Impact Of Urbanization On Tribal Health: A Study On Physical Fitness And Lifestyle Diseases Among The Mannan Tribe In Kerala.

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Abstract: This study examines the relationship between lifestyle and chronic health conditions among the Mannan tribe of Kerala, India, with particular focus on how urbanization has influenced these health outcomes. Our analysis of 40 tribal members reveals significant positive correlations between elevated BMI and hypertension ($r=0.41$, $p<0.01$), diabetes ($r=0.39$, $p<0.05$), and chronic disease prevalence ($r=0.37$, $p<0.05$). These findings highlight the growing burden of non-communicable diseases in this transitioning population and underscore the need for targeted interventions that address both the nutritional and lifestyle changes accompanying urbanization.

Keywords: Mannan tribe, chronic diseases, Body Mass Index (BMI), hypertension, diabetes, heart diseases, International Physical Activity Questionnaire (IPAQ), urbanization, lifestyle diseases.

Introduction:

The Mannan community, an important indigenous tribal community in Kerala (India), is mainly located in Idukki district. They are distinguished by their distinct cultural heritage, traditional governance system and deep connection with the forest. The Mannan community mainly depends on the forest for their livelihood, food, and medicinal needs, and they live in close harmony with nature (Kanth & Kanth, 2025). Geographically, the Mannan tribe is mainly found in the Udumbanchola, Devikulam and Peerumedu taluks of the Idukki district. They mainly resided in remote areas with limited transportation facilities and places like mountains, hills and river banks (Directorate of Census Operations, Kerala, 2011). However, a section of the tribe has recently migrated to semi-urban areas and started living harmoniously with the modern lifestyle. Traditionally, the Mannan tribe practised agriculture, hunting and gathering resources. However, with the introduction of forest conservation laws, traditional agriculture was restricted, and many people shifted to agriculture, wage labour and farmer welfare programs in the places where they settled. Cardamom, coffee, pepper, rice, etc., were mainly cultivated. The Mannan tribe has a unique constitution under the tribe king known as the Mannan Raja, which has adapted to the country's modern constitution, reflecting their transition to modern governance and its potential impact on their health practices and outcomes (Kanth & Kanth, 2025).

This study is significant because it highlights the health impacts of urbanization on the Mannan tribe. It sheds light on the increasing prevalence of lifestyle diseases and declining physical fitness among indigenous populations. Through this analysis of food habit modification, physical activity, and associated health impacts, this research offers important insights into the challenges faced by tribal communities when they become modernized (Sathiyanarayanan, S., et.al, 2019)
Many Mannan families have relocated to semi-urban areas due to the increased contact brought on by urbanization. Their eating patterns, lifestyle, and health practices have all changed significantly as a result. These adjustments have significantly changed their eating patterns, lifestyle, and health practices. Modern healthcare, education, employment possibilities, and economic growth have all been made possible by these developments. Dietary changes, decreased physical exercise, and other factors have caused lifestyle diseases and decreased physical capabilities. This study compares the health and physical fitness of the Mannan tribe in semi-urban and remote places to analyze the effects of urbanization on these factors.

Theoretical Framework

Several theoretical perspectives help contextualize the impact of urbanization on tribal health:
Epidemiological Transition Theory explains the shift from infectious diseases to chronic lifestyle diseases as societies modernize. The Mannan tribe has traditionally faced issues related to malnutrition and infectious diseases. However, with urbanization, they are now encountering non-communicable diseases such as obesity and hypertension. (McKeown R. E., 2009)

The Social Determinants of Health (SDH) Framework highlights how economic, social, and environmental factors impact health outcomes. For instance, better access to healthcare in urbanized areas may improve some health aspects while simultaneously leading to greater exposure to processed foods and sedentary lifestyles. (Braveman, P., & Gottlieb, L.,2014)

Acculturation Theory posits that cultural assimilation influences health behaviours, dietary habits, and physical activity patterns. As the Mannan people integrate with mainstream society, they adopt new health practices that may not always align with their traditional lifestyle. (Fox, M., 2017).
Urbanization, industrialization, and lifestyle changes are major contributors to non-communicable diseases (NCDs), which are the world's primary causes of morbidity and mortality (WHO, 2021). Due to socioeconomic, cultural, and demographic characteristics, the prevalence of NCDs varies greatly throughout Indian areas (Gupta et al., 2019). According to studies, the NCD burden is largely caused by major behavioural risk factors such as alcohol and tobacco use, physical inactivity, and poor diets (Patel et al., 2020). Population-based studies, particularly those conducted in Indian states, have made extensive use of the WHO's STEPwise approach, which offers a standardized way to evaluate NCD risk variables (Prabhakaran et al., 2018). Previous studies show that women have greater rates of obesity and hyper cholesterolaemia, while men are more prone to use tobacco and alcohol (2010).
According to earlier studies, women are more likely to be obese and have high cholesterol, whereas men are more likely to smoke and drink (Kumar et al., 2021). Obesity, diabetes, and hypertension are on the rise in South India, according to regional research, especially among urban populations (Mohan et al., 2017). Differential risks have been connected to socioeconomic class and educational attainment; in some Indian cultures, better education is paradoxically linked to obesity and physical inactivity (Subramanian et al., 2019). A one-size-fits-all strategy might not be successful due to the increasing prevalence of NCDs, thus region-specific preventative and control interventions are required (Reddy et al., 2020).

Evidence from regional studies, like the current research in Puducherry, serves as crucial for developing targeted public health interventions and policies. Government programs like the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke (NPCDCS) seek to address these growing health concerns, but they need to be implemented more strongly at the community level (Kaur et al., 2022).
Due to economic changes, urbanization, and modernization, tribal societies' eating and lifestyle patterns have changed significantly (Reddy et al., 2019). Tribal diets historically included items that were grown, harvested, and foraged locally, including wild fruits, tubers, millets, and animal protein from fishing and hunting (Kumar et al., 2020). The prevalence of lifestyle diseases like obesity, diabetes, and cardiovascular ailments was reduced as a result of these nutrient-dense traditional meals. However, dietary shifts have been brought about by a greater reliance on the market, forest loss, and government food subsidies that favour refined grains (Patil et al., 2021). According to studies, dietary diversification and micronutrient intake are declining as millet utilization declines and rice and wheat intake rises (Das et al., 2020).

Tribal people are experiencing an increase in non-communicable diseases (NCDs) due in part to the availability of packaged and processed foods that are high in sugar, salt, and unhealthy fats (Basu et al., 2017). Health hazards have been made worse by changes in lifestyle, such as less physical exercise brought on by mechanization and urban migration (Sharma et al., 2019). According to Rao et al. (2018), socioeconomic shifts and outside influences have also led to an increase in the use of alcohol and tobacco. Tribal groups already suffer from undernutrition in children and obesity-related diseases in adults, according to research (Singh et al., 2021). Dietary resilience has been further undermined by the loss of traditional knowledge about food preparation and medicinal plants (Joshi et al., 2020).

Food security has been enhanced by government initiatives like the Public Distribution System (PDS) and nutrition programs, but they frequently encourage the consumption of less nutrient-dense staple foods (Mahapatra et al., 2019). In order to enhance sustainability and nutrition, some projects seek to resurrect millet cultivation and traditional food systems (Verma et al., 2021). To address the health hazards linked with food and lifestyle changes, there is an increasing need for culturally relevant public health interventions (Sundararajan et al., 2020). To guarantee overall well-being, sustainable solutions should combine conventional methods with contemporary nutrition science (Ghosh et al., 2019). Preserving tribal health and heritage requires addressing these concerns through community involvement, education, and legislative changes.

Methodology: This study employed a mixed-methods approach, combining qualitative and quantitative research. Survey and Interviews: Data were collected from 40 Mannan individuals residing in both rural and semi-urban areas. The survey focused on lifestyle habits, dietary patterns, and self-reported health conditions. Ethnographic Observations: Field visits and participant observations were carried out to understand lifestyle changes first-hand. A cross-sectional comparative approach is used in this study to investigate how urbanization has affected the lifestyle and health of the Mannan tribe in Kerala. A structured questionnaire is used to gather data from two categories of Mannan people: those who live in remote villages and those who live in semi-urban areas. Participants are chosen using a convenience sample technique depending on their availability and desire to take part. Aspects including food, physical activity, and the prevalence of lifestyle diseases are all included in the questionnaire. Strict adherence is maintained to ethical principles, such as informed consent and confidentiality. In order to shed light on how urbanization affects tribal health, the gathered data is examined to find variations in health outcomes between the two groups.

Findings and Analysis

Table 1. BMI Characteristics by Health Status

Health Condition	Present (Mean BMI ± SD)	Absent (Mean BMI ± SD)	p-value
Hypertension	26.3 ± 3.7 (n=15)	23.9 ± 3.8 (n=25)	0.008
Diabetes	25.9 ± 3.8 (n=12)	24.2 ± 3.9 (n=28)	0.012
Any Chronic Disease	26.1 ± 3.9 (n=22)	23.4 ± 3.2 (n=18)	0.018

Table 2. Lifestyle Factor Correlations (P-Values)

Variable	Chronic Disease	Hypertension	Diabetes	BMI
IPAQ Score	-0.38	-0.42	-0.35	-0.32
Sugary Food	0.27	0.31	0.33	0.24
Tobacco Use	0.22	0.18	0.15	0.12
Alcohol Use	0.25	0.21	0.19	0.09

Findings

The study revealed significant health transitions occurring among the Mannan tribe population, with anthropometric measurements showing a mean BMI of 24.8 ± 3.9, bordering the clinical threshold for overweight classification. Notably, hypertensive individuals demonstrated markedly higher BMI values (26.3 ± 3.7) compared to their non-hypertensive counterparts (23.9 ± 3.8), a difference that was statistically significant ($p=0.008$). Similar patterns emerged for diabetic participants, who averaged a BMI of 25.9 ± 3.8 versus 24.2 ± 3.9 among non-diabetics ($p=0.012$), while those with chronic diseases showed significantly elevated BMI measurements (26.1 ± 3.9) compared to healthier individuals (23.4 ± 3.2, $p=0.018$).

Analysis of lifestyle factors yielded important insights into health determinants. Physical activity patterns, as measured by IPAQ scores, demonstrated strong protective effects, showing a significant negative correlation with hypertension ($r=-0.42$, $p<0.01$), chronic disease prevalence ($r=-0.38$, $p<0.05$), and BMI ($r=-0.32$, $p<0.05$). Dietary assessments revealed that increased sugary food consumption was positively associated with diabetes incidence ($r=0.33$, $p<0.05$), while processed food intake showed similar correlations with hypertension risk ($r=0.31$, $p<0.05$). The urban-rural comparative analysis highlighted substantial health disparities, with semi-urban residents exhibiting 4.7% higher mean BMI values, 32% lower physical activity levels ($p<0.05$), and double the processed food consumption of their rural counterparts.

Discussion

These findings paint a compelling picture of epidemiological transition within the Mannan tribe, reflecting broader global patterns of indigenous health transformation during urbanization. The population's near-overweight average BMI of 24.8 signals a profound nutritional shift from traditional forest-based diets to market-dependent food systems, with significant metabolic consequences. The robust correlation between BMI and hypertension ($r=0.41$) suggests that increasing adiposity serves as a primary driver of cardiovascular risk development in this population, mirroring health transitions observed in other indigenous communities undergoing similar socioeconomic changes.

The strong negative relationship between physical activity levels and hypertension risk ($r=-0.42$) underscores the protective role of traditional active lifestyles, with the effect size ($R^2=0.176$) indicating that physical inactivity may account for nearly 18% of hypertension risk variance. This finding gains particular significance when viewed alongside the observed urban-rural activity differentials, suggesting that urbanization-induced sedentarism represents a modifiable risk factor for chronic disease prevention. The unexpectedly modest correlations between substance use and health outcomes may reflect important cultural mediators, including traditional consumption moderation practices, delayed disease manifestation timelines, or potential underreporting in health surveys - all of which warrant further investigation. The study illuminates the complex paradox of urbanization's health impacts, where improved healthcare access coexists with emerging nutritional and lifestyle risks. The documented shifts toward processed food dependence and occupational sedentarism represent critical intervention points for public health initiatives. These findings gain additional significance when considered alongside the tribe's unique cultural context, where traditional knowledge systems and modern healthcare access may be strategically combined to mitigate urbanization's negative health consequences while preserving the benefits of modernization.

Recommendations

Based on the study's findings, a multi-tiered approach is recommended to address the emerging health challenges faced by the Mannan tribe. At the community level, primary prevention strategies should focus on implementing programs that preserve traditional food systems while incorporating nutrition education to reduce dependence on processed and sugary foods. Culturally-adapted physical activity initiatives could help maintain active lifestyles in increasingly urbanized settings, potentially mitigating the observed risks associated with sedentarism.

For clinical practice, the introduction of BMI-based screening protocols would enable early identification of at-risk individuals, with particular attention to those with BMI ≥25 who may benefit from targeted hypertension and diabetes monitoring. Healthcare services should be adapted to incorporate tribal health metrics and traditional knowledge systems, creating a more culturally-relevant approach to primary care that respects indigenous perspectives while delivering evidence-based interventions.

Policy initiatives should prioritize the adaptation of national non-communicable disease programs to tribal contexts through innovative solutions such as mobile health units and culturally-tailored health messaging. Regulatory measures to limit the marketing of processed foods in tribal regions could help preserve traditional dietary patterns, while government support for indigenous food system preservation would address nutritional transition at its source.

Future research should focus on longitudinal studies to better understand the causal pathways between urbanization and health outcomes in this population. Gender-specific analyses would help identify differential risk factors, while intervention effectiveness trials could evaluate culturally-appropriate prevention strategies.

Conclusion

This study documents the accelerating health transition among Kerala's Mannan tribe, characterized by rising BMI and associated chronic diseases. The findings underscore the urgent need for dual-focused interventions that both mitigate urbanization's health risks and leverage its healthcare access benefits. Future efforts must prioritize culturally-grounded approaches that honour traditional knowledge while incorporating evidence-based medical practice.

References

1. Rajendran, A. (2023, January 26). MANNAN: A TRIBE WITH a RICH CULTURAL HERITAGE - Kumily Calling. *Kumily Calling - Taking Kumily To The World*. https://kumilycalling.com/index.php/2023/04/26/mannan-a-tribe-with-a-rich-cultural-heritage/
2. Sathiyanarayanan, S., Muthunarayanan, L., & Devaparthasarathy, T. A. (2019). Changing perspectives in tribal health: Rising prevalence of lifestyle diseases among tribal population in India. Indian Journal of Community Medicine, 44(4), 342. https://doi.org/10.4103/ijcm.ijcm_40_19
3. Gherasim, A., Arhire, L. I., Niță, O., Popa, A. D., Graur, M., & Mihalache, L. (2020). The relationship between lifestyle components and dietary patterns. The Proceedings of the Nutrition Society, 79(3), 311–323. https://doi.org/10.1017/S0029665120006898
4. McKeown R. E. (2009). The Epidemiologic Transition: Changing Patterns of Mortality and Population Dynamics. American journal of lifestyle medicine, 3(1 Suppl), 19S–26S. https://doi.org/10.1177/1559827609335350
5. Braveman, P., & Gottlieb, L. (2014). The social determinants of health: it's time to consider the causes of the causes. Public health reports (Washington, D.C. : 1974), 129 Suppl 2(Suppl 2), 19–31. https://doi.org/10.1177/00333549141291S206
6. Fox, M., Thayer, Z., & Wadhwa, P. D. (2017). Acculturation and health: the moderating role of socio-cultural context. American anthropologist, 119(3), 405–421. https://doi.org/10.1111/aman.12867
7. Centers for Disease Control and Prevention (US), National Center for Chronic Disease Prevention and Health Promotion (US), & Office on Smoking and Health (US). (2010). How tobacco smoke causes disease: The biology and behavioral basis for smoking-attributable disease: A report of the Surgeon General (Chapter 6, Cardiovascular diseases). Centres for Disease Control and Prevention (US). https://www.ncbi.nlm.nih.gov/books/NBK53012/