

Cross-Sectional Study

The Prevalence of Risk Factors of Non-Communicable Diseases Among Transgenders in Delhi: A Community-Based Study

Nitin Panwar¹, Jugal Kishore²

¹Post Graduate Student, Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi, India

²Director Professor, Department of Community Medicine, Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi, India

DOI: <https://doi.org/10.24321/2454.325X.202608>

I N F O

Corresponding Author:

Jugal Kishore, Department of Community Medicine, Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi, India

E-mail Id:

drjugalkishore@gmail.com

Orcid Id:

<https://orcid.org/0000-0001-6246-5880>

How to cite this article:

Panwar N, Kishore J. The Prevalence of Risk Factors of Non-Communicable Diseases Among Transgenders in Delhi: A Community-Based Study. Int J Preven Curat Comm Med. 2026;12(2):22-28.

Date of Submission: 2026-04-18

Date of Acceptance: 2026-05-20

A B S T R A C T

Context: The transgender community continues to face widespread stigma, discrimination, and health inequities, which extend to their risk of non-communicable diseases (NCDs). Evidence on NCD risk factors among transgenders in Delhi is scarce, highlighting the need for community-based research to guide inclusive health interventions.

Aims: To estimate the prevalence of risk factors of NCDs among transgender individuals in Delhi.

Settings and Design: A community-based cross-sectional study conducted among transgenders residing in Delhi.

Methods and Material: A total of 141 transgender participants aged ≥ 18 years were recruited using snowball sampling. Data were collected using the WHO STEPS Instrument Questionnaire covering behavioral risk factors including tobacco use, alcohol consumption, diet, physical activity, and metabolic conditions like hypertension, diabetes, and hypercholesterolemia.

Results: Nearly half (49.6%) of the participants reported tobacco use, while 57.4% consumed alcohol. Inadequate diet (91.5%) and inadequate physical activity (97.9%) were highly prevalent. The burden of metabolic conditions was considerable, with 35% having hypertension, 17.6% diabetes, and 47.7% hypercholesterolemia. Educational status and religion were significantly associated with physical activity ($p = 0.000$), while alcohol use was significantly associated with socioeconomic status ($p = 0.008$). Physical activity also showed significant associations with hypertension ($p = 0.000$) and diabetes ($p = 0.000$).

Conclusion: The study highlights a high prevalence of behavioral and metabolic risk factors for NCDs among transgender individuals in Delhi. These findings underscore the urgent need for targeted, gender-affirmative, and community-sensitive public health interventions to address NCD risk in this marginalized group.

Keywords: LGBTQ, WHO STEPS, Hypertension, Diabetes Mellitus

Introduction

The transgender community, despite increasing visibility and advocacy efforts, continues to experience substantial social and health inequities. Discrimination, lack of social acceptance, violence, and marginalization remain prevalent challenges affecting transgender individuals globally and in India.¹ These challenges extend across multiple domains of life, including education, employment, healthcare access, and legal recognition. Transgender individuals frequently experience discrimination within healthcare settings, ranging from misgendering and stigma to inadequate or delayed medical care, resulting in poorer health outcomes and avoidance of healthcare services.²

Substance abuse and risky health behaviors have been reported more frequently among transgender populations compared to the general population, often acting as maladaptive coping mechanisms for social stress, discrimination, and psychological distress.³ Mental health concerns, including depression, anxiety, and suicidal ideation, are also highly prevalent among transgender individuals and contribute substantially to adverse health outcomes.⁴

Non-communicable diseases (NCDs), including cardiovascular diseases, diabetes mellitus, hypertension, and cancer, are emerging as important health concerns among transgender populations. While earlier research on transgender health largely focused on HIV/AIDS and sexually transmitted infections, increasing evidence suggests that transgender individuals may be at greater risk of developing NCDs because of behavioral, metabolic, and social determinants.⁵ Elevated levels of chronic stress due to stigma and discrimination have been linked with hypertension and cardiovascular disorders, while socioeconomic disadvantages, including lower income, unemployment, and limited access to healthy food and preventive healthcare, further increase susceptibility to NCDs.⁶

Gender-affirming hormone therapy may additionally influence cardiovascular and metabolic health outcomes. Studies have demonstrated alterations in blood pressure, lipid profiles, and glucose metabolism among transgender individuals receiving long-term hormone therapy, thereby increasing cardiovascular risk.^{7,8} Social determinants of health such as education, employment, social support, and access to healthcare services also significantly influence health outcomes in transgender communities.⁹

Globally, NCDs contribute to approximately 74% of deaths annually and have become a major public health concern.¹⁰ In India, the burden of NCDs has increased substantially

over recent decades, accounting for a major proportion of mortality and morbidity.¹¹ However, despite extensive literature regarding NCDs in the general population, evidence among transgender populations remains scarce, particularly in India. Existing studies conducted among transgender communities in different regions of India have demonstrated a high prevalence of tobacco use, alcohol consumption, physical inactivity, obesity, hypertension, and diabetes mellitus.^{12,14}

Limited research has explored NCD risk factors among transgender populations in Delhi. Therefore, understanding the burden and distribution of these risk factors is essential for developing inclusive, community-sensitive, and gender-affirmative healthcare interventions. Keeping this in view, the present study aimed to estimate the prevalence of risk factors for non-communicable diseases among transgender individuals residing in Delhi.

Methodology

Study Setting and Design

This cross-sectional study was conducted in the transgender population of Delhi, India, in 2023. The study aimed to estimate the prevalence of risk factors of non-communicable diseases among transgenders in Delhi.

Study Participants

The study was conducted among the transgender population residing in New Delhi. Participants included individuals who self-identified as transgender, were 18 years or older, and lived in New Delhi. However, individuals with severe mental disabilities that impaired their ability to comprehend the questions were excluded from the study.

Sample Size and Sampling Method

The sample size was calculated using the formula: Sample Size = $3.84 \times (P \times Q) / l^2$, where P is the prevalence rate of tobacco use (43.5%, based on the study by Madhavan et al.)¹², Q is $100 - P$ (56.5), and l is the margin of error (8.6). Substituting the values, the calculation is as follows: $3.84 \times (43.5 \times 56.5) / 8.6^2 = 9437 / 73.96 = 127.59$. To account for a 10% non-response rate, 12.76 was added, resulting in 140.35, which was rounded to 141 as the final sample size. The sampling was done through the snowball sampling technique. All the participants were approached, and the questionnaire was administered after taking informed written consent.

Study Tools

A standardized WHO STEPS instrument questionnaire is used to assess the prevalence of risk factors for NCDs in the study population. The WHO STEPS section of the

questionnaire focuses on assessing behavioral risk factors for non-communicable diseases (NCDs) through various questions targeting lifestyle habits, medical history, and physical activity. It covers areas such as tobacco use, alcohol consumption, diet, physical activity, and history of raised blood pressure, diabetes, and cholesterol. This part of the questionnaire aims to gather comprehensive information on personal habits like smoking, alcohol use, dietary patterns (including fruit, vegetable, and salt intake), and levels of physical activity (moderate to vigorous). It also inquires about the participant's history of chronic conditions like hypertension, diabetes, and cardiovascular diseases, along with any medications or lifestyle advice they may have received from healthcare providers.

Study Procedure

Local NGOs and NACO were contacted to identify potential contacts within the transgender population residing in New Delhi. Using these connections, the transgender population was approached, and the snowball sampling technique was employed. A total of 141 participants were contacted, and the questionnaire was administered after each participant provided written informed consent.

Operational Definitions

- *Current tobacco use*: Participants who reported smoking or using smokeless tobacco products within the previous 30 days according to WHO STEPS criteria.
- *Current alcohol use*: Participants who reported consumption of any alcoholic beverage within the previous 30 days according to WHO STEPS criteria.
- *Inadequate diet*: Consumption of fewer than five servings of fruits and/or vegetables per day according to WHO recommendations.
- *Inadequate physical activity*: Less than 600 MET-minutes/week based on WHO STEPS recommendations.
- *Hypertension*: Self-reported diagnosis by a healthcare professional or current use of antihypertensive medication.
- *Diabetes mellitus*: Self-reported diagnosis by a healthcare professional or current use of antidiabetic medication.
- *Hypercholesterolemia*: Self-reported diagnosis by a healthcare professional or use of lipid-lowering medication.
- *Transgender individual*: A person whose gender identity differs from sex assigned at birth and self-identifies as transgender.

Statistical Analysis

The data was entered into Microsoft Excel and subsequently cleaned to address errors and missing values. Data analysis

was conducted using licensed SPSS software version 21.0. The results were presented through tables and appropriate diagrams. Qualitative data were summarized as proportions, while quantitative data were described using measures such as mean and dispersion. Categorical variables were expressed as frequencies and percentages. Associations between categorical variables were assessed using the chi-square test or Fisher's exact test. Statistical significance was considered at $p < 0.05$.

Ethical Considerations

The study adhered to ethical guidelines outlined in the Declaration of Helsinki. Ethical clearance was obtained from the Institutional Ethical Committee under reference IEC/VMMC/SJIV/THESIS/202/CC-79. Participants were provided with a detailed participant information sheet outlining the study objectives, procedures, risks, and benefits. Written informed consent was obtained from all participants prior to data collection. High-risk transgenders were advised to consult the Prevention Health & Screening OPD at VMMC & SJH for life modification.

Results

In the present study, the majority of transgender participants (87%) were literate, while 13% were illiterate. This indicates a relatively high level of basic education among the study population. With respect to socioeconomic status, most participants (87.9%) belonged to the upper class, followed by 8.5% in the upper middle class and 2.8% in the middle class. A very small proportion (0.7%) were from the lower class, and none belonged to the lower middle class.

Table 1. Educational status and Socioeconomic status of study participants (N = 141)

Educational Status	Number	Percentage
Literate	123	87 %
Illiterate	18	13%
Socioeconomic status		
I (Upper Class)	124	87.9%
II (Upper Middle Class)	12	8.5%
III (Middle Class)	4	2.8%
IV (Lower Middle Class)	0	0%
V (Lower Class)	1	0.7%

Table 2 shows the distribution of non-communicable disease (NCD) risk factors among the study participants. Tobacco use was reported by 49.6% of participants, indicating that almost half of the transgender individuals in the study were

exposed to this important behavioural risk factor. Alcohol use was present in 57.4% of participants, making it the most common substance-related risk behaviour identified. Regarding dietary habits, a very high proportion (91.5%) of the participants were found to have an inadequate diet. Furthermore, inadequate physical activity was observed in 97.9% of participants, highlighting it as the most prevalent risk factor in the study population. Overall, these findings suggest a high burden of lifestyle-related risk behaviours that may contribute significantly to the development of NCDs in this group.

Table 2. Prevalence of risk factors of NCDs in study participants (N = 141)

Risk Factors	Number	Percentage
Tobacco use	70	49.6%
Alcohol use	81	57.4%
Inadequate diet	129	91.5%
Inadequate physical activity	138	97.9%

Table 3 describes the prevalence of risk factors among study participants diagnosed with non-communicable diseases. Among participants with hypertension (n = 28), 53.5% reported tobacco use and the same proportion (53.5%) reported alcohol use. Almost all (96.4%) had an inadequate diet, while 89.3% had inadequate physical activity. Among those with diabetes mellitus (n = 13), tobacco use was reported by 61.5% and alcohol use by 53.8%. An inadequate diet was present in 92.3% of participants, and inadequate physical activity in 77%. In participants with hypercholesterolemia (n = 31), 48.4% reported tobacco use and 64.5% reported alcohol use. Nearly all had an inadequate diet (97.0%), and 93.6% reported inadequate physical activity.

Table 3. Prevalence of risk factors in study participants with diagnosed NCDs

Risk Factors	Hypertension (%) (n = 28)	Diabetes Mellitus (%) (n = 13)	Hypercholesterolemia (%) (n = 31)
Tobacco use	15 (53.5%)	8 (61.5%)	15 (48.4%)
Alcohol use	15 (53.5%)	7 (53.8%)	20 (64.5%)
Inadequate diet	27 (96.4%)	12 (92.3%)	30 (97%)

Inadequate physical activity	25 (89.3%)	10 (77%)	29 (93.6%)
------------------------------	------------	----------	------------

Analysis of the associations between sociodemographic characteristics, risk factors, and non-communicable diseases revealed several statistically significant findings. Educational status was significantly associated with physical activity (p = 0.000), with adequate physical activity reported exclusively among illiterate participants. Similarly, religious background showed a significant association with physical activity (p = 0.000), as adequate physical activity was reported only among participants belonging to the “other” religious category. Socioeconomic status demonstrated a significant association with alcohol consumption (p = 0.008), with a markedly higher prevalence of alcohol use among participants from the upper socioeconomic class. A statistically significant association was observed between physical activity and hypertension and diabetes. However, the direction of this association should be interpreted cautiously because of the small number of participants reporting adequate physical activity and the possibility of reverse causality. No other statistically significant associations between risk factors and non-communicable diseases were observed in the present study.

Discussion

This study sheds light on the concerning prevalence of behavioural and metabolic risk factors for non-communicable diseases (NCDs) among transgender individuals in Delhi. The findings indicate alarmingly high levels of tobacco and alcohol use, physical inactivity, and poor dietary habits, alongside a substantial burden of hypertension, diabetes, and hypercholesterolaemia. These findings not only mirror existing global and national evidence but also underscore the urgent need for tailored health interventions for this marginalised population.

Contrary to general population trends, the study found no significant association between age and key behavioural risk factors, such as tobacco use, alcohol consumption, and dietary habits. This finding is surprising, given that younger individuals are typically more likely to engage in risk behaviours. However, similar results were observed in a study by Manzoor et al.¹⁵ in Pakistan, where behavioural risks were distributed evenly across age groups within the transgender community. This may be attributed to persistent socio-economic challenges and chronic marginalisation faced by transgender individuals throughout their lives, which can blunt the typical age-related shifts in health behaviours. In contrast, studies in

Western contexts, such as that by Sánchez-Toscano et al.⁷, found that older transgender individuals often have better health behaviours due to improved access to healthcare and support networks, highlighting regional disparities in healthcare accessibility and social safety nets.

Socio-economic status (SES) emerged as a key determinant of health in this study. A large proportion of participants reported low income and engagement in precarious occupations such as begging and sex work. These economic constraints not only contribute to poor dietary practices and limited physical activity but also perpetuate mental health issues and reliance on substances like tobacco and alcohol. The findings are consistent with those of Madhavan et al.¹² who reported that transgender individuals in Puducherry experienced economic marginalisation that led to increased risk behaviours. Interestingly, a significant association was found between higher SES and alcohol consumption, with 95.06% of individuals in the upper-class reporting alcohol use. This pattern reflects findings from Gheisari et al.¹⁶ and Sánchez-Toscano et al.⁷, who observed similar trends in other transgender populations. In these studies, higher SES individuals had more disposable income and social exposure to alcohol-consumption environments, possibly using alcohol as a means of coping with stressors associated with visibility in professional spaces. This indicates that increased economic resources do not necessarily correlate with healthier behaviours and may, in some cases, increase access to risky substances.

Nearly half (49.6%) of the participants reported tobacco use, and more than half (57.4%) reported alcohol use—figures significantly higher than the general population. International studies, such as Tan et al.³, have shown that transgender individuals are nearly twice as likely to smoke as cisgender individuals, with tobacco often used to manage the psychological effects of discrimination, depression, and anxiety. The study by Gheisari et al.¹⁶ also linked tobacco use with increased risk of coronary artery disease in transgender populations. Similar trends were observed in Fernandez et al.¹⁷, where 40.8% of transgender individuals in Kerala smoked, driven by socio-economic exclusion and lack of support. Despite the high prevalence of tobacco use, this study did not find a significant association between tobacco use and metabolic conditions such as hypertension, diabetes, or hypercholesterolaemia. This contrasts with the broader literature, which consistently links tobacco use with NCDs. The lack of association may be due to sample size limitations, high baseline prevalence of these conditions, or unmeasured confounding factors such as chronic stress or hormone therapy.

Alcohol use in this study aligns with previous findings from Madhavan et al.¹² and Prasanth et al.¹⁴ who found

that alcohol is often used by transgender individuals to cope with socio-economic vulnerability and stigma. Studies from the United States, such as Pharr et al.⁵ have also documented higher rates of heavy drinking among transgender populations due to cumulative minority stress. These patterns underline the need for substance-use interventions that address not only behavioural aspects but also the underlying psychosocial stressors.

Physical inactivity was nearly universal (97.9%) among participants. This is consistent with Pingili et al.¹⁸ who reported that transgender individuals, particularly those facing obesity or socio-economic challenges, often lead sedentary lives. Barriers such as unsafe public spaces, fear of harassment in gyms, and lack of inclusive facilities significantly limit physical activity. In addition, individuals involved in survival-based occupations may lack time or motivation for exercise, as emphasised by Prasanth et al.¹⁴

The study found a significant association between physical activity and the presence of hypertension and diabetes. All participants who reported adequate physical activity also reported both conditions. This counterintuitive finding could be explained by reverse causality—individuals diagnosed with chronic conditions may initiate physical activity as part of disease management. Alzahrani et al. (2020) also noted that transgender individuals with cardiovascular risks were more likely to increase physical activity post-diagnosis. Moreover, physical activity alone may not be sufficient to offset other persistent risk factors such as obesity, hormone therapy, and poor diet, as shown by Pingili et al.¹⁸

Unhealthy diets were reported by 91.5% of participants, characterised by low intake of fruits and vegetables and high consumption of processed, calorie-dense foods. These findings are similar to those from Poudel et al. (2019) in Nepal, where 95.7% of transgender individuals failed to meet daily nutritional recommendations. In Tamil Nadu, Shenoy et al.¹³ observed that transgender individuals had inadequate nutrition due to limited access to affordable, healthy food, largely stemming from economic hardship. Despite the expected relationship, this study did not find a significant association between dietary adequacy and metabolic disorders. This may be due to the overwhelmingly poor dietary patterns across the sample, limiting the ability to detect statistical differences. Prasanth et al.¹⁴ however, found strong correlations between unhealthy diet and NCD prevalence in Chennai. This indicates that while the role of diet is clear from a pathophysiological perspective, more nuanced and stratified data may be necessary to detect such associations in highly disadvantaged groups.

Metabolic disorders were highly prevalent: 35% of participants had hypertension, 17.57% had diabetes,

and 47.69% had hypercholesterolaemia. These findings are concerning and are supported by multiple studies, including Pharr et al.⁵, Alzahrani et al.²⁰ and Sánchez-Toscano et al.⁷, which reported higher rates of metabolic diseases among transgender individuals, particularly those on long-term gender-affirming hormone therapy (GAHT). Hormone therapy can significantly impact lipid metabolism, blood pressure, and glucose levels. Sánchez-Toscano et al.⁷ and Banks et al.⁸ reported increases in LDL cholesterol and triglycerides and reductions in HDL cholesterol among transgender women on hormone therapy. These effects, compounded by poor lifestyle habits and chronic stress, amplify cardiovascular risks in this population. Therefore, regular monitoring of lipid profiles and metabolic parameters is essential, especially for those undergoing GAHT.

Overall, this study reveals an urgent need for public health strategies that address both the behavioural and social determinants of health among transgender populations. The high prevalence of risk factors for NCDs reflects not only individual choices but also structural inequities such as poverty, stigma, lack of access to healthcare, and unsafe public spaces. Tailored health education, accessible screening, inclusive health services, and socio-economic empowerment initiatives are essential to mitigate these disparities. The findings of this study support a call for integrated, gender-affirmative healthcare and underscore the need for further longitudinal and intervention-based research to develop sustainable, context-specific solutions.

Conclusion

Overall, this study reveals an urgent need for public health strategies that address both the behavioural and social determinants of health among transgender populations. The high prevalence of risk factors for NCDs reflects not only individual choices but also structural inequities such as poverty, stigma, lack of access to healthcare, and unsafe public spaces. Tailored health education, accessible screening, inclusive health services, and socio-economic empowerment initiatives are essential to mitigate these disparities. The findings of this study support call for integrated, gender-affirmative healthcare and underscore the need for further longitudinal and intervention-based research to develop sustainable, context-specific solutions.

Statements and Declarations

There are no financial implications linked to this study for study participants or authors.

There is no funding linked to the study

References

1. American Psychological Association. Guidelines for psychological practice with transgender and gender nonconforming people. *American psychologist*. 2015 Dec 16;70(9):832-64. [Google Scholar] [PubMed]
2. Winter S, Settle E, Wylie K, Reisner S, Cabral M, Knudson G, Baral S. Synergies in health and human rights: a call to action to improve transgender health. *The Lancet*. 2016 Jul 23;388(10042):318-21. [Google Scholar] [PubMed]
3. Tan AS, Gazarian PK, Darwish S, Hanby E, Farnham BC, Koroma-Coker FA, Potter J, Ballout S. Smoking protective and risk factors among transgender and gender-expansive individuals (Project SPRING): qualitative study using digital photovoice. *JMIR Public Health and Surveillance*. 2021 Oct 6;7(10):e27417. [Google Scholar] [PubMed]
4. Baker KE, Wilson LM, Sharma R, Dukhanin V, McArthur K, Robinson KA. Hormone therapy, mental health, and quality of life among transgender people: a systematic review. *Journal of the Endocrine Society*. 2021 Apr 1;5(4):bvab011. [Google Scholar] [PubMed]
5. Pharr JR, Batra K. Propensity score analysis assessing the burden of non-communicable diseases among the transgender population in the United States using the behavioral risk factor surveillance system (2017–2019). *InHealthcare* 2021 Jun 9 (Vol. 9, No. 6, p. 696). MDPI. [Google Scholar] [PubMed]
6. EUROPA RF, DE L'EUROPE BR. Healthy cities tackle the social determinants of inequities in health: a framework for action. <https://www.who.int/southeastasia/publications-detail/healthy-cities-tackle-the-social-determinants-of-inequities-in-health-a-framework-for-action> Sánchez-Toscano E, Domínguez-Riscart J, Larrán-Escandón L, Mateo-Gavira I, Aguilar-Diosdado M. Cardiovascular risk factors in transgender people after gender-affirming hormone therapy. *Journal of Clinical Medicine*. 2023 Sep 23;12(19):6141. [Google Scholar] [PubMed]
7. Banks K, Kyinn M, Leemaqz S, et al. Effects of gender-affirming hormone therapy on blood pressure among transgender and gender-diverse adults. *Hypertension*. 2021;78(5):e45–53. [PubMed]
8. Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on social determinants of health. Geneva: World Health Organization; 2008. <https://www.who.int/publications/i/item/WHO-IER-CSDH-08.1> [PubMed]
9. World Health Organization. Noncommunicable diseases: key facts. Geneva: World Health Organization;

2023. <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>
10. Dandona L, Dandona R, Kumar GA, Shukla DK, Paul VK, Balakrishnan K, Prabhakaran D, Tandon N, Salvi S, Dash AP, Nandakumar A. Nations within a nation: variations in epidemiological transition across the states of India, 1990–2016 in the Global Burden of Disease Study. *The Lancet*. 2017 Dec 2;390(10111):2437-60. [Google Scholar] [PubMed]
 11. Madhavan M, Reddy MM, Chinnakali P, Kar SS, Lakshminarayanan S. High levels of non-communicable diseases risk factors among transgenders in Puducherry, South India. *Journal of Family Medicine and Primary Care*. 2020 Mar 1;9(3):1538-43. [Google Scholar] [PubMed]
 12. Shenoy V, Premarajan KC, Sarkar S, Lakshminarayanan S. Risk factors of non-communicable diseases among male-to-female transgenders in Chennai. *Int J Community Med Public Health*. 2019;6(3):1112–7.
 13. Prasanth BK, Eashwar VM, Mahalakshmi K, Ramachandran K. Epidemiology of non-communicable diseases among transgender population residing in Chennai district, Tamil Nadu. *Journal of Family Medicine and Primary Care*. 2023 Apr 1;12(4):762-7. [Google Scholar] [PubMed]
 14. Manzoor I, Ashraf M, Shahid A, et al. Health-seeking behaviour and healthcare experiences among transgender community in Lahore, Pakistan. *J Pak Med Assoc*. 2022;72(4):677–83.
 15. Gheisari F, Emami M, Raeisi Shahraki H, Samipour S, Nematollahi P. The role of gender in the importance of risk factors for coronary artery disease. *Cardiology Research and Practice*. 2020;2020(1):6527820. [Google Scholar] [PubMed]
 16. Fernandez B, Gaitonde R. Non-communicable diseases and its risk factors among the transgender population in Kerala: a cross-sectional study. *International Journal for Equity in Health*. 2024 May 24;23(1):107. [Google Scholar] [PubMed]
 17. Pingili A, Vempati R, Vemula M, Lakkimsetti M, Madhavaram H, Nanjundappa A, Gummadi J, Singh S, Desai R, Sunkara P. Prevalence of cardiovascular events among transgender adults with obesity: a population-based analysis. *Obesity Pillars*. 2024 Sep 1;11:100125. [Google Scholar] [PubMed]
 18. Poudel B, Paudel K, Adhikari B, Paudel R, Bhusal S, Adhikari N, Adhikari TB, Sapkota VP, Shrestha R. Prevalence of common risk factors of major noncommunicable diseases among sexual and gender minorities in Kathmandu valley, Nepal. *Medicine*. 2024 Apr 5;103(14):e37746. [Google Scholar] [PubMed]
 19. Alzahrani T, Nguyen T, Ryan A, Dwairy A, McCaffrey J, Yunus R, Forgione J, Krepp J, Nagy C, Mazhari R, Reiner J. Cardiovascular disease risk factors and myocardial infarction in the transgender population. *Circulation: Cardiovascular Quality and Outcomes*. 2019 Apr;12(4):e005597. [Google Scholar] [PubMed]