Section: Community Medicine

Original Research Article

PREVALENCE OF BEHAVIOURAL AND METABOLIC RISK FACTORS FOR NONCOMMUNICABLE DISEASES AMONG ADULTS IN NORTH KERALA- A RECORD-BASED STUDY

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ABSTRACT

Background: Family Adoption Programme records can inform prevention priorities within the communities served by medical colleges. This study estimated the prevalence of individual behavioural and metabolic risk factors for noncommunicable diseases among enrolled adults in Kadanapally Panchayat, Kerala.

Materials and Methods: This record-based cross-sectional study included 146 adults with complete Family Adoption Programme records available for January–September 2025. Eight selected behavioural and metabolic risk factors were assessed. Data were analysed using IBM SPSS Statistics, version 24. Prevalence estimates were calculated with 95% confidence intervals (CIs) using Wilson scores.

Results: Participants were aged 30–82 years, with a mean age of 55 years (standard deviation 11); 94 (64.4%) were women. Inadequate physical activity was recorded in 93.2% (95% CI 87.9–96.2), inadequate fruit and/or vegetable consumption in 77.4% (95% CI 70.0–83.4), current alcohol use in 17.1% (95% CI 11.9–24.1), and current tobacco use in 5.5% (95% CI 2.8–10.4). Central obesity was recorded in 72.6% (95% CI 64.9–79.2), excess weight in 55.5% (95% CI 47.4–63.3), raised blood pressure in 50.0% (95% CI 42.0–58.0), and raised blood glucose in 48.6% (95% CI 40.7–56.7).

Conclusion: The highest recorded prevalence was for inadequate physical activity, inadequate fruit and/or vegetable consumption, and adiposity. These findings support coordinated lifestyle assessment and cardiometabolic follow-up within the programme. Estimates describe the enrolled sample and should not be interpreted as population estimates for Kerala.

Keywords: Noncommunicable diseases; Risk factors; Prevalence; Family Adoption Programme; Kerala; Cross-sectional studies.

INTRODUCTION

Noncommunicable diseases account for a substantial burden of preventable illness and premature mortality. Tobacco use, alcohol consumption, unhealthy diet and insufficient physical activity are important behavioural risk factors, while adiposity, raised blood pressure and raised blood glucose identify related metabolic risk factors. Their assessment is central to prevention because it can guide counselling, clinical evaluation and continuity of care before complications develop.[1]

Indian population surveys demonstrate the relevance of assessing behavioural and metabolic risk factors together. The National Noncommunicable Disease Monitoring Survey documented substantial prevalence of inadequate diet and physical inactivity alongside raised blood pressure, excess weight and raised glucose.[2] The ICMR–INDIAB study further established a considerable national burden of

metabolic abnormalities, with geographical variation that limits the usefulness of a single national estimate for local planning.[3]

Kerala has an extensive evidence base on noncommunicable disease risk.[4] A statewide survey described behavioural risk factors, abdominal obesity and raised blood pressure and raised blood glucose across the adult population.[5] A longitudinal study from rural Kerala also documented increases in adiposity and physical inactivity over a follow up of approximtely seven years.[6] These studies provide a regional context, but the needs of families enrolled in a particular community programme may differ from those of the broader population.

The Family Adoption Programme links undergraduate medical education with continuing contact with families and their health needs. Routinely maintained family records offer an opportunity to describe the risk profile of enrolled adults and identify priorities for programme activity. Such estimates complement population surveys, although their interpretation must account for programme enrolment, record completeness and the characteristics of the families represented.

This study aimed to estimate the prevalence of individual behavioural and metabolic risk factors for noncommunicable diseases among adults enrolled in the Family Adoption Programme in Kadanapally Panchayat, Kerala.

MATERIALS AND METHODS

Study design and setting: This record-based cross-sectional study assessed individual NCD risk factors among adults enrolled in the Family Adoption Programme in Kadanapally Panchayat, Kerala. The records were maintained by the Department of Community Medicine, Government Medical College, Kannur. The study records covered January–September 2025.

All programme records of adults with complete information on the study variables available during January–September 2025 were included. The analytical sample included 146 adults. No additional participant recruitment or new measurements were undertaken. The individual adult was the unit of analysis; the sample was not selected to represent all residents of the panchayat or the state.

Variables and outcomes: Sociodemographic variables were age, sex, religion, marital status, educational attainment, occupation, socioeconomic class and health insurance status. Socioeconomic class was assessed using the B. G. Prasad scale 2025. Age was summarised using the mean, standard deviation and range.

Four behavioural indicators were assessed: current tobacco use, current alcohol use, inadequate consumption of fruits and/or vegetables, and inadequate physical activity. Four metabolic risk factors were assessed: excess weight, central obesity, raised blood pressure and raised blood glucose. Excess weight was defined as a body mass index ≥25 kg/m². Behavioural and metabolic risk-factor status was determined from the information documented in the programme records.

Raised blood pressure and raised blood glucose were considered as recorded risk factors and were not interpreted as newly confirmed diagnoses of hypertension or diabetes. Current alcohol use did not indicate harmful consumption. Cholesterol was not included among the assessed risk factors. These eight risk factors described selected behavioural and metabolic risk domains rather than an exhaustive assessment of noncommunicable disease risk.

Statistical analysis: Categorical variables were summarised as frequencies and percentages, and age was summarized using mean, standard deviation and range. For each risk factor, prevalence was calculated as the proportion of participants with the recorded risk factor. Wilson score method was used to estimate 95% confidence intervals.7 Data were analyzed using IBM SPSS: version 24, licensed to Academy of Medical Sciences, Pariyaram)

The reporting approach was informed by the STROBE and RECORD statements for observational studies using routinely collected health data.8,9

Ethical consideration: Ethical approval was obtained from the institutional ethics committee.

RESULTS

Characteristics of the study sample: The analysis included 146 adults aged 30–82 years, with a mean age of 55 years (standard deviation 11). Participants aged 45–59 years constituted the largest age group (80; 54.8%), and women accounted for 94 (64.4%) records. Most participants were married (138; 94.5%) and Christian (143; 97.9%). Half of the participants had completed high school, and homemakers formed the largest occupational category (47; 32.2%). Lower-middle socioeconomic class was the most frequent category (38; 26.0%). Health insurance was recorded for 71 participants (48.6%). The sociodemographic distribution is presented in [Table 1].

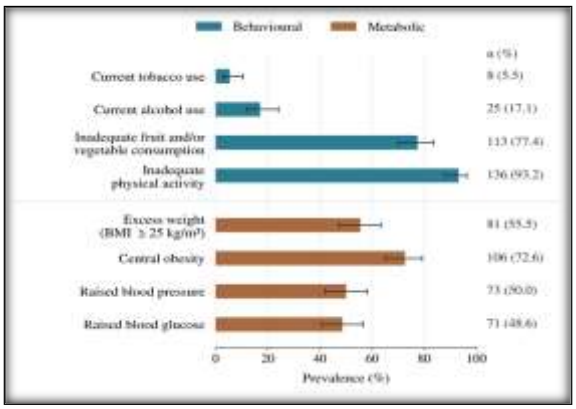

Figure 1: Prevalence profile of individual behavioural and metabolic noncommunicable disease risk factors (N = 146)

Behavioural risk factors: Inadequate physical activity was the most frequently recorded behavioural risk factor, present in 136 participants (93.2%; 95% CI 87.9–96.2). Inadequate consumption of fruits and/or vegetables was recorded in 113 participants (77.4%; 95% CI 70.0–83.4). Current alcohol use was recorded in 25 participants (17.1%; 95% CI 11.9–24.1), whereas current tobacco use was recorded in 8 participanta (5.5%; 95% CI 2.8–10.4). Prevalence estimates for the eight behavioural and metabolic risk factors are presented in [Table 2].

Metabolic risk factors: Central obesity was recorded in 106 participants (72.6%; 95% CI 64.9–79.2), and excess weight in 81 participants (55.5%; 95% CI 47.4–63.3). Raised blood pressure was recorded in 73 participants (50.0%; 95% CI 42.0–58.0), and raised blood glucose in 71 participants (48.6%; 95% CI 40.7–56.7). The prevalence estimates is shown in [Figure 1].

Table 1: Sociodemographic characteristics of adults enrolled in the Family Adoption Programme (N = 146)

Characteristic	Category	n (%)
Age, years	30–44	23 (15.8)
	45–59	80 (54.8)
	≥60	43 (29.5)
Sex	Male	52 (35.6)
	Female	94 (64.4)
Religion	Hindu	3 (2.1)
	Christian	143 (97.9)
Marital status	Unmarried	3 (2.1)
	Married	138 (94.5)
	Separated	2 (1.4)
	Divorced	1 (0.7)
	Widowed	2 (1.4)
Education	Primary	16 (11.0)
	Middle school	24 (16.4)
	High school	73 (50.0)
	Higher secondary	26 (17.8)
	Graduate	4 (2.7)
	Postgraduate	1 (0.7)
	Professional	2 (1.4)
Occupation	Clerical	5 (3.4)
	Skilled	8 (5.5)
	Semi-skilled	39 (26.7)
	Manual labourer	36 (24.7)
	Homemaker	47 (32.2)
	Retired/not working	11 (7.5)
Socioeconomic class	Upper	10 (6.8)
	Upper middle	34 (23.3)
	Middle	36 (24.7)
	Lower middle	38 (26.0)
	Lower	28 (19.2)
Health insurance	No	75 (51.4)
	Yes	71 (48.6)

Values are n (%). Percentages may not total 100.0 because of rounding. Socioeconomic class reflects the recorded B. G. Prasad classification.

Table 2: Prevalence of individual behavioural and metabolic NCD risk factors (N = 146)

Risk factor	n	Prevalence, %	95% CI, %
Behavioural factors			
Current tobacco use	8	5.5	2.8–10.4
Current alcohol use	25	17.1	11.9–24.1
Inadequate consumption of fruits and/or vegetables	113	77.4	70.0–83.4
Inadequate physical activity	136	93.2	87.9–96.2
Metabolic factors			
Excess weight (BMI ≥25 kg/m²)	81	55.5	47.4–63.3
Central obesity	106	72.6	64.9–79.2
Raised blood pressure	73	50.0	42.0–58.0
Raised blood glucose	71	48.6	40.7–56.7

CI, confidence interval; BMI, body mass index; NCD, noncommunicable disease. Intervals were calculated using the Wilson score method. Indicators are not mutually exclusive. All estimates use 146 records; they are unweighted sample estimates.

Bars represent prevalence estimates; whiskers indicate Wilson 95% confidence intervals. BMI, body mass index. Each factor was assessed separately, and participants could have more than one factor.

DISCUSSION

This analysis identified a high recorded prevalence of behavioural and metabolic risk factors among adults enrolled in a Family Adoption Programme in Kerala.

Among the behavioural risk factors, inadequate physical activity and inadequate fruits and/or vegetables consumption had the highest recorded prevalences. Among the metabolicrisk factors, central obesity had the highest recorded prevalence, while excess weight, raised blood pressure and raised blood glucose were each present in approximately half or more of the participants. These findings indicate potential prevention and follow-up needs within the population enrolled in the Family Adoption programme

Physical activity merits particular attention because nearly all included adults (93.2%) were classified as inadequately active. The NNMS reported inadequate physical activity in 41.3% of adults, whereas the Kerala statewide survey reported it in 21.9% of adults.[2,5] The ICMR–INDIAB Phase-1 survey likewise reported substantial physical inactivity, with differences by sex and urban–rural residence.10 These estimates provide context but should not be treated as directly comparable benchmarks. The present sample drawn from Family Adoption Programme records comprised mainly of adults aged 45 years or older (84.2%) and was predominantly female (64.4%). Differences in activity questions, domains assessed and classification criteria could also contribute to the differences in prevalence estimates. The high size of the recorded prevalence therefore supports careful physical activity assessment within the programme, without establishing that physical [inactivity is more prevalent in the surrounding population. WHO guidelines provides physical activity recommendations for adults and older adults, including those living with chronic conditions.[11]

The frequent recording of inadequate fruit and/or vegetable consumption supports including dietary assessment along with physical activity assessment. A binary classification for dietary assessment does not capture serving size, food affordability, dietary diversity or the reasons for low intake. Standardised questions and measurements, such as those used in the WHO STEP wise approach, may improve consistency in subsequent assessments and facilitate comparison over time.[12]

The metabolic findings also have implications for follow-up of the participants. Central obesity was recorded more often than excess weight, reflecting the different aspects of adiposity captured by the two measures. The analysis described each risk factor separately and did not examine their overlap within individuals. The findings support assessment of both central obesity and excess weight during follow-up.

Raised blood pressure and raised blood glucose each affected approximately half of the participants. These findings indicate that clinical review may be needed. They do not distinguish previously diagnosed disease from newly detected abnormalities, or indicate whether they were adequately treated or controlled. Follow-up can establish the clinical context of the recorded finding before assigning a diagnosis or interpreting it as evidence of unmet treatment needs.

Regional findings provide additional evidence for the metabolic risk factor profile observed in the study. Sarma and colleagues in a survey in Kerala, reported abdominal obesity in 60.2%, raised blood pressure in 30.4% and raised fasting blood glucose in 19.2%.5 Sathish and colleagues reported increases in body mass index and waist circumference over time in rural Kerala.6 The ICMR–INDIAB study also reported a high metabolic burden in Kerala, together these evidences support

sustained local assessment of metabolic health.3 The current record-based estimates add programme-specific information, but do not demonstrate a temporal trends or a difference in prevalence relative to population-based studies

Behavioural risk factors like current tobacco and alcohol use were reported less frequently than the dietary, physical activity and adiposity measures, as they were self-reported and may have been influenced by recall, question wording and social desirability, but these behaviours do warrant continued assessment

The findings support linking risk assessment with continued care, consistent with the integrated approach to primary care supported by WHO PEN.13 Repeated family contact may provide opportunities to review physical activity and dietary practices, reassess anthropometric and clinical findings. The current analysis did not assess referral completion, treatment adherence or intervention effectiveness. Its contribution is to identify the recorded risk factors that may inform subsequent programme planning and evaluation.

Strengths and limitations: Use of programme records provides information on the risk-factor profile of adults enrolled in the programme. However, exclusion of incomplete records and the concentration of participants in particular demographic groups limit generalisability.

Self-reported behavioural risk factors may be subject to information bias, including social desirability and misclassification; recall bias may also affect reported dietary intake and physical activity.

The cross-sectional design does not allow assessment of changes in behavioural and metabolic risk-factor status over time. Potential correlation among adults from the same household was not accounted for, which may have resulted in confidence intervals with narrower width, compared to those if clustering was present. Cholesterol and other NCD risk factors not captured in the Family Adoption programme records were not assessed, so the findings should not be interpreted as a complete cardiometabolic evaluation.

CONCLUSION

Among adults enrolled in the Family Adoption Programme, most frequently recorded risk factors were inadequate physical activity, inadequate fruit and/or vegetable consumption central obesity and excess weight. Raised blood pressure and raised

blood glucose were also commonly recorded. The findings support coordinated lifestyle assessment and cardiometabolic follow-up within the programme, with standardised recording to facilitate future evaluation and adopt appropriate measures.

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