**Background**

Overweight/obesity, and hypertension, are considered as major risk factors for various non-communicable diseases (NCDs), including cardiovascular diseases (CVD) such as heart disease and stroke, which are the leading causes of death worldwide. In 2019, an estimated 5 million deaths from noncommunicable diseases (NCDs) were attributed to having a higher-than-optimal body mass index (BMI). Additionally, approximately 1.28 billion adults aged 30 to 79 years worldwide have hypertension, which is also considered a significant cause of premature death globally.(Hypertension, n.d.; Obesity, n.d.).

Compared to 1990, the percentage of hypertensive adults in the WHO European region decreased in 2019, while in a similar time frame, a significant increase was noted in Asian regions, particularly in WHO Southeast Asia, where the percentage increased from 29% to 32%. Additionally, in 2022, 1 in 8 people worldwide were living with obesity. Over the past four decades, obesity has more than doubled. As of 2019, there were 2,329,503 deaths in Asia, attributed to high body mass index (BMI), an increase of 265% from 1990. A 268% increase in disability-adjusted life years (DALYs) has been associated with high BMI in the last 30 years for the Asian region.(Global Report on Hypertension, n.d.; Li et al., 2023).

Nepal has experienced a notable rise in weight-related health issues over the past two decades. Among women of reproductive age, overweight rates nearly tripled from 8.5% to 22.2% between 2006 and 2016, while obesity rates increased more than fivefold from 0.9% to 5.1%. For men, a 2016 health survey revealed that 17.1% were overweight and 2.5% were obese. These weight trends coincide with significant cardiovascular as well as NCD-related health concerns in the country. Research shows that over a quarter of Nepal's population (27.3%) suffers from hypertension or pre-hypertension. Cardiovascular diseases have become the leading cause of disability-adjusted life years lost in Nepal, with high blood pressure and elevated body mass index identified as the primary risk factors. While Nepal's cardiovascular disease rates exceed the South Asian average, they remain below global levels.(Bhattarai et al., 2020; Huang et al., 2019; Wei et al., 2024)

Although multiple studies have documented the prevalence of overweight and hypertension in Nepal, there is limited research using geospatial analysis to examine the determinants and distribution of these chronic disease risk factors. While epidemiological studies have investigated the distribution of cardiovascular disease risk factors, there remains a need for clearer geospatial analysis to inform targeted policies. To address this gap, we aimed to conduct a comprehensive spatial analysis using national survey datasets to understand the geographic distribution of hypertension and overweight/obesity in Nepal and their associated factors.

**Methods**

**Study design**

This study analyzed secondary data from The Demographic and Health Surveys (DHS) Program

Nepal (NDHS), nationally representative surveys, conducted in 2022 in Nepal.(*The DHS Program - Country Main*, n.d.)

**Study setting**

Nepal is a landlocked nation situated in South Asia (27°42'N to 30°27'N and 80°04'E to 88°12'E) and encompasses a total area of 147,516 km². Following the 2015 constitutional establishment of the Federal Republic, the country's administrative structure comprises seven provinces subdivided into 77 districts. The urban-rural framework consists of 6 metropolitan cities, 11 sub-metropolitan cities, 276 urban municipalities, and 460 rural municipalities. The country's physical geography is characterized by three distinct ecological zones, the Mountains (elevation >2,000m), Hills (elevation 700-2,000m), and Terai (elevation <700m). Demographic data from the 2021 Census indicates a population of 29,164,578, with a female majority (51.1%) and a modest annual growth rate of 0.92%.(Board, n.d.; *Population | National Population and and Housing Census 2021 Results*, n.d.)

**Sample and sampling:**

The NDHS surveys used two-stage cluster random sampling. The sampling process of NDHS 2022 is described in the NDHS reports. In 2022, thirty households were selected from each primary sampling unit (total clusters: 476: 248 from urban and 228 from rural) in the first stage of sampling, resulting in a total sample size of 14,280 households (7,440 from urban and 6,840 from rural areas). Of the total households selected, interviews were conducted in 13,786 households.  A total of 14,845 women and 4,913 men were successfully interviewed with a response rate of 97% response rate among women and 95% response rate among men participants.(*The DHS Program - Nepal: Standard DHS, 2022 Dataset*, n.d.)

**Data collection:**

Data collection for NDHS 2022 took place between January 5 and June 22, 2022.(*The DHS Program - Country Main*, n.d.)

**Measurement of variables**

**Outcome variable**

This study analyzed two binary outcome variables derived from anthropometric and clinical measurements. Body Mass Index (BMI), along with other anthropometric factors such as height and weight, were extracted from the dataset. Following the Asia pacific classification, participants were categorized into two binary groups: those with a BMI of 23 kg/m² or higher were coded as '1' (overweight/obese), while those with a BMI of less than 25 kg/m² were coded as '0' (normal/underweight). (Weir & Jan, 2024)

From the dataset, final systolic and diastolic blood pressure measurements were extracted Following the American Heart Association guidelines, participants were classified as hypertensive (coded as '1') if they had a systolic blood pressure ≥130 mmHg and/or diastolic blood pressure ≥80 mmHg. Those with blood pressure below these thresholds were classified as normal (coded as '0').(*High Blood Pressure&nbsp;*, n.d.)

**Independent variables**

Given the literature and availability of variables across the DHSs, we used respondents' sex respondents age, marital status, educational level, wealth index, residency region, and ecological region.

**Data Processing**

In accordance with DHS guidelines, the dataset was initially downloaded and stratified by gender, and processed separately for male and female-specific variables. Male-specific and female-specific variables were carefully separated before being standardized and merged into a unified dataset for comprehensive analysis. The anthropometric measurements underwent systematic standardization procedures. Body Mass Index (BMI) values were adjusted according to DHS guidelines. Weight measurements were converted using proper decimal placement as specified by DHS, while height measurements were transformed to meters following DHS guidelines. After these adjustments, BMI was categorized into a binary variable using Asian-specific cut-off points: BMI ≥23 kg/m² was coded as '1' to represent overweight or obese status, while BMI <23 kg/m² was coded as '0' for normal. Blood pressure measurements were processed according to the American College of Cardiology/American Heart Association guidelines to create a binary hypertension variable. Participants with a systolic blood pressure of ≥130 mmHg and/or diastolic blood pressure of ≥80 mmHg were classified as hypertensive (coded as '1'), while those below these thresholds were coded as '0'.

Demographic variables were categorized to facilitate analysis and interpretation. Age was stratified into three groups: young adults (16-39 years), middle-aged adults (40-59 years), and older adults (60+ years). Education levels were classified into three categories: "No education" (including those who responded 'don't know'), "Basic Education" (comprising lower and upper basic education, grades 1-8), and "Secondary or Higher" (including lower secondary, higher secondary, and above). Marital status was condensed into three categories: "Married," "Unmarried," and "Divorced/Separated/Widowed." Wealth status was derived from the DHS wealth index and categorized as "Poor" (combining the poorest and poorer quintiles), "Middle" (middle quintile), and "Rich" (combining the richer and richest quintiles). To ensure data quality and completeness, the final analytical dataset included only cases where either BMI or blood pressure measurements were available; records missing both measurements were excluded from the analysis.

**Statistical analysis**

We used R version 4.4.1 for pre-analytical processing and statistical analysis. The analysis employed a complex survey design approach using the survey package in R to account for the DHS sampling methodology. Survey weights and primary sampling units were incorporated into the survey design object to ensure nationally representative estimates. Descriptive statistics were calculated for both categorical and continuous variables. For categorical variables, weighted counts and percentages were calculated and presented, while means and standard deviations were calculated for continuous variables.

Two separate multivariable logistic regression models were fitted using the survey-weighted model. The first model examined factors associated with overweight/obesity, while the second investigated factors associated with hypertension. Both models included other covariates. Model diagnostics included variance inflation factor (VIF) analysis to assess multicollinearity. Results are presented as adjusted odds ratios (OR) with 95% confidence intervals.

**Geospatial Analysis**

To examine the spatial distribution and clustering of overweight/obesity and hypertension across Nepal, we conducted a spatial analysis using SaTScan software **version()** and visualized results using ArcGIS Pro **Version().** A purely spatial Bernoulli model was employed for both outcomes of interests.

The spatial scan statistics using the Bernoulli model were implemented to detect geographic clusters with significantly high or low rates of each condition. The analysis was performed using the following parameters: circular scanning window, maximum spatial cluster size set to 50% of the total population at risk, and statistical significance assessed using 999 Monte Carlo replications. Identified clusters were considered significant at p<0.05. Results are presented in tabular format showing cluster characteristics including radius (km), number of locations within each cluster, population coverage, observed and expected cases, relative risk, percentage of cases in the area, log-likelihood ratio, and p-values. Additionally, spatial distribution maps were made using ArcGIS Pro, with relative risks indicated by different colors. The maps include district boundaries and topographical features for geographic context.

**Ethical approval (THIS was my initial plan now needs to change)**

We carried out a secondary data analysis for this study, which did not necessitate obtaining ethical approval. Nonetheless, the original survey that provided the data received ethical clearance from the Nepal Health Research Council's ethical review board (Reference number: 678, Date: 30th September 2021) and the institutional review board of ICF International (Reference number: 180657.0.001.NP.DHS.01, Date: 28th April 2022). To access the data, we registered on the official website of “The DHS Program” (http://www.dhsprogram.com) and submitted a request. Once we received the necessary permissions, we downloaded the data from the DHS online archive and agreed to their terms of use.(*The DHS Program - Datasets Terms of Use*, n.d.)

**Results**

Table 1. represents the sociodemographic and health parameters of our study participants. Results include weighted results. Among the weighted 136,235 participants, a majority were female 68.2%, and were aged between 16-39 years 60.3%. Most participants were married 73.2%, and around 39.2% of the participants had attained secondary or higher education. The respondents were mostly residing in urban areas 67.3%, and more than half of the respondents were residing in the Terai ecological region 53.8%. In our study, 42.0% of the participants were classified as rich, while 38.4% were categorized as poor, and the remaining were in the middle-income category. 38.5% of participants were classified as hypertensive, and 42.5% were categorized as overweight/obese. The mean age of participants was 37.9 years with an SD of 16.59. Average systolic and diastolic blood pressure was 116.83 mmHg with an SD of 19.63 mmHg and 75.96 mmHg with an SD of 11.52 mmHg, respectively among our study participants. The mean BMI was 22.82 kg/m² (SD 4.24), with participants having an average height of 1.55 meters (SD=0.08) and weight of 55.03 kg (SD 11.58).

**Table 1. Socio-demographic characteristics and health parameters of study participants.**

|  |  |  |  |
| --- | --- | --- | --- |
|  | | **Total** | **Percent** |
| **S. N** | **Gender** | | |
| 1 | Male | 43,371 | 31.8 |
| 2 | Female | 92,864 | 68.2 |
|  | **Age Category** | | |
| 1 | 16-39 | 82,186 | 60.3 |
| 2 | 40-59 | 36,702 | 26.9 |
| 3 | 60+ | 17,347 | 12.7 |
|  | **Marital Status** | | |
| 1 | divorced/separated/widowed | 9,338 | 6.9 |
| 2 | Married | 99,732 | 73.2 |
| 3 | Unmarried | 27,166 | 19.9 |
|  | **Education Category** | | |
| 1 | No education | 40,070 | 29.4 |
| 2 | Basic Education | 42,722 | 31.4 |
| 3 | Secondary or Higher | 53,443 | 39.2 |
|  | **Residency** | | |
| 1 | Rural | 44,500 | 32.7 |
| 2 | Urban | 91,736 | 67.3 |
|  | **Ecological Belt** | | |
| 1 | Mountain | 7,462 | 5.5 |
| 2 | Hill | 55,462 | 40.7 |
| 3 | Terai | 73,312 | 53.8 |
|  | **Wealth Categories of Participants** | | |
| 1 | Poor | 52,345 | 38.4 |
| 2 | Middle | 26,737 | 19.6 |
| 3 | Rich | 57,154 | 42 |
|  | **Blood Pressure Category** | | |
| 1 | Normal | 62,059 | 61.5 |
| 2 | Hypertensive | 38,915 | 38.5 |
|  | **BMI Category** | | |
| 1 | Normal | 78,148 | 57.5 |
| 2 | Overweight/Obese | 57,763 | 42.5 |
|  |  | **Total** | **Mean (SD)** |
| 1 | Age | 13,540 | 37.9(16.59) |
| 2 | Systolic BP | 10,022 | 116.83(19.63) |
| 3 | Diastolic BP | 10,022 | 75.96(11.52) |
| 4 | BMI | 13,508 | 22.82(4.24) |
| 5 | Height (Mtr) | 13,510 | 1.55(0.08) |
| 6 | Weight(kg) | 13,523 | 55.03(11.58) |

\*\*All percentages are weighted to account for survey design.

\*\*BP: Blood Pressure

\*\*BMI: Body Mass Index

\*\*SD: Standard Deviation

Table 2 represents the spatial scan statistics that identified twelve statistically significant clusters of BMI distribution across Nepal (p<0.05). High-risk clusters (RR>1.0) were predominantly observed in five geographic locations (C1, C4, C5, C7, and C10), with relative risks ranging from 1.54 to 1.60. The largest high-risk cluster (C1) encompassed a radius of 148.48 km with a population of 3,309 individuals (RR 1.60, p<0.001). This cluster demonstrated the highest log-likelihood ratio as well (LLR=213.28), indicating strong evidence of spatial clustering. Similarly, several low-risk clusters where RR < 1.0 were also identified, with C2, C3, and C11 showing particularly low relative risks of 0.44, 0.40, and 0.39 respectively. The spatial extent of these low-risk clusters varied considerably, with a radius ranging from 17.22 km to 139.30 km. Several spatial overlaps were also observed within certain clusters C1 with C4, C5, and C2 with C3 and C9.

**Table 2 Spatial Clustering Analysis of High or Normal Body Mass Index Distribution (BMI).**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Clusters** | **Radius (km)** | **Number of Locations** | **Overlap With Clusters** | **Population** | **Observed Cases** | **Expected Cases** | **Relative Risk** | **Percent cases in the area** | **Log-Likelihood Ratio** | **P-Value** |
|  |
| C1 | 148.48 | 127 | 4, 5 | 3309 | 1794 | 1286.07 | 1.6 | 54.2 | 213.28 | <0.001 |  |
| C2 | 139.3 | 63 | 3, 9 | 1751 | 325 | 680.54 | 0.44 | 18.6 | 191.19 | <0.001 |  |
| C3 | 80.22 | 48 | 2 | 1329 | 219 | 516.53 | 0.4 | 16.5 | 173.62 | <0.001 |  |
| C4 | 52.08 | 51 | 1 | 1344 | 778 | 522.36 | 1.57 | 57.9 | 110.36 | <0.001 |  |
| C5 | 58.85 | 51 | 1 | 1332 | 757 | 517.69 | 1.54 | 56.8 | 97.52 | <0.001 |  |
| C6 | 37.38 | 21 | - | 684 | 157 | 265.84 | 0.58 | 23 | 41.17 | <0.001 |  |
| C7 | 23.76 | 11 | - | 336 | 200 | 130.59 | 1.55 | 59.5 | 29.94 | <0.001 |  |
| C8 | 60 | 34 | - | 993 | 283 | 385.94 | 0.72 | 28.5 | 25.19 | <0.001 |  |
| C9 | 59.08 | 30 | 2 | 801 | 219 | 311.32 | 0.69 | 27.3 | 24.89 | <0.001 |  |
| C10 | 19.21 | 7 | - | 227 | 137 | 88.23 | 1.57 | 60.4 | 21.69 | <0.001 |  |
| C11 | 17.22 | 5 | - | 132 | 20 | 51.3 | 0.39 | 15.2 | 18.02 | <0.001 |  |
| C12 | 15.56 | 6 | - | 187 | 0.55 | 72.68 | 0.55 | 21.4 | 13.24 | 0.002 |  |

Table 3 represents the spatial scan statistics for clusters identified as significant clusters (p<0.05) for high or normal blood pressure distribution in Nepal. High-risk clusters (RR>1.0) were identified in six locations C2, C3, C6, C7, C10, and C11, with relative risks ranging from 1.28,1.16, 1.25, 1.27, 1.16 and 1.16 respectively. Cluster C2 demonstrated the highest relative risk RR 1.28 and case percentage of 68.2%, despite its small spatial extent with a radius of 34.12 km. Cluster C3, the largest in terms of population coverage where n = 1,769 and a number of locations n = 59, showed a relative risk of 1.16 and contained 61.3% of cases within its boundary. Similarly, Low cluster areas where RR where <1.0, were observed in five clusters C1, C4, C5, C8, and C9. The smallest cluster, C9, encompassed only two locations within a 17.16 km radius and demonstrated the lowest relative risk (RR 0.53) with 28.6% of cases in the area. Notably, C1, despite having a larger radius of 56.99 km and population (n 866), maintained a relatively low risk (RR 0.73). Moreover, Spatial overlap was observed among several clusters C1 overlapped with C4 and C9, while C3 showed overlap with C6, C11, and C23 (which was not a significant cluster), C4 with C1, C6, and C11 on C3.

**Table 3 Spatial Clustering Analysis of High or Normal Blood Pressure Distribution.**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Clusters** | **Radius (km)** | **Number of Locations** | **Overlap With Clusters** | **Population** | **Observed Cases** | **Expected Cases** | **Relative Risk** | **Percent cases in the area** | **Log-Likelihood Ratio** | **P-Value** |
|  |
| C1 | 56.99 | 30 | 4, 9 | 866 | 349 | 467.41 | 0.73 | 40.3 | 34.75 | <0.001 |  |
| C2 | 34.12 | 19 | - | 519 | 354 | 280.12 | 1.28 | 68.2 | 22.65 | <0.001 |  |
| C3 | 67.9 | 59 | 6, 11, 23 | 1769 | 1085 | 954.79 | 1.16 | 61.3 | 22.41 | <0.001 |  |
| C4 | 40.84 | 22 | 1 | 580 | 235 | 313.05 | 0.74 | 40.5 | 22.03 | <0.001 |  |
| C5 | 35.14 | 19 | - | 629 | 266 | 339.49 | 0.78 | 42.3 | 18.06 | <0.001 |  |
| C6 | 27.11 | 14 | 3 | 462 | 310 | 249.36 | 1.25 | 67.1 | 17.01 | <0.001 |  |
| C7 | 34.83 | 9 | - | 272 | 186 | 146.81 | 1.27 | 68.4 | 11.95 | 0.005 |  |
| C8 | 40.26 | 12 | - | 345 | 143 | 186.21 | 0.76 | 41.4 | 11.14 | 0.01 |  |
| C9 | 17.16 | 2 | 1 | 77 | 22 | 41.56 | 0.53 | 28.6 | 10.23 | 0.023 |  |
| C10 | 44.26 | 24 | - | 646 | 403 | 348.67 | 1.16 | 62.4 | 9.78 | 0.033 |  |
| C11 | 59.63 | 24 | 3 | 671 | 417 | 362.16 | 1.16 | 62.1 | 9.61 | 0.043 |  |

Table 4 represents results from our first logistic model for BMI and its associated factors, the results (intercept = -3.26903) revealed several significant socio-demographic, economic, and geographic determinants of being obese/overweight among study participants. Gender shows a significant association, with females having 23% higher odds of being obese/overweight compared to males (OR 1.23, 95% CI: 1.10-1.38, p<0.001), Similarly, middle age grouped adults 40-59 years have 47% higher odds (OR 1.47, CI: 1.28-1.68, p<0.001), while old individuals 60+ years show 28% lower odds (OR 0.72, CI: 0.60-0.87, p=0.001) compared to age group 16-39 years of being obese/overweight. Being married showed remarkably higher odds OR 4.23 (3.52 – 5.08) compared to unmarried individuals, and being divorced/separated/widowed also shows substantially higher odds of being obese/overweight with OR 3.58 (2.66-4.83) with p-value <0.001.

Furthermore, the model also revealed that having basic education increases the odds of being obese/overweight by 30% (OR 1.30, 95% CI: 1.13-1.51, p<0.001), and having Secondary or higher education increases the odds of obese/overweight by 52% (OR 1.52, 95% CI: 1.28-1.81, p<0.001). Being wealthy nearly doubled the odds of being obese/overweight and being rich demonstrates four times higher odds with OR 4.09 (3.52-4.74) and p<0.001. Moreover, hypertensive individuals show a statistically significant 144% higher odds of being obese/overweight with p<0.001. Being a rural resident shows a protective effect with 16% lower odds compared to urban residents of being obese/overweight with OR 0.84 (0.73-0.96) p-value of 0.012. Similarly, if we compare it to the terai region residing in a mountain region Mountain regions have 56% higher odds of being obese/overweight with a statistically significant p-value of 0.002, and Hill regions show 94% higher odds (OR 1.94, 95% CI: 1.68-2.24, p<0.001). These findings indicate that BMI status in Nepal is significantly influenced by multiple socio-demographic and geographic factors, with particularly strong associations observed for marital status, wealth category, and hypertension.

**Table 4 Logistic Regression Results Factors Associated with High Body Mass Index (BMI)**

|  |  |  |  |
| --- | --- | --- | --- |
| BMI Models Result | | | |
| **Model Intercept** | **-3.26903** | **OR(95% CI)** | **p-value** |
| **Gender** |  |  |  |
| Male | **Ref** | |
| **Female** | 1.23 (1.10–1.38) | **<0.001** |
| **Age Group** | | | |
| 16-39 |  | **Ref** | |
| 40-59 | 1.47 (1.28–1.68) | **<0.001** |
| 60+ | 0.72 (0.60–0.87) | **0.001** |
| **Marital Status** | | | |
| Unmarried |  | **Ref** | |
| Married | 4.23 (3.52–5.08) | **<0.001** |
| Divorced/Separated/Widowed | 3.58 (2.66–4.83) | **<0.001** |
| **Education** | | | |
| No education |  | **Ref** | |
| Basic Education (1 - 8) | 1.30 (1.13–1.51) | **<0.001** |
| Secondary or Higher ( 9 and above) | 1.52 (1.28 – 1.81) | **<0.001** |
| **Wealth Category** | | | |
| Poor |  | **Ref** | |
| Middle | 1.97 (1.69–2.31) | **<0.001** |
| Rich | 4.09 (3.52 – 4.74) | **<0.001** |
| **Blood Pressure** | | | |
| Normal |  | **Ref** | |
| Hypertensive | 2.44 (2.20–2.71) | **<0.001** |
| **Residency Region** | | | |
| Urban |  | **Ref** | |
| Rural | 0.84 (0.73–0.96) | **0.012** |
| **Ecological Region** | | | |
| Terai |  | **Ref** | |
| Mountain | 1.56 (1.18–2.05) | **0.002** |
| Hill | 1.94 (1.68–2.24) | **<0.001** |

Table 5 presents the factors associated with being hypertensive among study participants in our analysis, Gender shows a significant protective effect among females compared to males of being hypertensive with OR 0.71 (0.64-0.78) and p<0.001), indicating 29% lower odds of hypertension compared to males. Whereas age showed a strong positive association with hypertension, middle-aged adults 40-59 years had more than doubled odds (OR 2.23, CI: 1.95-2.54, p<0.001), and old individuals 60+ years showed the highest risk (OR 2.61, CI: 2.17-3.13, p<0.001) compared to the reference age group 16-39. Similarly, Married individuals showed 62% higher odds and divorced/separated/widowed individuals demonstrated the highest odds with OR 2.25, (1.70-2.99) and p<0.001 making marital status a significant predictor of hypertension among our study participants.

BMI showed a strong association, with obese/overweight individuals having 146% higher odds of hypertension OR 2.46 (2.21-2.73) and p<0.001, Rural residence showed a protective effect OR 0.83, (0.71-0.96) p=0.016 and Ecological regions showed no significant statistical associations p>0.05. Notably, several factors such as educational status, wealth, and ecological regions did not show a significant association at our threshold level with hypertension p>0.05.

**Table 5 Logistic Regression Results Factors Associated with High Blood Pressure among study participants**

|  |  |  |  |
| --- | --- | --- | --- |
| **Blood Pressure Model Result** | | **Results** | |
| **Intercept** | **-1.38182** | **OR (95% CI)** | **p-value** |
| **Gender** |  |  |  |
| Male |  | |
| **Female** | 0.71 (0.64–0.78) | **<0.001** |
| **Age Group** | | | |
| 16-39 |  |  | |
| 40-59 | 2.23 (1.95–2.54) | **<0.001** |
| 60+ | 2.61 (2.17–3.13) | **<0.001** |
| **Marital Status** | | | |
| Unmarried |  |  | |
| Married | 1.62 (1.35–1.95) | **<0.001** |
| Divorced/Separated/Widowed | 2.25 (1.70–2.99) | **<0.001** |
| **Education** | | | |
| No education |  |  | |
| Basic Education (1 - 8) | 0.90 (0.79–1.03) | 0.119 |
| Secondary or Higher ( 9 and above) | 0.88 (0.74–1.04) | 0.131 |
| **Wealth Category** | | | |
| Poor |  |  | |
| Middle | 0.89 (0.75–1.05) | 0.175 |
| Rich | 0.96 (0.81–1.14) | 0.654 |
| **BMI** | | | |
| Normal |  |  | |
| Obese/Overweight | 2.46 (2.21–2.73) | **<0.001** |
| **Residency Region** | | | |
| Urban |  |  | |
| Rural | 0.83 (0.71–0.96) | 0.016 |
| **Ecological Region** | | | |
| Terai |  |  | |
| Mountain | 1.07 (0.76–1.50) | 0.694 |
| Hill | 1.07 (0.91–1.25) | 0.414 |