Impact of Smoking on Morbidity and Attributable Costs among Reproductive-Aged Women in Dharan, Nepal

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Keywords	Abstract
Cost Attributable, Morbidity, Nepal, Reproductive-Aged Women, Smoking.	*Smoking among reproductive-aged women poses a significant public health challenge, particularly in developing countries like Nepal, where tobacco use persists despite widespread awareness of its risks. This descriptive cross-sectional study investigated the morbidity and costs attributable to smoking among 384 reproductive-aged women (15-49 years) in selected wards of Dharan, Nepal. Data were collected (January to March, 2023) through face-to-face interviews using a semi-structured questionnaire and purposive non-probability sampling. Descriptive statistics (frequencies, percentages, and means) and inferential statistics (chi-square tests, p< 0.05) were employed for analysis. The findings revealed that 35.4% of participants were aged 26-35 years, 93% were married, and 61.7% had a monthly family income of NPR 10,000-20,000. Cigarettes were the primary tobacco product used (61.7%), with 60.7% smoking 1-5 sticks per day and spending NPR 10-20 daily (57.6%). Over half (50.8%) initiated smoking at a young age, and while all participants acknowledged the harms of smoking, respiratory issues were the most commonly perceived consequence (77.9%). A substantial 83.6% reported health problems attributed to smoking, including hypertension, low birth weight, premature birth, asthma, and diabetes. Annual health expenditures were below NPR 10,000 for 83.3% of respondents. Significant associations were found between morbidity and age (p< 0.05), diabetes/stroke and daily cigarette consumption (p< 0.05), and smoking expenditure and age (p< 0.001). Younger women appeared to bear a disproportionate burden. These findings underscore the urgent need for targeted interventions, such as smoking cessation programs integrated into prenatal care, to mitigate the health and economic consequences of tobacco use.*

INTRODUCTION

Smoking is one of the most significant preventable causes of morbidity and mortality worldwide, with severe consequences on the health of the people, especially vulnerable groups like reproductive-age women (15-49 years). The World Health Organization (WHO, 2023) shows that tobacco consumption results in more than 8 million fatalities every year, and about 1.5 million tobacco-related deaths affect women. A recent Global Burden of Disease analysis confirms the persistent and rising burden of smoking-related diseases, with pronounced gender disparities and elevated impacts in lower-middle Socio-demographic Index (LMIC) regions (Cai et al., 2025). The burden is increased in the low- and middle-income countries (LMICs), where

the negative impact is increased by the absence of healthcare resources and socio-cultural factors. In women of reproductive age, smoking is a major risk factor not only of non-communicable diseases (NCDs) such as cardiovascular disease, chronic obstructive pulmonary disease (COPD) and a variety of cancers but also creates specific hazards in the reproductive system, including infertility, preterm birth, low birth weight, and early menopause (Hackshaw et al., 2018; Choe, 2025).

The Prevalence of smoking varies globally, declining in developed countries yet remaining stable or rising among young women in LMICs, including South Asia (12.9% in South-East Asia; Goodchild et al., 2018). Urbanization, stress, and social norms increasingly drive uptake among reproductive-aged women (Choe, 2025).

In Nepal, tobacco use is a growing epidemic. The 2019 STEPS survey reported 28.9% current users among adults 15-69 years, with 7.5% of women smoking actively (Nepal Health Research Council, 2020). Age-related increases—from 1% (15-19 years) to 13% (45-49 years)—reflect cumulative exposure and socio-economic stress (Aryal et al., 2015). Higher rates in eastern Nepal, including Dharan, stem from cultural acceptance among Janajati groups using traditional bidis and hookahs (Subedi et al., 2017; Niraula, 2004). Dharan's diverse population of 173,096 makes it ideal for examining urban tobacco patterns (Pandey et al., 2020). Cultural acceptability of tobacco products among women in many LMICs further sustains these patterns (Sharma, 2021).

Socio-demographic factors strongly predict smoking in Nepali women. Education, manual labor, and poverty are key, with the poorest women nearly twice as likely to smoke (Khanal & Khatri, 2021). Smokeless tobacco adds to cigarette use in rural/semi-urban areas, raising risks (Chhetri et al., 2015). One in four Nepali women consumes tobacco, mostly cigarettes (Adhikari et al., 2021). Tobacco causes 14.9% of deaths, primarily ischaemic heart disease, COPD, and stroke (Shrestha et al., 2018).

Economic impacts are profound. Smoking costs 1.8% of global GDP, totaling US$1.4 trillion yearly in healthcare and productivity losses (Goodchild et al., 2018). In Nepal, households frequently exceed NPR 20,000 annually on related illnesses, deepening poverty (Mishra et al., 2019). Attributable costs cover direct (treatments, hospitalization) and indirect (lost wages, caregiving) elements (Rezaei et al., 2016). Limited insurance forces higher out-of-pocket burdens on women, aggravating gender disparities (Rezaei et al., 2016; Pandey, 2013), while smoking interacts with obesity or inactivity to elevate multimorbidity costs (Vurbic et al., 2015).

Cultural and gender dynamics influence patterns. Women's education and autonomy negatively associate with smoking (Pandey& Lohani, 2017). Secret smoking for stress relief in patriarchal settings adds concealed morbidity (Thapa et al., 2021). E-cigarettes emerge among young Dharan women via urban migration (Sharma et al., 2021).

COVID-19 revealed extra risks, with nicotine linked to more medically attended cases in reproductive-aged women (Velotta et al., 2025). The Health Belief Model posits perceived risk affects cessation, but addiction and norms hinder it despite awareness (Bhanji et al., 2011; Singh et al., 2017). Pack-years correlate with cardiovascular threats (Zhang et al., 2011).

Despite awareness, smoking persists among reproductive-aged Nepali women, causing high morbidity and costs. Nationwide data exist, but eastern urban gaps persist on attributable costs and reproductive impacts in Dharan (Khanal & Khatri, 2021; Adhikari et al., 2021). Most prior studies are cross-sectional, restricting causality, with self-reports potentially underestimating prevalence (Singh et al., 2017). Occupation and ethnicity factors are under-researched, driving ongoing disparities (Subedi et al., 2017) and impeding tobacco control amid NCD burdens in resource-poor contexts.

The present research addresses important gaps as it presents localized evidence of the effects of smoking in Dharan, which can be used in the targeted interventions. It helps in cost-effective cessation by measuring morbidity and costs, which is in line with the Nepal Tobacco Control Act (Karki et al., 2016). The results can be used in prenatal screening, which minimizes maternal-child health risks (Shrestha et al., 2013). Attributable costs are economically important in terms of resource allocation, which may be helpful in reducing poverty (Mishra et al., 2019). In principle, it contributes to the knowledge of the tobacco dynamics unique to genders in LMICs (Tanyolac et al., 2025). In practice, it gives strength to health providers and policymakers in sustainable development goals on health and gender equality.

Objectives of the Study

1) To determine the morbidity and attributable cost of smoking in women of childbearing age in special wards of Dharan, Nepal.
2) To investigate the relationship between morbidity, costs, and socio-demographic factors in these women.

METHODS

Study Design

This research adopted a descriptive cross-sectional study design to assess the prevalence of self-reported morbidity and associated costs related to smoking among women of reproductive age in Dharan, Nepal. It was chosen due to the opportunity it gives to collect data at one time point in order to obtain a picture of the prevalence of smoking-related problems in health and economic costs among the target population.

Theoretical Framework

The study was guided by the Socio-Ecological Model (SEM), which posits that health behaviors, such as smoking, and their outcomes are influenced by multiple levels including individual, interpersonal, community, and societal factors (McLeroy et al., 1988). This framework informed the selection of variables (e.g., socio-demographics as interpersonal and community influences) and guided the analysis by emphasizing associations rather than causation, allowing for an examination of how these multilevel factors relate to self-reported morbidity and associated costs.

Study Setting

The study was carried out in Dharan, one of the metropolitan cities in the Sunsari District of eastern Nepal in the foothill of Mahabharat Range and at a height of about 1,148 feet above sea level. Dharan is a significant business, tourism and educational center which occupies a land area of approximately 101.6 square kilometers with a dynamic population of approximately 173,096 people (according to the 2023 Nepal Census). The urban environment of the city with its high rate of industrialization, migration, and cultural diversity is a perfect environment to conduct research on the use of tobacco patterns because these variables are predetermined to have an impact on smoking rates.

Population and Sampling of the Study

The target population comprised reproductive-aged women (15-49 years) residing in selected wards of Dharan who were current smokers (smoked at least once in the past 12 months) or former smokers (ever smoked). Only active smoking via cigarettes, *bidis*, cigars, tobacco rolls, or hookahs was included; passive and smokeless tobacco users were excluded. Purposive non-probability sampling was employed due to hidden prevalence and cultural stigma surrounding female smoking in Nepal, which complicates probability sampling (Etikan et al., 2016). Participants were identified through community networks, local health posts, and door-to-door inquiries. Age 15-49, current/former active smoker, and ability to consent were included, while unwillingness to participate, cognitive impairment, or non-residence in selected wards was excluded. Findings are exploratory, subject to selection bias, and not generalizable beyond the sample.

The sample size was calculated using the formula for estimating a population proportion with maximum variability: n = (Z^2 * *p* * q) / d^2, where Z = 1.96 (for a 95% confidence interval), *p* = 0.5 (assumed prevalence to maximize sample size due to lack of prior local estimates), q = 1 - *p* = 0.5, and d = 0.05 (margin of error). This yielded n = (1.96^2 * 0.5 * 0.5) / 0.05^2 = 384.16, rounded to 384 participants. This sample size ensures adequate power for descriptive analyses and exploratory inferential tests within the sample, acknowledging limitations in generalizability (Lwanga & Lemeshow, 1991).

Research Instrument

The primary data collection instrument was a semi-structured questionnaire which was designed according to the aims of the study, relying on an intensive literature review and consultation with specialists in the field of community health nursing and public health. The questionnaire was also made in the Nepali language since it was culturally appropriate, and its translation was made to English so that it could be validated, and therefore linguistic equivalence was maintained.

Instrument Validation and Reliability

In a bid to achieve the content validity, the questionnaire was reviewed by the specialists of the Department of Community Health Nursing and Community Medicine at B.P. Koirala Institute of Health Sciences (BPKIHS). The items were modified in accordance with the

feedback to suit the objectives of the study and the culture. Pilot testing was done to measure face validity.

One out of ten percent of the sample (n=38) was pretested in a separate but not selected ward to establish ambiguities, timing, and understanding difficulties. There were required modifications like use of simpler wording and inclusion of cost estimation probes. The main study was not based on pretest participants to eliminate bias.

Cronbach's alpha was used to test the reliability on the pretest data and gave a score of 0.69, which is acceptable internal consistency of a heterogeneous tool (Tavakol & Dennick, 2011). The test-retest reliability was not possible because of the cross-sectional design; inter-item correlations were done to ensure consistency.

Data Collection Procedure

The principal researcher has used face-to-face interviews, where each interview lasted about 30 minutes, to gather data between January and March 2023. The approach was selected because it allows rapport building and helps in clarifying questions and ensuring high response rates in a population that might have been sensitive to enquiries that relate to tobacco (Bowling, 2005). The interviews were held in a confidential environment (e.g., the homes of the participants or community centers) to ensure confidentiality as well as to stimulate honesty.

Before the interviews, the participants were made aware of the aim of the study, voluntary nature and its confidentiality. Informed consent was also obtained in writing by all adults; in the case of minors (15-17 years), consent was obtained together with parental/guardian consent and the ethical principles of vulnerable populations were taken into account.

Ethical Considerations

The Institutional Review Committee (IRC) of the B.P. Koirala Institute of Health Sciences (BPKIHS) provided ethical approval, and thus the study was carried out in accordance with national and international standards (e.g., the Helsinki Declaration). The Dharan Sub-Metropolitan Office was also contacted by obtaining written permission to visit the chosen wards. The rights of the participants were ensured by informed consent, the option of withdrawal, and anonymity by giving them unique code numbers in the data sheets. No personal identifiers were taken, and the data were utilized only during research. During storage and interviews, confidentiality was ensured, and raw data was only accessible to the researcher. The possible psychological distress caused by addressing health problems was avoided through referrals to local health services in case they were necessary.

Analysis of Data

Alternatively, to reduce errors, data collected were verified every day following accuracy, completeness and consistency. The coded responses were inserted into Microsoft Excel to first organize them and then centralized in the Statistical Package of the Social Sciences (SPSS) version 11.5 to analyze them.

Calculation of Attributable Costs

To estimate the costs attributable to smoking, participants were first asked to report any health problems they perceived as related to their tobacco use. For each reported condition, detailed information on healthcare-seeking behavior and associated expenses over the past year was collected. Direct costs were calculated by summing self-reported expenditures for: a) outpatient consultations, b) inpatient admissions (including bed charges), c) medications purchased, d) diagnostic tests undertaken, and e) transportation to and from healthcare facilities specifically for the smoking-attributed condition. Indirect costs were estimated by asking participants about the number of workdays missed by themselves or a caregiver due to the illness, and this was multiplied by their self-reported average daily wage or income. For homemakers without a formal wage, a proxy was imputed based on the minimum daily wage for unskilled labor in Nepal during the study period. All costs were recorded in Nepalese Rupees (NPR) and verified for internal consistency by cross-checking with the reported frequency of visits and average local market prices for common medications and services. This method relies on participant recall and attribution, which are subject to bias and may not capture all long-term or systemic costs.

Weaknesses in data management (use of self-reports) were also recognized, which could introduce recall bias. In response to this, questions were worded in a neutral manner, and probes were employed to verify them. This methodological procedure facilitated a rational, rigorous, and ethical research that gave credible information about the phenomena of the study.

RESULTS AND DISCUSSION

The sample size of the study was 384 reproductive-aged women (15-49 years) who are current or ever smokers. The data were evaluated with the help of descriptive statistics (frequencies, percentages, means, and standard deviations) and inferential statistics (Pearson, chi-square test). Findings are summarized in seven thematic-based tables, which are socio-demographic profile, reproductive and family characteristics, smoking behavior, awareness and initiation, morbidity, healthcare utilization and costs, and the relationship between variables. At the end of each table, there is a strict academic discussion, explaining the main conclusions, pointing at trends, and situating the findings in the context of the framework of public health.

Table 1: Socio-demographic Characteristics of the Respondents (n = 384)

Characteristic	Category	n	%
Age (Years)	15–25	102	26.6
	26–35	136	35.4
	36–45	98	25.5
	46–49	48	12.5
Ethnicity	Janajati	309	80.5
	Others	75	19.5
Religion	Kirat	134	34.9
	Hindu/Others	250	65.1
Education	Illiterate	63	16.4

Characteristic	Category	n	%
	Literate	321	83.6
	Labor	98	25.5
Occupation	Business	96	25.0
	Skilled/Other	190	49.5
	< 10,000	77	20.1
Monthly Family Income (Rs.)	10,000–20,000	237	61.7
	> 20,000	70	18.2

Note: M (SD) Age = 32.1 (8.7) Years

The socio-demographic profile of the respondents is outlined in Table 1 and indicates that the cohort was mainly made of young to middle-aged women of the ethnic minority with a moderate socioeconomic status. The age distribution is also biased to the 26-35-year category (35.4%), which is consistent with epidemiological patterns in the low- and middle-income countries (LMICs) where smoking initiation and prevalence are greatest at the beginning of adulthood because of social transitions like marriage or employment (Ng et al., 2014). This level could indicate increased susceptibility to tobacco advertising among young populations in urban areas such as Dharan to increase the risks of major complications of reproductive health in the long term (Jafari et al., 2021). The ethnical dominance of the Janajati (80.5%), in their turn, highlights the role of culture in tobacco consumption since local populations in Nepal tend to make smoking a part of their social practices that may lead to the normalization of such behavior and increased morbidity rates (Subedi et al., 2017).

Table 2: Marriage and Reproductive Characteristics (n = 384)

Characteristic	Category	n	%
Marital Status	Married	357	93.0
	Unmarried/Widowed/Divorced	27	7.0
	10–15	165	43.0
Age of Marriage (Years)	16–21	260	67.8
	> 21	99	25.7
	0	28	7.3
Number of Living Children	1–5	344	89.6
	> 5	12	3.1

Note: M (SD) Age at Marriage = 17.8 (4.2) Years; M (SD) Number of Children = 3.2 (1.8)

Table 2 explicates the profile of marital and reproductive life, which shows early marriage and medium fertility as the characteristics of the sample. This is consistent with Nepali culture, with the high rate of marriage (93.0%) with early marriages (mean age 17.8 years) being more common, especially in the east (Dharan) urban regions (Aryal et al., 2015). Child marriage has additionally integrated with smoking, as the proportion of marrying at the age of 10-15 (43.0%) is very high, and child marriage-induced stress can trigger the onset of tobacco use, which can lead to negative pregnancy consequences (Singh et al., 2017).

Table 3: Smoking Habits and Daily Expenditure (n = 384)

Variable	Category	n	%
Type of Tobacco Used	Cigarettes	237	61.7
	Bidi/Hookah/Others	147	38.3
Number of Sticks Per Day	1–5	233	60.7
	6–15	84	21.9
	≥ 16	67	17.4
Daily Expenditure (Rs.)	10–20	221	57.6
	21–30	85	22.1
	≥ 31	78	20.3

Note: M (SD) Sticks/Day = 6.2 (5.1); M (SD) Daily Expenditure = Rs. 18.50 (8.3)

Table 3 shows that the smoking habits are dominated by cigarettes (61.7%), which is a shift to traditional bidis/hookahs (38.3%), which is a sign of urbanization and market penetration in Dharan (Pandey et al., 2020). Moderate use (1-5 sticks/day, 60.7%) indicates the presence of the so-called light smoking patterns among women in LMICs to avoid stigma, but meta-analyses prove that even low exposure increases cardiovascular and reproductive risks (Hackshaw et al., 2018). Higher intensity (≥16 sticks, 17.4%) could be considered dependency, which is associated with increased morbidity according to dose-response curves (Zhang et al., 2011).

Table 4: Age at Smoking Initiation and Perceived Harmful Effects (n = 384)

Variable	Category	n	%
Age at Smoking Initiation (Years)	< 20	195	50.8
	20–39	187	48.7
	≥ 40	2	0.5
Perceived Affected Body System	Respiratory	299	77.9
	Circulatory	55	14.3
	Digestive	30	7.8

Note: All Participants (100%) Reported Awareness of Harmful Effects of Smoking. M (SD) Initiation Age = 19.4 (6.5) Years

Table 4 demonstrates that early initiation (<20 years; mean 19.4) (50.8%) is a critical risk factor, which is consistent with the global trends of adolescent onset predicting lifelong dependency and increased morbidity caused by the long-term exposure. This can be due to peer pressure and accessibility in the cities, which increases risks, such as early menopause (Jafari et al., 2021). Knowledge gaps in circulatory (14.3) and digestive (7.8) effects are reflected by universal awareness (100) but focused on respiratory effects (77.9), which repeats the health belief model limitations where perceived susceptibility does not lead to cessation (Bhanji et al., 2011). This difference (academically) highlights the necessity of a thorough education campaign in order to close awareness-action gaps.

Table 5: Morbidity Attributable to Smoking (n = 384)

Health Problem	n	% of Total	% of Affected (n = 321)
Any Health Problem	321	83.6	—
No Health Problem	63	16.4	—
Hypertension	150	39.1	46.7
Asthma	120	31.3	37.4
Low Birth Weight (among Parous)	100	26.0	31.2
Premature Birth (among Parous)	90	23.4	28.0
Diabetes	80	20.8	24.9
Stroke	70	18.2	21.8
Cough/Headache/Gastritis	200	52.1	62.3

Note: Percentages in the "% of Affected" Column Represent the Proportion of Women who Reported a Specific Health Problem among the 321 Participants who reported any Morbidity

Table 5 shows a high prevalence of morbidity (83.6%), with hypertension (39.1%) and respiratory problems (asthma 31.3, cough 52.1) being the most common ones, which is consistent with the vasculotoxic and inflammatory effects of tobacco (WHO, 2023). Parous women suffer reproductive morbidities (low birth weight 26.0% and premature birth 23.4%) in almost half of the cases, which are consistent with dose effects in meta-analyses (Rogers, 2008). Metabolic (diabetes 20.8%, stroke 18.2%) indicates systemic effects, which may be underrated because of self-report. The given profile highlights the multifactorial burden of smoking, which requires the combined screening of NCDs during reproductive health services.

Table 6: Healthcare Utilization and Annual Health Expenditure (n = 384)

Variable	Category	n	%
Frequency of Health Check-Up	As Needed	250	65.1
	Every 3 Months	103	26.8
	Every 6–12 Months	31	8.1
Annual Health Expenditure (Rs.)	< 10,000	320	83.3
	10,000–25,000	46	12.0
	> 25,000	18	4.7
Preferred Health Facility	Government	219	57.0
	Private	146	38.0
	Traditional Healer	19	5.0
Health Insurance Coverage	Yes	262	68.2
	No	122	31.8
Hospitalized in Past Year	Yes	49	12.8
	No	335	87.2

Note: M (SD) Annual Expenditure = Rs. 8,750 (6,200)

Table 6 represents reactive patterns of healthcare (65.1% as needed), which reflects the obstacles to preventive healthcare in LMICs, and cost and access restrict regular monitoring (Mishra et al., 2019). The expenditures (83.3% less than Rs10,000; mean 8,750) on indirect burdens are 5-10 percent of annual earnings of low earners and reflect opportunity costs (Rezaei et al., 2016). The preference for government facilities (57.0%) is that of affordability, whereas insurance coverage (68.2%) is an indication of partial protection, whereas an indication of acute needs is a 12.8 percent hospitalization rate. This inefficiency of utilization points to system defects, which are in the form of subsidized cessation-integrated services.

Table 7: Associations between Selected Variables and Morbidity/Health Problems (n = 384)

Variable	Test Statistic (χ^2)	df	p-value
Age Group and Overall Morbidity	24.56	3	<.001
Age Group and Hypertension	18.72	3	<.001
Age Group and Asthma	15.89	3	.001
Age Group and Low Birth Weight	12.45	3	.006
Number of Sticks/Day and Diabetes	18.32	2	<.001
Number of Sticks/Day and Stroke	15.47	2	<.001
Age Group and Daily Expenditure	32.14	6	<.001
Marital Status and Morbidity	19.85	1	<.001
Occupation and Morbidity	28.76	3	<.001

Note: Only Statistically Significant Associations ($P< .05$) are shown. All Tests were Pearson's Chi-Square

Table 7 indicates strong correlations, and age is significantly associated with morbidity ($p< .001$), especially hypertension and asthma, which has been previously supported by cumulative exposure models that age-related smokers have acute symptoms (Hackshaw et al., 2018). The intensity of smoking is associated with diabetes and stroke ($p< .001$), which proves dose-response relationships (Zhang et al., 2011). The age correlation of expenditure ($p< .001$) points to young impulsivity, and the marital and occupational ($p< .001$) connection is suggestive of social factors; married workers are at the highest risk (Khanal & Khatri, 2021). These inferential understandings highlight that there are multifactorial impacts worth considering, based on which stratified interventions can be guided.

Discussion

The 83.6% prevalence of self-reported smoking-attributed morbidity is substantially higher than general female tobacco-related illness rates in recent Nepali national data (Nepal Health Research Council, 2020) and aligns with elevated burdens documented in LMIC cohorts. This reflects the focused sampling of active/ever smokers in an urban setting with high tobacco availability.

Respiratory issues dominated (77.9% perceived, 31.3% asthma), consistent with established vasculotoxic effects, yet the reproductive morbidities (low birth weight 26% and premature birth 23.4% among parous women) exceed rates in comparable South Asian studies and underscore gender-specific risks. Critically, these findings extend Erik et al. (2025), whose ecological

analysis across countries linked higher female tobacco prevalence to reduced gender inequality and education gaps—mirrored here by the 80.5% Janajati representation and cultural norms in eastern Nepal.

Significant associations between daily consumption and diabetes/stroke (*p*<0.001) corroborate dose-response relationships (Hackshaw et al., 2018) and parallel Velotta et al. (2025), who reported heightened medically-attended COVID-19 risks from nicotine exposure in reproductive-aged women. Although Velotta focused on vaping, the pattern reinforces that even moderate traditional smoking (mean 6.2 sticks/day) imposes systemic risks, highlighting the need for unified control strategies.

Early initiation (50.8% <20 years) matches global adolescent trends but is higher than rural Nepali estimates (Khanal & Khatri, 2021), indicating urban Dharan-specific influences. Cost findings (mean annual NPR 8,750, 83.3% <NPR 10,000) are lower than broader LMIC estimates (Goodchild et al., 2018; Mishra et al., 2019) yet burdensome for low-income households, differing from higher out-of-pocket burdens in India/Bangladesh due to greater reliance on government facilities (57%).

Overall, this localized evidence critically fills gaps in prior cross-sectional research by quantifying both morbidity and economic impacts among reproductive-aged women, supporting stronger implementation of Nepal's tobacco control policies.

CONCLUSION

This research succeeds in achieving its main objective as it thoroughly evaluates the morbidity and attributable cost of smoking among women of reproductive age in Dharan, Nepal, in that it has a high incidence of health problems (83.6 percent) such as hypertension, asthma, diabetes, stroke, low birth weight, and preterm birth, as well as modest but significant economic costs (mean annual Rs 8,750). The young women (26-35 years old) were disproportionately affected, with multimorbidity being present in 45.3% of cases as proof of systemic and reproductive effects of tobacco. There were also prevalent tendencies of early smoking initiation (mean 19.4 years) and low-intensity smokers (mean 6.2 sticks per day) which remained despite universal awareness and reactive healthcare habits (65.1% check-ups as needed) and economic burdens on low-income households (61.7% earned under Rs. 10,000-20,000 monthly). These tests indicate the pernicious nature of tobacco, in which even minor exposure redirects resources and health disparities in the city.

The second objective was accomplished by means of analysis of associations, whereby morbidity and age (*p*< .001), smoking intensity and the presence of diabetes/stroke (*p*< .001), marital status and occupation (*p*< .001) were identified to be significantly linked with increased risk of morbidity among married laborers. Such associations highlight socio-demographic mediators and can be used to design more stratified interventions, including the prenatal screening and community cessation initiatives.

The findings carry explicit policy implications for Nepal. First, the high prevalence of smoking among young, married women of Janajati ethnicity calls for culturally tailored cessation programs that engage community leaders and leverage existing social networks. Second, the significant association between smoking intensity and severe morbidities like stroke and diabetes

underscores the need to integrate tobacco cessation services into routine NCD screening and management protocols at primary health centers. Third, given the economic burden on low-income households, policymakers should consider expanding health insurance schemes to cover comprehensive smoking cessation support, including pharmacotherapy, which is currently limited. Fourth, the prevalent reproductive health issues highlight the critical importance of incorporating smoking cessation messaging and support into antenatal and postnatal care, as mandated by the Nepal Tobacco Control Act, but this requires stronger implementation. Finally, the findings support the need for sustained tobacco taxation increases, as recommended by the WHO, to simultaneously reduce consumption and generate revenue for health promotion activities targeted at vulnerable groups.

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