.375)	0.483
Married	77 (39.1)	120 (60.9)			
Alcohol status					
Alcoholic	59 (60.8)	38 (39.2)	32.7	4.28 (2.565-7.155)	0.001
Non-alcoholic	54 (26.6)	149 (73.4)			
Smoking status					
Smoker	17 (19.8)	69 (80.2)	16.5	0.302 (0.167-0.549)	0.001
Non smoker	96 (44.9)	118 (55.1)			
Comorbidities					
Yes	82 (77.4)	24 (22.6)	110	17.9 (9.905-32.581)	0.001
No	31 (16)	163 (84)			

**Table 3: Binary logistic regression model on the association of selected risk factors and Physical inactivity among adults residing in Rural Goa (n = 300)**

Variables in the model	AOR	95% CI for AOR		p value
		Lower	Upper	
≥ 45 years	2.1595	1.104	4.222	0.024
Female	2.9501	1.498	5.808	0.002
Literate	2.1176	0.645	6.950	0.216
Alcohol use	2.4513	1.279	4.696	0.007
Presence of comorbidities	20.0921	10.175	39.672	0.001
Constant	0.028			0.000

**Discussion:**

In this study involving 300 participants, majority of the study participants 204 (68%) were aged between 18 and 44 years. This trend aligns with findings from Ramamoorthy et al.<sup>[10]</sup>, where 69.6% of the study participants were in the age group of 18-44 years. Similarly, 65.9% of the study participants were in the age group of 18-44 years in a study done by Newtonraj et al.<sup>[4]</sup> in rural Kancheepuram. This suggests a recurring pattern in age distribution across similar studies. Similarly, Newtonraj et al.<sup>[4]</sup> observed a predominance of female participants in their study conducted in rural Kancheepuram, a trend that mirrors the current findings. Additionally, 69.7% of study participants were identified as Hindu, a proportion consistent with the results reported by Aslesh et al.<sup>[11]</sup> in a study conducted in rural Kerala where 70.8% of the study participants were Hindu by religion indicating that the religious composition in present study reflects broader demographic trends observed in similar research. Literacy levels were high with majority of study participants 267 (89%) being literate, a pattern observed in study by Sharma et al.<sup>[9]</sup> done in rural Chandigarh where 80.4% of the study participants were literate. Moreover, marital status trends were similar, with the majority of participants being married, as reported in study done by Newtonraj et al.<sup>[4]</sup> in rural Kancheepuram. A study done by Ramamoorthy et al.<sup>[10]</sup> using findings from National Noncommunicable Disease Monitoring Survey reported that 79.7% of the study participants were married which was higher than the current finding and this difference may be due to the difference in sample size and the study by Ramamoorthy et al being a nationwide survey.

The prevalence of physical inactivity in current study was 37.7% and it closely aligns with 36.7% of physical inactivity reported in a national cross-sectional survey conducted in India.<sup>[12]</sup> A study by Devamani et al.<sup>[13]</sup> done in Vellore reported that 40.6% of the study participants were physically inactive. However, the prevalence of physical inactivity in present study was lower than that reported by Mohanty et al.<sup>[14]</sup> in Odisha where 71.9% of the study participants were physically inactive. A study by Newtonraj et al.<sup>[15]</sup> done in Urban Puducherry reported that 49.7% of the study participants were physically inactive. This difference is likely because these studies were conducted in urban settings, where physical inactivity tends to be higher.

In this study, there was significant associations between physical inactivity and factors such as sex, education, comorbidities, older age, and alcohol consumption. A study by Sharma et al.<sup>[9]</sup> done in rural Chandigarh reported that females were 1.9 times at higher risk of physical inactivity and literates were 1.8 times at higher risk of physical inactivity which is almost similar to the current findings. A study by Devamani et al.<sup>[13]</sup> in rural Vellore reported that women, literates and alcohol users were at higher risk of physical inactivity which aligns with the findings of the current study. Mohanty et al.<sup>[14]</sup> in his study conducted in Bhubaneshwar, Odisha reported that participants with chronic disease were at higher risk of physical inactivity similar to the current study.

**Conclusion and Recommendation:**

In this study, prevalence of physical inactivity among adults in rural Goa was found to be 37.7% which poses significant long-term health risks, including

obesity, diabetes, and cardiovascular diseases. Age > 45 years, females, literates, alcohol users and presence of comorbidities were found to be significantly associated with physical inactivity. Based on the study findings, it is recommended to strengthen community-based health education programs that encourage regular physical activity, especially among high-risk groups such as older adults, females and those with comorbidities. Health workers should be trained to provide guidance and motivation, and group activities or awareness sessions can be organized to focus on physical activity within rural communities. Policymakers have to take an all-encompassing approach that supports active lives by means of better infrastructure, community involvement, and focused health campaigns.

#### Limitations:

This study has several limitations. Its cross-sectional design limits causal inference, providing only a snapshot of physical inactivity. Reliance on self-reported data via the Global Physical Activity Questionnaire (GPAQ) may introduce recall bias. Findings may not be generalizable beyond rural Goa due to regional differences. Factors such as diet, mental health, and specific occupational activity were not fully assessed. Future research should use longitudinal designs and broader sampling to address these issues.

#### Declaration:

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Conflict of Interest: Nil

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