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Lifestyle Risks and Health Conditions among Working Women in Odisha: Implications for Women's Livelihoods and Sustainable Development

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ABSTRACT: Introduction:

Lifestyle-related risk behaviours, including tobacco consumption and alcohol use, have emerged as significant public health concerns in India, particularly among women of working age. These behaviours are influenced by socioeconomic, cultural, and occupational contexts, rather than solely by individual choice. In Odisha, where women predominantly participate in informal and agricultural work, factors such as poverty, limited health awareness, and traditional norms intensify their exposure to these risks. Comprehending the impact of these behaviours on health outcomes is essential for the formulation of effective policy interventions.

Aim and Objectives: This study examined the association between lifestyle risk factors and selected non-communicable diseases (NCDs) among working women in Odisha, utilizing data from the NFHS-5 (2019–2021). The objectives of the study were threefold: (i) to analyze the socio-demographic and occupational characteristics of working women; (ii) to assess the prevalence of lifestyle risk factors, including tobacco and alcohol consumption; and (iii) to investigate the relationship of these factors with health outcomes such as diabetes, hypertension, thyroid disease, and chronic respiratory diseases..

Materials and Methods: Using data from the NFHS-5 (2019-21) survey, which encompassed 1,262 employed women aged 15 to 49 years, descriptive statistics and Chi-square tests were performed to assess the associations between lifestyle risks and health outcomes. The independent variables included tobacco and alcohol consumption, while the dependent variables encompassed diabetes, hypertension, thyroid disorders, and chronic respiratory diseases.

Findings: Tobacco use (22.5%) and alcohol consumption (6.9%) were prevalent among the respondents. The rates of hypertension (5.5%), diabetes (1.6%), thyroid disorders

(2.1%), and chronic respiratory diseases (1.6%) indicate a rising NCD burden. Tobacco use was significantly associated with chronic respiratory disease ($\chi^2 = 10.64$, $p = 0.005$) and thyroid disorders ($\chi^2 = 7.87$, $p = 0.020$).

Conclusion: The findings underscore the need for gender-sensitive health strategies focusing on behavioral risk reduction, regular screening, and workplace wellness programs to improve the health outcomes of female workers in Odisha.

INTRODUCTION :

The participation of women in paid employment has significantly impacted the social and economic dimensions of their lives, while also introducing new challenges concerning their health and well-being. Employment provides women with economic independence, autonomy, access to resources, and social inclusion. However, occupational responsibilities often coincide with substantial domestic tasks and caregiving duties. This convergence is likely to lead to extended working hours, workplace stress, insufficient rest, unhealthy dietary practices, and inadequate physical activity during leisure time (Idris et al., 2021; Chandrasekaran et al., 2025). Research from India demonstrates that both paid employment and unpaid household and caregiving responsibilities form a considerable part of the total workload, contributing to mental distress among women (Richardson et al., 2017).

Therefore, women's workforce participation should be viewed not only as an element of their empowerment but also as a potential factor affecting their health through various occupational, behavioral, and psychosocial mechanisms.

The health outcomes associated with women's employment have gained increasing importance due to the rising incidence of non-communicable diseases (NCDs). Cardiovascular disease, diabetes, hypertension, and obesity are among the NCDs affected by a combination of behavioral, metabolic, socioeconomic, and environmental factors. A systematic review of women in the workforce revealed high prevalence rates of hypertension, diabetes, metabolic syndrome, overweight/obesity, low physical activity, poor dietary habits, and dyslipidaemia among employed women (Idris et al., 2021). Specifically, the prevalence rates for hypertension ranged from 16.6% to 66.4%, for diabetes from 8.9% to 16.0%, and for overweight/obesity

from 33.8% to 77.0%. Furthermore, long working hours, dual work responsibilities, and occupational stress were identified as significant determinants of NCDs among employed women (Idris et al., 2021).

The health and socio-economic status of women are essential structural determinants for achieving the United Nations Sustainable Development Goals, particularly SDG 3 (Health and Well-being) and SDG 5 (Gender Equality). In Odisha, the growing involvement of women in both formal and informal labour sectors has led to the dual burden of managing work and domestic responsibilities. This dual role increases their vulnerability to non-communicable diseases, which are aggravated by stress, inadequate nutrition, sedentary lifestyles, and hypertension.

The NFHS-5 survey (2019–2021) constitutes the fifth national-level assessment of health and nutrition, incorporating data from all Indian states. Analyzing datasets from Odisha is vital, as the declining health conditions of female workers negatively impact workplace productivity and the sustainable accumulation of human capital. Examining the health vulnerabilities associated with the lifestyles of working women will aid in the formulation of public policies that integrate gender-specific factors, thereby advancing the state's sustainable development goals.

However, the relationship between employment and health is not uniformly consistent for all women. Variables such as the nature of work, employment conditions, education, income, working conditions, and the balance between paid

and unpaid work may influence health outcomes. Research examining the link between employment status and metabolic syndrome suggests that this relationship can vary according to educational level, indicating that socioeconomic resources may affect the health implications of employment status in women (Erem et al., 2012). Similar studies focusing on women in India have identified that work stress can stem from factors such as a high workload, lack of organizational support, job insecurity, work-life imbalance, gender discrimination, and financial constraints (Chandrasekaran et al., 2025).

Additionally, research conducted among working women in a tertiary healthcare institution in Delhi has underscored occupational stress, compounded by the dual responsibilities women face in balancing professional and domestic roles (Parashar et al., 2017).

The psychosocial dimension of women's work is particularly significant, as mental and physical well-being are intricately linked. Data from rural regions in India indicate that household responsibilities, including childcare, cooking, water collection, and cleaning, contribute to women's mental distress (Richardson et al., 2017). In Gujarat, employed women reported experiencing greater stress compared to their non-working counterparts (Patel et al., 2024). This information is crucial, as prolonged stress can affect women's behavior, sleep, diet, and exercise, and increase the risk of cardiovascular diseases. Furthermore, occupational stress has been shown to impact the cardiovascular health of working women in other regions (Boo & Oh, 2019).

A third pathway connecting occupation and health is lifestyle behavior. Key behavioral and metabolic risk factors associated with the development of noncommunicable diseases (NCDs) include physical inactivity, unhealthy diets, smoking, alcohol consumption, and being overweight. According to data from India's Noncommunicable Disease Monitoring Survey, the prevalence of physical inactivity among adult participants was 41.4%, with a notably higher rate among women (52.4%) compared to men (Ramamoorthy et al., 2022). Additionally, women engaged in less physical activity than men. Notably, physical inactivity was linked to specific socioeconomic and metabolic risk factors, indicating its association with broader social and health determinants (Ramamoorthy et al., 2022). This evidence is particularly relevant for working women, as their occupations do not consistently promote physical activity.

Geographical and gender disparities in lifestyle patterns have been documented across India. A comprehensive national study on dietary habits, physical activity, and obesity highlighted unhealthy dietary practices and insufficient physical activity among Indian adults, with a particular focus on disparities among women regarding obesity and physical activity in urban versus rural settings (Anjana et al., 2016). Notably, fewer than 5% of the population met the recommended intake of fruits and vegetables, and women in urban areas exhibited higher obesity rates compared to their rural counterparts. These findings indicate that health risks associated with lifestyles in India are linked to the ongoing nutritional and epidemiological transitions within the country (Anjana et al., 2016).

The evolving nutritional profile of Indian women is particularly significant for India, as the country continues to face a dual burden of malnutrition and overnutrition. Subramanian and Smith (2006), using data from a nationally representative sample of Indian women, demonstrated an inequality in nutritional status along a socioeconomic gradient. Specifically, underweight conditions are prevalent among socioeconomically deprived groups, while obesity is more common among socioeconomically privileged individuals. Recent studies confirm the persistence of

this dual burden. Dutta et al. (2019), analyzing data from NFHS-4, identified the coexistence of underweight conditions and increasing obesity among adults, with education and wealth being associated with obesity. Similarly, Pengpid and Peltzer (2019) observed the same trend of underweight conditions alongside rising obesity in a study involving over 580,000 Indian women, also using NFHS-4 data.

Socioeconomic disparities in obesity among Indian women have been consistently documented across various NFHS cycles. Sengupta et al. (2015) identified variations in the relationship between socioeconomic status, place of residence, and overweight/obesity (OW/OB) across different Indian states, noting that obesity prevalence is not confined to urban and affluent regions. Kumar et al. (2022), using NFHS-4 data, highlighted the unequal distribution of OW/OB, disproportionately affecting economically advantaged women. Additionally, an analysis of four NFHS cycles from 1998–1999 to 2019–2021 revealed an increasing obesity burden among ever-married women of reproductive age, emphasizing the persistent significance of obesity as a women's health issue in India (Singh et al., 2025). These findings indicate that lifestyle-related health concerns must be understood within the evolving socioeconomic and nutritional context of India.

The association between obesity and other diseases underscores the necessity for a comprehensive evaluation of women's health status. Corsi and Subramanian (2019), using nationally representative Indian data, identified a distinct socioeconomic gradient in the prevalence of diabetes, hypertension, and obesity. Notably, the socioeconomic gradient was most

pronounced for obesity, with a significant portion of the population burden due to diabetes, hypertension, and obesity borne by individuals from more affluent socioeconomic backgrounds. Similarly, the systematic review and meta-analysis by Krishnamoorthy et al. (2020) found that the pooled prevalence of metabolic syndrome among Indian adults is approximately 30%, with higher rates in women compared to men. Urban residents and individuals from different regions exhibit varying levels of prevalence, with Odisha, for example, recording a high prevalence rate of metabolic syndrome.

The relationship between lifestyle and metabolism-related disorders is particularly evident among working women. For instance, a study involving female school teachers in Chennai, who are engaged in a sedentary profession,

revealed a significant prevalence of metabolic syndrome, associated with factors such as physical inactivity, age, dining out, and the consumption of refined cereals (Monica et al., 2023). Similarly, research among healthcare professionals in Gujarat identified a notable prevalence of metabolic disorders, demonstrating a direct correlation between the fatty liver index and conditions such as hypertension, diabetes, and cardiovascular diseases (Shah et al., 2025). Further evidence is provided by studies conducted in Odisha, where Malini et al. (2009) found that impaired glucose tolerance or diabetes was prevalent among some subjects, and obesity and increased waist-to-hip ratio were common among women with abnormal glucose levels.

Occupational schedules may add on to metabolic risks by contributing to changes in sleeping, dietary practices, and physical activities. According to Bahinipati et al. (2022), in a study carried out among healthcare workers in Odisha, night shift was found to be related to metabolic risks, where circadian rhythm disturbance, lack of sleep, changing eating patterns, and inadequate physical activities were identified as some possible ways. This is especially true for working women since occupational schedules affect health-related behaviors outside of the workplace.

Hypertension is yet another important health condition where the interrelationships between lifestyles, socio-economic, and occupational factors become evident. Using data from NFHS-4, Kumar and Misra (2021) have shown the presence of gender differences in the occurrence of hypertension and its risk factors in India. In the case of women, age, non-working status, alcohol consumption, and diabetes were found to be among the most important factors of hypertension. Likewise, using data from NFHS-4, Virk et al. (2022) have established that in non-pregnant women of age 15-49 years, hypertension was linked to various demographic, socioeconomic, and health-related variables.

In another study, Tripathi et al. (2024) proved that there was a significant proportion of undiagnosed hypertension among women aged 15-49 years in India, and the undiagnosed hypertension was correlated with age, BMI, wealth, education, caste, and geographic region.

Moreover, studies performed at the state level also show the context specificity of factors determining the health status of women. Bansode et al. (2021), for example, using NFHS-4 data from Karnataka, revealed that there were 6.3% of women with diabetes and 10.5% of

women with hypertension among women aged 15-49 years; moreover, obese women had substantially higher rates of both diseases. It is also noted that socioeconomic factors, obesity, and substance abuse were important for the studied population.

The significance of the use of tobacco and alcohol is especially relevant when evaluating the risks of lifestyles among women. Satapathy et al. (2022), who employed the NFHS-4 database of Odisha and conducted a survey of 30,587 women aged 15-49 years, noted that 12.8% of women consumed tobacco, with smokeless tobacco being the prevalent mode of its use. The authors also determined hypertension among women and revealed tobacco consumption, age, obesity, diabetes, place of residence, and socio-economic conditions to be relevant variables. In recent literature based on the NFHS-5 database, the consumption of tobacco and alcohol among Indian women was assessed and established to be an essential component of the emerging problem of hypertension (Yadav & Siddiqui, 2024).

Recently generated evidence from NFHS-5 is especially crucial to understand the associations in question. In their paper based on standardised measurements of blood pressure from NFHS-5 data, Mohammad et al. (2024) found that 21.2% of Indian women aged 15 and above suffer from hypertension, where age, BMI, waist circumference, blood glucose levels, alcohol consumption, and level of education were the key factors associated with hypertension. There was also a

substantial variability in hypertension prevalence among different regions of the country. The results of another NFHS-5 analysis in the context of eastern India have shown that the prevalence of hypertension in reproductive-age women is 10.6%, where the highest prevalence rate was observed in the state of Odisha. Factors such as age, marital status, education, wealth, occupation, tobacco consumption, diabetes, consumption of fried foods, and BMI were significantly related to hypertension (Roy et al., 2024).

Health burden of women is also not limited to individual NCDs but is also related to comorbidities. For example, according to Singh et al. (2023), who analyzed the data from NFHS-5, the burden of chronic NCDs among reproductive age women in India was associated with demographic, socio-economic, reproductive, anthropometric, and lifestyle factors. There were also differences by sex in studies of NCD multimorbidity among the elderly population in India, where multimorbidity was significantly correlated with being overweight/obese and tobacco exposure among women (Sharma et al., 2023). The implication from the above is that there might be some accumulative effects of lifestyle factors on health outcomes for women.

In addition, working women in the informal economy may also have an extra layer of occupational risk. A systematic review done recently in India shows that informal working women face several problems related to their occupation like musculoskeletal, cardiorespiratory, dermatological, and ophthalmic problems even though the quality of data varies with each occupation (Seth et al., 2026). There has also been previous literature on occupational hazards faced by working women which has shown musculoskeletal problems faced by women cultivators due to physically demanding occupational tasks (Pal & Dhara, 2018). Besides, the impact of occupational heat and sanitation problems in the workplaces of Indian working women is linked with occupational heat, dehydration, genitourinary problems, and poor workplace facilities (Venugopal et al., 2016). From all these pieces of literature, it is quite clear that “working women” are a very heterogeneous group. The objectives of the research are to understand the socio-demographic and occupational profile of working women in Odisha, prevalence of lifestyle risk factors such as tobacco and alcohol use, and their relationship with non-communicable diseases like diabetes, hypertension, thyroid disease, and respiratory disease.

1. REVIEW OF LITERATURE

Research has increasingly focused on working women, who bear occupational, household, and social responsibilities that may impact their health. The entry of women into the workforce has altered traditional patterns of women's work; however, their domestic responsibilities persist alongside their professional roles. Consequently, working women may experience issues such as occupational stress, time constraints, insufficient physical activity, poor dietary habits, and a lack of preventive healthcare. These factors contribute to conditions conducive to the development of non-communicable diseases (NCDs), including hypertension, diabetes, obesity, cardiovascular diseases, and other chronic illnesses. The transition from communicable to non-communicable diseases represents a major health challenge in India today. Research indicates that behavioral and metabolic risks, such as smoking, alcohol consumption, unhealthy diets, physical inactivity, overweight and obesity, and elevated blood sugar levels, are closely associated with chronic diseases. A systematic review by Peter et al. (2019) demonstrated that lifestyle-related risk factors, particularly physical inactivity and unhealthy eating habits, are linked to various non-communicable diseases, including cardiovascular disease, diabetes, stroke, and cancers. Therefore, lifestyle risks should not be examined in isolation, as multiple risk factors may collectively influence the development of various diseases.

The increasing prevalence of metabolic disorders in the country is notably influenced by social and economic development, urbanization, dietary changes, and evolving lifestyles. Corsi and Subramanian (2019) examined the socioeconomic gradient of diabetes, hypertension, and obesity in India using data from the nationally representative NFHS-4 survey. Their findings indicated positive socioeconomic gradients for each disorder, with the steepest gradient observed in obesity. The study concluded that obesity, diabetes, and hypertension are more prevalent among socioeconomically advantaged individuals. The association between obesity and other metabolic disorders has been extensively researched. A meta-analysis by Ahirwar and Mondal (2019) identified a significant correlation between obesity and both hypertension and type 2 diabetes in India. The odds ratio for the association between obesity and hypertension was 3.82, highlighting body weight as a critical metabolic risk factor for heart health. Similarly, Misra et al. (2013) identified overweight, obesity, and particularly abdominal obesity as major concerns among Indian women, attributing the rising prevalence to sedentary lifestyles, dietary imbalances, postpartum weight gain, and decreased physical activity. There is growing recognition of the specific health impacts on

working women. Idris et al. (2021) conducted a systematic review of non-communicable diseases (NCDs) among working women, analyzing evidence from 12 studies indexed in PubMed and Scopus. The review revealed significant variations in the prevalence of hypertension, diabetes, metabolic syndrome, and other NCDs among working women. Notably, overweight/obesity, physical inactivity, unhealthy dietary habits, and dyslipidemia were identified as the most prevalent risk factors. Additionally, long working hours, dual burdens, and occupational stress were significant factors adversely affecting health.

The findings of the systematic review conducted by Idris et al. (2021) are particularly pertinent to this research, as they underscore the necessity of examining women's employment in the context of their multifaceted roles. Employed women frequently encounter a "dual burden" due to the demands of both paid employment and unpaid domestic responsibilities. This dual burden can result in inadequate time for exercise, proper nutrition, rest, and healthcare. Furthermore, it is asserted that workplace intervention programs must address both the physical and psychosocial health aspects of women. Evidence from the Indian urban context further illustrates the significance of behavioral and psychosocial factors. A study of working and non-working women residing in urban slums revealed elevated levels of physical inactivity and stress among employed women. The data indicate that 38% of working women reported experiencing stress, in contrast to 17% of their non-working counterparts. Although employed women demonstrated greater awareness of non-communicable diseases (NCDs), the presence of behavioral risk factors suggests that knowledge does not invariably translate into healthy behavior. Work can exert a dual impact on women's health, potentially influencing it both positively and negatively. On one hand, employment may enhance women's income, self-reliance, and access to information and healthcare services. Conversely, extended working hours, occupational stress, sedentary jobs, and work-family conflicts may adversely affect health.

Hypertension is a significant lifestyle-related non-communicable disease (NCD) among adults. Kumar and Misra (2021) investigated sex differences in the prevalence and risk factors of hypertension using data from the NFHS-4. Their analysis included 699,686 women aged 15–49 years, identifying age as a determinant of hypertension in women. Additionally, alcohol consumption and diabetes were identified as significant risk factors for hypertension in this demographic. The study emphasizes gender differences in hypertension determinants, highlighting the necessity for gender-specific interventions to prevent NCDs. Recent evidence from the NFHS-5 data corroborates these findings. Patil et al. (2025) compared hypertension risk factors in men and women using NFHS-5 data, reporting that behavior and metabolism-related risk factors influence hypertension in both genders, while certain risk factors exhibit gender-specific effects. Their study employed a theoretical framework linking socioeconomic factors with behavioral and metabolic risk factors, aiding in the development of a conceptual framework for examining lifestyle risk factors in women. One of the most significant studies pertinent to the current research is the investigation of high blood pressure among reproductive-aged women in eastern India, utilizing NFHS-5 data. The prevalence of high blood pressure in this demographic was found to be 10.6%, with a higher incidence in urban areas compared to rural ones. Notably, Odisha exhibited the highest prevalence among the eastern states included in the study. Factors such as age, marital status, education, wealth, occupation, tobacco use, diabetes, consumption of fried food, and body mass index (BMI) were identified as statistically significant determinants of high blood pressure. Tobacco and alcohol consumption are critical behavioral risk factors associated with non-communicable diseases (NCDs). Particularly relevant is the potential predominance of smokeless tobacco use among women in Odisha. Satapathy et al. (2022), through an analysis of NFHS-4 data for Odisha, examined the association between tobacco use and hypertension among adult women. This study included 30,587 women aged 15–49, of whom 12.8% used tobacco, predominantly in smokeless forms. Hypertension was diagnosed in 7.3% of these women. Key predictors of hypertension included age, urban residence, economic status, marital status, obesity, diabetes, and tobacco use. The study concluded that tobacco consumption is a significant predictor of hypertension among women in Odisha. These findings are particularly relevant to the current study as they highlight the potential interaction between behavioral risk factors and metabolic diseases. Consequently, tobacco use should not be examined in isolation from BMI, diabetes, hypertension, socio-economic factors, and other variables. Studies based on NFHS-5 have further elucidated the association between tobacco and alcohol use as behavioral risks and hypertension among women in India. According to Yadav and Siddiqui (2024), altered dietary habits, along with behavioral risks such as tobacco and alcohol use, contribute to the burden of hypertension among women. Their analysis, utilizing the NFHS-5 dataset involving 724,115 women, underscores the importance of employing nationally representative surveys to comprehend behavioral risks associated with women's health.

Nevertheless, the association between obesity, lifestyle, and diabetes is particularly pertinent for working women. Evidence from Odisha, predating the NFHS-5 period, highlights this issue. Malini et al. (2009) conducted a study involving 100 working women in Berhampur, Odisha, focusing on the risk factors for type 2 diabetes. The study identified 24 women with blood glucose levels indicative of either impaired glucose tolerance or diabetes. The incidence was notably higher among older working women, and obesity was prevalent among those with diabetes or impaired glucose tolerance. These women also demonstrated insufficient awareness regarding the necessity of lifestyle modifications. Although this research, based on a small sample, suggests a potential association between obesity, age, and lifestyle behaviors among working women in Odisha, its findings cannot be generalized to the entire state due to the limited sample size and geographical and occupational scope. Therefore, it is crucial to utilize NFHS-5 data. The current research aims to address these gaps by employing NFHS-5 (2019-21) data to investigate the relationship between lifestyle and health status among working women in Odisha. This study seeks to examine the distribution patterns of major risk factors and the relationship between these risk factors and selected self-reported health statuses.

2. METHODOLOGY

This study utilized data from the fifth round of the National Family Health Survey (NFHS-5, 2019–21), a nationally representative survey conducted throughout India. The analysis concentrated on a subsample of 1,262 working women aged 15–49 years residing in Odisha. NFHS-5 employed a stratified two-stage sampling design and gathered comprehensive information on demographic characteristics, health status, lifestyle behaviours, and socioeconomic conditions. The research adopted a cross-sectional design to investigate the association between lifestyle risk factors and selected non-communicable diseases (NCDs) among working women. Lifestyle risk factors, considered as independent variables, included tobacco and alcohol consumption. Tobacco use was categorized based on respondents' self-reported use of smoking and smokeless tobacco products, while alcohol consumption was assessed through information on current alcohol use. The dependent variables were self-reported health outcomes, specifically diabetes, hypertension, thyroid disorder, and chronic respiratory disease, each coded as a binary variable indicating the presence or absence of the condition. Descriptive statistical techniques were employed to summarize the socioeconomic profile of respondents and the prevalence of lifestyle risk factors and health conditions. Frequency distributions and percentages were calculated to describe the characteristics of the study population. To examine the association between lifestyle risk factors and health outcomes, Chi-square (χ^2) tests of independence were applied. The Chi-square test assessed whether significant differences existed in the prevalence of diabetes, hypertension, thyroid disorder, and chronic respiratory disease across categories of tobacco and alcohol use. Statistical significance was evaluated at the 5 percent level ($p < 0.05$). Data analysis was conducted using SPSS version 27 software.

3. RESULTS

Table 1: Socio-Demographic Profile of the Women Workers in Odisha, NFHS-5

Religion of the Respondents		
	Frequency	Percent
Hindu	1171	92.8
Muslim	8	0.6
Christian	81	6.4
Others	2	0.2
Total	1262	100.0
Ethnicity of the Respondents		
	Frequency	Percent

SC/OBC	920	72.9
ST	325	25.8
General	17	1.3
Total	1262	100.0
Respondent's occupation (grouped)		
	Frequency	Percent
Professional / technical / managerial	72	5.7
Clerical	11	0.9
Sales	57	4.5
Services / household and domestic	109	8.6
Agricultural	561	44.5
Skilled and unskilled manual	452	35.8
Total	1262	100.0
Age in 5-year groups		
	Frequency	Percent
15-19	108	8.6
20-24	165	13.1
25-29	166	13.2
30-34	213	16.9
35-39	238	18.9
40-44	190	15.1
45-49	182	14.4
Total	1262	100.0
Type of place of residence		
	Frequency	Percent
Urban	172	13.6
Rural	1090	86.4
Total	1262	100.0
Highest educational level		
	Frequency	Percent

No education	510	40.4
Primary	215	17.0
Secondary	441	34.9
Higher	96	7.6
Total	1262	100.0
Wealth index for urban/rural		
	Frequency	Percent
Poorest	580	46.0
Poorer	295	23.4
Middle	201	15.9
Richer	107	8.5
Richest	79	6.3
Total	1262	100.0

Analysis of the data reveals that 92.8% of the sample population consists of Hindus (1171 out of 1262 individuals). Christians constitute 6.4%, Muslims 0.6%, and the 'others' category accounts for a mere 0.2%. This indicates a high degree of religious homogeneity and minimal diversity within the study population. Regarding social background, a majority of respondents belong to the SC/OBC category (72.9%), with Scheduled Tribes comprising 25.8% and the General category representing 1.3%. This suggests that the respondents predominantly originate from socially disadvantaged groups, which significantly impacts their socio-economic status and educational attainment. In terms of occupation, agricultural roles constitute the largest segment (44.5%), followed by skilled and unskilled manual labor (35.8%). Professional, technical, and managerial positions, which require higher qualifications, account for 5.7%, while clerical roles represent only 0.9%. Sales occupations comprise 4.5%, and service or household occupations make up 8.6%. Consequently, there is limited occupational diversity among the respondents. The age distribution indicates that most respondents are working adults, with the largest proportions in the 35-39 (18.9%),

30-34 (16.9%), and 40-44 (15.1%) age groups. Younger age brackets (15-24 years) constitute only 21.7% of the sample. This reflects a relatively mature and economically active population, which has significant implications for employment levels and productivity. A substantial majority of the sample resides in rural areas (86.4%), with only 13.6% living in urban settings. This residential data aligns with the occupational structure, highlighting the population's strong agricultural orientation. The educational level of the population is notably low, with at least 40.4% of respondents lacking formal education. Primary education has been completed by 17% of respondents, secondary education by 34.9%, and only 7.6% have attained higher education.

Table 2: Health Status among Women Workers in Odisha, NFHS-5

Currently has diabetes		
	Frequency	Percent
No	1224	97.0
Yes	20	1.6
Don't know	18	1.4

Total	1262	100.0
Has sought treatment for diabetes		
	Frequency	Percent
No	6	0.5
Yes	14	1.1
Total	20	1.6
Currently has hypertension		
	Frequency	Percent
No	1174	93.0
Yes	69	5.5
Don't know	19	1.5
Total	1262	100.0
Has sought treatment for hypertension		
	Frequency	Percent
No	19	1.5
Yes	50	4.0
Total	69	5.5
Currently has a chronic respiratory disease including asthma		
	Frequency	Percent
No	1235	97.9
Yes	20	1.6
Don't know	7	0.6
Total	1262	100.0
Has sought treatment for a chronic respiratory disease including asthma		
	Frequency	Percent
No	6	0.5
Yes	14	1.1
Total	20	1.6
Currently has thyroid disorder		
	Frequency	Percent
No	1225	97.1
Yes	27	2.1

Don't know	10	0.8
Total	1262	100.0
Has sought treatment for thyroid disorder		
	Frequency	Percent
No	4	0.3
Yes	23	1.8
Total	27	2.1

Based on the results, it is clear that the rate of diabetes among women employees is very low, with 97% of the respondents answering that they do not have diabetes while only 1.6% had been diagnosed with the disease and 1.4% did not know about their health status. Out of the 20 women who were diabetic, 70% have been receiving medication which reflects their health seeking behaviors although the rate of the disease is low. Hypertension is seen as a more prevalent health problem than diabetes. Since 93% of the respondents indicated that they do not have hypertension, 5.5% (69 women) had been diagnosed with the disease and 1.5% were uncertain of their health condition. Of the women who had hypertension, 72.5% have been receiving treatment while 27.5% are not. Though the number of people suffering from hypertension is few, this still is considered as an important health issue. The prevalence rate of chronic respiratory diseases, asthma included, among the women is 1.6% where 97.9% do not have such disease and 0.6% are uncertain. This particular condition is less common among the study participants but demonstrates consistency in awareness and utilization of healthcare facilities. Thyroid disorder occurs in 2.1% of the respondents whereas 97.1% of them denied the occurrence of this condition and 0.8% of them did not know whether they had it or not. However, one should mention that this disease is characterized by the highest percentage of treatment among all chronic diseases, since 85% of the affected women get treated while only 15% are untreated. Despite the fact that this disease is not common, the percentage of treatment is quite high.

Table 3: Prevalence of Smoking and Alcohol Consumption Among Women Workers in Odisha (NFHS-5)

Currently smokes or uses tobacco besides cigarettes		
	Frequency	Percent
No	978	77.5
Yes	284	22.5
Total	1262	100.0
Khaini		
	Frequency	Percent
No	1097	86.9
Yes	165	13.1
Total	1262	100.0
Paan with tobacco		
	Frequency	Percent
No	1194	94.6

Yes	68	5.4
Total	1262	100.0
Do you drink alcohol		
	Frequency	Percent
No	1175	93.1
Yes	87	6.9
Total	1262	100.0
Chews tobacco		
	Frequency	Percent
No	1242	98.4
Yes	20	1.6
Total	1262	100.0
Smokes/uses Gutkha / paan masala with tobacco		
	Frequency	Percent
No	1211	96.0
Yes	51	4.0
Total	1262	100.0
Smokes/uses Khaini		
	Frequency	Percent
No	1097	86.9
Yes	165	13.1
Total	1262	100.0
Smokes/uses Paan with tobacco		
	Frequency	Percent
No	1194	94.6
Yes	68	5.4
Total	1262	100.0

The data from the NFHS-5 illustrates the prevalence of various forms of tobacco use and alcohol consumption among 1,262 female employees in Odisha. The study identifies behavioral patterns with significant health implications. Specifically, the prevalence of smoking and alcohol consumption among these women highlights trends of public health importance. Overall, 22.5% of the women reported using some form of tobacco other than cigarettes, indicating that nearly a quarter of the women engage in tobacco consumption. This suggests that tobacco use is relatively prevalent among working women in the state. Among the different types of smokeless tobacco, khaini is the most prevalent, with 13.1% of

women reporting its use, indicating its popularity in the region. Additionally, paan with tobacco (5.4%) and gutkha or paan masala with tobacco (4.0%) are consumed by a portion of the women, while chewing tobacco is the least common form, with a prevalence of 1.6%. Alcohol consumption by female employees is much lesser in number. Alcohol consumption was observed by only 6.9% of women, which means that there is about one out of every 14 women using alcohol. This lesser rate of use indicates current social norms and attitudes about the use of alcohol by women in the state of Odisha, where the use of alcohol by women is not very socially accepted in comparison to the use of tobacco by women. It can be seen that there is greater acceptance and preference of smokeless tobacco than the use of any form of smoking and alcohol consumption. Although alcohol use is very low, the use of smokeless tobacco, particularly khaini, poses a great danger to health. This habit increases the risks of oral cancers, cardiovascular disease, and several issues related to reproductive health.

Table 4: Hypertension and uses of Tobacco

Currently has hypertension	Currently smokes or uses tobacco besides cigarettes			X2- value, df, p-value
	Total	No	Yes	
No	1174	909(77.4%)	265(22.6%)	1.431, 2, p ~0.489
Yes	69	56(81.2%)	13(18.8%)	
Don't know	19	13(68.4%)	6(31.6%)	

The table above illustrates the association between the current status of hypertension and the use of tobacco products, excluding cigarettes. This association was evaluated using the chi-square test for independence, with a total sample size of 1,262 participants. Within the non-hypertensive group, 22.6% currently use tobacco, whereas 77.4% do not. Conversely, in the hypertensive group, 18.8% use tobacco, while 81.2% abstain. The group with an unknown hypertension status exhibited the highest percentage of tobacco use at 31.6%; however, this group comprised a very small sample size (n=19).

The chi-square test yielded a value of $\chi^2 = 1.431$ with a p-value of approximately 0.489, indicating no statistically significant differences among the three groups. Given that the p-value exceeds 0.05, there is no significant association between the current status of hypertension and the current use of tobacco. Consequently, it can be concluded that hypertension status does not influence tobacco use.

Table 5: Thyroid disorder and uses of Tobacco

Currently has thyroid disorder	Currently smokes or uses tobacco besides cigarettes			X2- value, df, p-value
	Total	No	Yes	
No	1225	948(77.4%)	277	7.872 ^a , 2, p~0.020
Yes	277	25(9.2%)	2(7.4%)	
Don't know	10	5(50%)	5(50%)	

The table illustrates the association between current thyroid disorder status and the use of tobacco products other than cigarettes. The dataset comprises a total of 1,512 participants. Among individuals without any thyroid disorder, 22.6% used tobacco products other than cigarettes, whereas 77.4% did not. Conversely, among respondents with a thyroid disorder, 7.4% used tobacco products other than cigarettes, while 92.6% did not. This indicates that the prevalence of tobacco product use, excluding cigarettes, is notably low among individuals with thyroid disorders. In the subset of individuals with unknown thyroid disorder status, 50% reported using tobacco products other than cigarettes; however, this group

consists of a very small sample size ($n=10$). The chi-square test yielded a value of $\chi^2 = 7.872$ with a p-value of approximately 0.020, indicating that the observed differences among the groups are statistically significant. Given that the p-value is less than 0.05, it can be concluded that there is a significant relationship between thyroid disorder status and the use of tobacco products other than cigarettes.

Table 6: Chronic respiratory disease and use of Tobacco

Currently has a chronic respiratory disease including asthma	Currently smokes or uses tobacco besides cigarettes			X2- value, df, p-value
	Total	No	Yes	
No	1235	955(77.3%)	280(22.7%)	10.644,2, $p \sim 0.005$
Yes	20(100.0%)	20(100.0%)	0(0%)	
Don't know	7 (100.0%)	3 (42.9%)	4(57.1%)	

The table analyzes the association between chronic respiratory disease and the consumption of tobacco products apart from cigarettes. A sample size of 1,262 people was used in the research. Out of the total number of people without a chronic respiratory disease, 22.7% used tobacco, while 77.3% did not. On the other hand, no one with a chronic respiratory disease consumed tobacco; all 20 people (100%) with chronic respiratory disease said they do not use tobacco. The last category of people, whose respiratory disease status was unknown, had a higher percentage of consumers (57.1%), but it is important to note that this was a small sample size ($n=7$). From the chi-square test conducted ($\chi^2 = 10.644$, $p \approx 0.005$), it can be concluded that there is a statistically significant difference among the three categories above. This is because the p-value is less than 0.05, and therefore the association between chronic respiratory disease and tobacco consumption is significant. From the results, it can be inferred that those with a chronic respiratory disease do not use tobacco products.

Table 7: Diabetes and Uses of Tobacco

Currently has diabetes	Currently smokes or uses tobacco besides cigarettes			X2- value, df, p-value
	NO	Yes	Total	
No	949 (77.5%)	275(22.5%)	1224(100.0%)	1.857 ^a $p \sim 0.395$
Yes	17(85.0%)	3(15.0%)	20 (100.0%)	
Don't know	12(66.7%)	6 (33.3%)	18(100.0%)	

Being diabetic at present was not significantly related to either current smoking or the use of tobacco products for any of the subjects studied ($\chi^2 = 1.857$, $p = 0.395$). The use of tobacco products was noted by 22.5% of participants who did not have diabetes, while this rate was 15.0% for participants having diabetes and 33.3% for those unaware of their diabetes status.

Table 8: Relationship between Diabetes and Occupation

Currently has Diabetes	Respondents' occupation							X2- value, df, p-value
	Professional /technical /managerial	Clerical	Sales	Services /house hold/domestic	Agricultural	Skilled And unskilled manual	Total	
NO	68(5.6%)	9(0.7%)	53(4.3%)	104(8.5%)	549(44.9%)	441(36.0%)	1224(100%)	49.745
Yes	4(20.0%)	0	4	4 (20.0%)	5(25.0%)	3	20	$p \sim 0.0$

			(20.0%)		(15.0%)	(100%)
Don't know	0	2(11.1%)	0	1(5.6%)	7(38.9%)	8(44.4%)
Total	72(5.7%)	11(0.9%)	57(4.5%)	109(8.6%)	561(44.5%)	45235.8

A statistically significant association was identified between the respondents' occupations and their current diabetic status ($\chi^2 = 49.745$, $p < 0.001$). Among respondents without diabetes, the predominant occupational group was agriculture, accounting for 44.9%, while skilled and unskilled manual workers constituted 36.0%. Conversely, among respondents with diabetes, agriculture represented 25.0% of the group, whereas professional/technical/managerial, sales, and services/household/domestic occupations each comprised 20.0%. Lastly, within the group of individuals unaware of their diabetic status, skilled and unskilled manual workers and those in agriculture accounted for 44.4% and 38.9%, respectively.

Table9: Age group and Hypertension

Age group (years)	Hypertension – No, n (%)	Hypertension – Yes, n (%)	Don't know, n (%)	Total, n (%)	X2-value,df p-value
15–19	105 (8.9%)	0 (0.0%)	3 (15.8%)	108 (8.6%)	44.796 p~0.0
20–24	161 (13.7%)	2 (2.9%)	2 (10.5%)	165 (13.1%)	
25–29	163 (13.9%)	2 (2.9%)	1 (5.3%)	166 (13.2%)	
30–34	199 (17.0%)	10 (14.5%)	4 (21.1%)	213 (16.9%)	
35–39	213 (18.1%)	20 (29.0%)	5 (26.3%)	238 (18.9%)	
40–44	177 (15.1%)	12 (17.4%)	1 (5.3%)	190 (15.1%)	
Total	1,018 (86.1%)	46 (100.0%)	16 (100.0%)	1,080	

The age group was found to have a statistically significant relationship with the current hypertension status ($\chi^2 = 44.796$, $p < 0.001$). There was a higher prevalence of cases of hypertension in respondents belonging to the older age groups especially the 35-39 age group which constituted 29.0% of the total respondents having hypertension, followed by 40-44 age group with 17.4% of the respondents. In contrast to this, there were no cases of respondents belonging to the 15-19 age group with hypertension, while only 2.9% of the respondents in the 20-24 and 25-29 age groups had hypertension.

Table 10: Age Group and Current Diabetes Status

Age group (years)	Diabetes – No, n (%)	Diabetes – Yes, n (%)	Don't know, n (%)	Total, n (%)	X2-value, df p-value
15–19	105 (8.6%)	0 (0.0%)	3 (16.7%)	108 (8.6%)	35.250 ^a p~0.0
20–24	164 (13.4%)	0 (0.0%)	1 (5.6%)	165 (13.1%)	
25–29	165 (13.5%)	0 (0.0%)	1 (5.6%)	166 (13.2%)	
30–34	210 (17.2%)	0 (0.0%)	3 (16.7%)	213 (16.9%)	
35–39	228 (18.6%)	4 (20.0%)	6 (33.3%)	238 (18.9%)	
40–44	182 (14.9%)	7 (35.0%)	1 (5.6%)	190 (15.1%)	
45–49	170 (13.9%)	9 (45.0%)	3 (16.7%)	182 (14.4%)	

The association between age and current diabetes status was statistically significant ($\chi^2 = 35.250$, $p < 0.001$). No respondents aged 15-34 years were diagnosed with diabetes, whereas individuals aged 35 years and older did exhibit diabetes. Among those with diabetes, the largest proportion was in the 45-49 years age group (45.0%), followed by the 35-39 years group (35.0%) and the 40-44 years group (20.0%). The prevalence of diabetes increased with age, with 1.7% in the 35-39 years group, 3.7% in the 40-44 years group, and 4.9% in the 45-49 years group.

Table 11: Wealth Index and Current Hypertension Status

Wealth Index	Hypertension – No, n (%)	Hypertension – Yes, n (%)	Don't know, n (%)	Total, n (%)	X2-value,df p-value
Poorest	545 (46.4%)	22 (31.9%)	13 (68.4%)	580 (46.0%)	18.172 ^a p~0.020
Poorer	274 (23.3%)	18 (26.1%)	3 (15.8%)	295 (23.4%)	
Middle	190 (16.2%)	9 (13.0%)	2 (10.5%)	201 (15.9%)	
Richer	95 (8.1%)	12 (17.4%)	0 (0.0%)	107 (8.5%)	
Richest	70 (6.0%)	8 (11.6%)	1 (5.3%)	79 (6.3%)	
Total	1,174 (100.0%)	69 (100.0%)	19 (100.0%)	1,262 (100.0%)	

The analysis revealed a statistically significant association between wealth status and current hypertension status ($\chi^2 = 18.172$, $p = 0.020$). Among individuals with hypertension, the highest proportions were observed in the poorest (31.9%) and poorer (26.1%) wealth categories. In contrast, the middle, richer, and richest categories accounted for 13.0%, 17.4%,

and 11.6%, respectively. For individuals without hypertension, the poorest wealth category had the highest percentage (46.4%), as did those unaware of their hypertension status (68.4%).

4. DISCUSSION

This study emphasizes the increasing burden of lifestyle-related non-communicable diseases (NCDs) among working women in Odisha, illustrating how gendered social and occupational contexts influence health behaviors and outcomes. The prevalence of tobacco use (22.5%) and alcohol consumption (6.9%) among women of working age, alongside measurable levels of hypertension, diabetes, thyroid disorders, and chronic respiratory diseases, indicates that NCD risk is no longer restricted to men or older age groups (Sharma et al., 2024). The significant correlation between tobacco use and chronic respiratory diseases and thyroid disorders suggests that lifestyle risks are already manifesting as adverse health outcomes in this relatively young and economically active population (Feng et al., 2025).

From the perspective of gender and Sustainable Development Goal (SDG) 5, these findings highlight structural inequalities that shape women's health trajectories. SDG 5 aims to achieve gender equality and empower all women and girls, including enabling women to participate in the labor market on equitable terms and without disproportionate health risks (Manandhar et al., 2018). In Odisha, many women are engaged in informal, low-paid, and physically demanding work, often combined with unpaid care responsibilities at home. These conditions may contribute to stress, social isolation, and limited autonomy, leading to dependence on substances such as tobacco or alcohol as coping mechanisms rather than purely individual "lifestyle choices." Thus, behavioral risks are embedded in gendered divisions of labor, unequal bargaining power in households and workplaces, and limited access to health-promoting resources (Sheth et al., 2026).

The strong association between tobacco use and chronic respiratory disease, as well as thyroid disorders, has implications for women's livelihoods and economic empowerment—central concerns of SDG 5. Poor health can reduce women's productivity, increase absenteeism, and push them out of the labor force, reinforcing economic dependency and gender gaps in income and decision-making power. In households where women's earnings are crucial for survival, illness may also heighten financial vulnerability through out-of-pocket health expenditures and lost income. Unaddressed NCD risks among working women can therefore undermine progress not only toward SDG 3 (Good Health and Well-being) but also toward SDG 5 targets related to equal rights to economic resources and women's full and effective participation in economic life.

The focus on working women also reveals deficiencies in gender-responsive health systems and workplace policies. Regular NCD screening, counseling on tobacco and alcohol use, and access to preventive services are often not integrated into occupational health programs, particularly in informal or semi-formal sectors where women are overrepresented. This reflects a broader pattern of gender-blind health and labor policies (Matsuura, 2022). Addressing lifestyle risks among working women requires interventions beyond individual behavior change, including gender-sensitive workplace policies such as flexible work arrangements, stress management support, protection from harassment and discrimination, and health education tailored to women's specific needs and constraints. These measures align with SDG 5 targets on recognizing and valuing unpaid care work and ensuring women's equal opportunities for leadership and participation in economic life (Lindberg et al., 2023).

At community and policy levels, empowering women with information, agency, and supportive environments is central to NCD prevention and the realization of SDG 5. Behaviour change communication must account for literacy levels, cultural norms, and women's time constraints, and should involve men, families, and employers to challenge gender norms that normalize substance use or restrict women's access to healthcare. Strengthening women's collectives, self-help groups, and trade unions can enhance collective bargaining for safer workplaces, health benefits, and social protection. Integrating gender and occupational perspectives into state-level NCD action plans would help ensure that working women in Odisha are explicitly recognized as a priority group. (M Randolph-Cunningham, 2017).

This study has some limitations. The use of NFHS-5 data constrains the analysis to self-reported behaviors and diagnosed conditions, which may underestimate the true prevalence of both risk factors and NCDs, especially among women with limited access to healthcare. The cross-sectional design precludes causal inference, so associations between tobacco use and specific health outcomes cannot be interpreted as definitive cause–effect relationships. Moreover, the analysis does not fully

capture sector-specific workplace exposures or the nuances of women's unpaid care burdens, which are critical dimensions of SDG 5. Future research should incorporate qualitative and mixed-methods approaches to explore how gender norms, workplace dynamics, and household responsibilities intersect to shape lifestyle risks and health outcomes among working women. (Rani & Subbiah, 2024).

Despite these limitations, the study provides evidence that lifestyle risks and NCDs among working women in Odisha are closely intertwined with gender inequality. The findings support the argument that advancing SDG 5 requires integrating health, labour, and social policies in a gender-responsive manner. Targeted interventions that reduce behavioral risks, expand access to screening and treatment, and create supportive workplace and community environments can improve women's health, strengthen their livelihoods, and accelerate progress toward gender equality and sustainable development in Odisha. (Bachani et al., 2021)

5. CONCLUSION

This research demonstrates that working women in Odisha face numerous challenges related to lifestyle behavior risks and non-communicable diseases (NCDs), with tobacco use, including both non-cigarette and smokeless forms, being particularly prominent. Although tobacco prevalence did not show a statistically significant association with hypertension and diabetes in this young demographic, inverse relationships with chronic respiratory diseases and thyroid issues highlight the complex interplay between health conditions and health behaviors. These findings emphasize the necessity for early detection, health education, and appropriate counseling. Consequently, it is crucial to prioritize working women in NCD prevention and control initiatives in Odisha, rather than subsuming them under broader categories such as adult women or women of reproductive age. Interventions, including health education, tobacco cessation, health screening activities, and the establishment of a healthy work environment, must be enhanced in both the formal and informal employment sectors for women. This study underscores the need for gender- and work-sensitive NCD policies and programs in Odisha. Identifying lifestyle-related risk factors within the socio-economic and occupational contexts of working women can facilitate early diagnosis and promote healthier behaviors. This approach will contribute to improving the health status concerning NCDs in Odisha and, more broadly, in India.

Declarations

Availability of data and materials: The data utilized in this study were obtained from the National Family Health Survey (NFHS-5, 2019–21), which is publicly available through the Demographic and Health Surveys (DHS) Program database at <https://dhsprogram.com>. Access to the dataset is granted upon registration and approval by the DHS Program. Researchers interested in the data and analytical materials used in this study may contact the corresponding author and obtain them upon reasonable request.

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