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Introducing the Nepal Journal of Public Health: Advancing Public Health Knowledge and Practice

Greetings to our esteemed readers, contributors, and supporters,

It is with great pleasure that we introduce the first issue of the Nepal Journal of Public Health (NJPH). The NJPH is an official publication of Central Department of Public Health, Institute of Medicine, Tribhuvan University. Our aim is to publish and disseminate novel and innovative research articles that contribute to the public health sciences, policies, practices, and outcomes. The NJPH seeks to promote interdisciplinary dialogue, support evidence-based public health practice, and inform key stakeholders in decision making at local, national, and international levels.

The NJPH is a peer-reviewed, open-access journal dedicated to advancing knowledge and fostering innovation in the field of public health. The NJPH serves as a platform for researchers, and practitioners, to share their scientific findings, experiences, and perspectives on a wide range of public health issues so as to enhance understanding, inform policy, and improve public health practices. The NJPH is committed to highlighting the role of public health in addressing health disparities, enhancing health education, and promoting sustainable health practices. The journal publishes scholarly papers/articles covering both theoretical and applied research in the area of public health and especially encourages submissions that explore innovative health interventions, implementation and policy research, and collaborative health initiatives.

The journal encourages to promote recent public health theories and practices. Public health theories are conceptual frameworks that guide the understanding of health determinants, the spread of diseases, and the influences on health behaviors and outcomes. These theories are essential in designing and implementing public health interventions (practices) by providing insights into the various factors that affect population health.

The NJPH also advocates for public health ethics within the practice of population health, addressing the challenges of promoting and protecting population health while upholding individual rights, fairness, and social justice. It emphasizes the need to balance the collective good with individual freedoms, ensuring that community-focused decisions are ethically justifiable.

The success of the NJPH is attributable to the invaluable contributions of our editorial board and advisory committee members. Their collective effort in designing the editorial structure and ensuring the journal's quality has set a strong foundation for our work. We are honored to have a diverse group of national and international experts who bring a wealth of experience and insight to the journal. We extend our heartfelt thanks to them for their commitment and support.

Correspondence to:
Dr. Khem B. Karki
Editor-in-Chief
Nepal Journal of Public Health
Email: khemkarki9n@gmail.com

We also want to acknowledge the dedication of the reviewers. Their work in reviewing manuscripts and providing constructive feedback are essential for maintaining the journal's quality and relevance. We also wish to express our gratitude to the authors who have submitted their work for this inaugural issue. Your contributions are the cornerstone of the journal, and we are excited to share your research with our readers.

So far, we have planned to publish the journal twice a year. However, due to the overwhelming response from authors, we are considering increasing the number of issues annually. Stay tuned for potential additional issues. However, our primary focus remains on the quality of the papers rather than the quantity or volume. As we embark on this journey, we welcome feedback and suggestions to help us continuously improve and serve our readers effectively. We look forward to your continued engagement and support as we advance the field of public health through the NJPH.

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Nutritional Status and Its Associated Factors among Under-Five Children in Bidur Municipality, Nuwakot District, Nepal: A Secondary Data Analysis

Pranil Man Singh Pradhan[1], Smriti Pant[1], Gambhir Shrestha[1], Namrata Karki[1], Tanweer Ahmad Mikrani[1], Deepak Raj Joshi[1], Sushan Man Shrestha[2], Prem Basel[1], Khem Karki [1]

ABSTRACT

Background: Undernutrition among under-five children is a major public health problem in Nepal. The study's main objective was to assess the nutritional status and its associated factors among under-5 children of Bidur Municipality, Nuwakot district using secondary data analysis.

Methods: We analyzed the data of 667 under-five children from 3183 households collected from the Community Health Diagnosis 2023 program database stored in the Kobo toolbox. Nutritional status indicators were measured by using the WHO classification. The chi-square test was applied to find out the association of nutritional status with independent variables such as maternal age at marriage, age at first child, antenatal, delivery, and post-natal care, exclusive breastfeeding, complementary feeding practices, and immunization status.

Results: Nearly 32% (95%CI: 28.3-35.8) of the children were stunted, 12.1% (95%CI: 9.7-14.7) wasted, and 13.9% (95%CI: 11.4-16.6) were underweight. Early age at marriage, less than four ANC visits by the mother, history of substance use during pregnancy, and not exclusively breastfeeding were significantly associated with different forms of undernutrition.

Conclusion: Promotion of exclusive breastfeeding and a higher number of ANC visits and discouraging early-age marriage and substance use during pregnancy are necessary to prevent undernutrition in under-five children.

Keywords: Malnutrition, Nepal, under-five children

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[1] Department of Community Medicine and Public Health, Maharajgunj Medical Campus, Institute of Medicine, Tribhuvan University, Kathmandu, Nepal
[2] Central Department of Public Health, Tribhuvan University Kathmandu, Nepal

Correspondence to:
Deepak Raj Joshi
Department of Community Medicine and Public Health
Maharajgunj Medical Campus, Institute of Medicine
Tribhuvan University
Kathmandu, Nepal
Email: deepak.joshi@iom.edu.np

BACKGROUND

The nutritional status of under-five children is a critical indicator of a population's health and well-being(1,2). Malnutrition among children poses significant challenges to individual health, impairing physical growth, cognitive development, and long-term well-being such as diabetes, cardiovascular disease, and obesity late in life (3). Malnutrition among under-five children is a major public health issue in Nepal, with significant implications for child health, development, and overall well-being. According to Nepal Demographic Health Survey 2022, 25% of the children under five were stunted, 8% were wasted, and 19% were underweight. This figure indicates that a considerable proportion of Nepal's children are affected by acute and chronic malnutrition (4). Dietary practices, access to health care services, and socioeconomic determinants are the major factors associated with malnutrition among children(3).The municipalities of hilly districts like Nuwakot are likely to face similar challenges related to malnutrition, given their potential socio-economic

disparities (5). Understanding the specific nutritional needs and challenges faced by under-five children in these settings is essential for designing targeted interventions that address the root causes of malnutrition. By investigating factors such as dietary practices, access to healthcare services, and socioeconomic determinants, we can tailor interventions to meet the unique needs of the local population. This study aims to investigate the current status of nutrition among under-five children and its associated factors in selected wards of Bidur Municipality, Nuwakot district of Nepal by analyzing secondary data.

METHODS

This was a cross-sectional study with secondary data analysis. The study population consisted of children under five years old in different wards of Bidur Municipality. The Bidur Municipality was established in 2073 as an urban municipality of Nepal as per the new Constitution of Nepal 2072. The headquarters of Bidur Municipality is located in Bidur, Nuwakot district of Nepal(6). The total population of this municipality was 54351 living in 15234 households as per the 2021 National Census(7). We analyzed the data collected in the Community Health Diagnosis Program in Bidur Municipality.

Sampling method

We utilized all the data collected in Community Health Diagnosis (CHD) conducted between 19th Jan 2024 to 18th Feb 2024. For primary data collection, 10 wards out of 13 wards in Bidur municipality were chosen purposively. A convenient sampling approach was used to collect data, selecting approximately 25% of the total households in each selected ward as a sample. If the household had children under 5 years of age, the mother was interviewed and necessary measurements were taken of the children to assess the nutritional status. For this study, we conducted a secondary data analysis of 667 under-five children out of 3183 households.

Study variables

Dependent variables: Malnutrition was assessed by anthropometric measurements such as height, and weight, and nutritional indices such as stunting, wasting and underweight were calculated. Anthropometric measurements such as weight and height were recorded following the World Health Organization (WHO) guidelines. Indicators based on weight, height, and age were further assessed and compared with the WHO growth reference standards (2006) (8). The participant's weight was measured in kilograms (Kg) with a weighing scale to assess their growth and nutritional status using the standard technique to the nearest 0.5 kg. If the child was less than two years old or was unable to stand, tared weighing was performed, and if the child was two years or older, the child was weighed alone using a standardized, recently calibrated analog weighing machine. Using the standard technique, the participant's height was measured using a stadiometer/ infantometer to the nearest 0.1 cm. If a child was less than two years of age, recumbent length (lying down) was measured using an infantometer; however, if the child was two years or older and could stand, standing height was measured using a stadiometer (9).

For the calculation of underweight, the child's weight was recorded and compared to the median values; alternatively, the participant's weight was plotted against age on a graph for comparison with the standard curve. A low weight-for-age is termed as underweight, defined as a weight-for-age Z-score (WAZ) of less than -2. Severely underweight was classified if WAZ was less than -3 of the WHO (2006) reference values [8]. Wasting is an indicator of acute malnutrition and is defined as a weight-for-height Z-score (WHZ) of less than -2. A Z-score between -2 and -3 was classified as moderate wasting. Severe wasting was classified if WHZ was less than -3 according to the WHO (2006) reference standards (8). Low height for age indicates stunting and depicts early chronic exposure to undernutrition. Stunting is a height-for-age Z-score (HAZ) of less than -2. A Z-score between -2 and -3 was considered moderate stunting, and severe stunting was classified if HAZ was less than -3 of the WHO (2006) reference standards. Anthropometric data was entered into the WHO Anthro software (WHO, Geneva, Switzerland) for analysis and the prevalence of stunting, wasting and underweight were determined using the WHO Z-scoring system. Children with WAZ, WHZ, and HAZ between +2 to -2 were considered adequately nourished or normal (1,9).

The independent variables considered in this study were the child's age (months), age at marriage (years) and first pregnancy (years), substance use during pregnancy (yes/no), antenatal care (ANC) practices (visits to antenatal clinic), health-seeking behavior, delivery care (health facility vs home delivery), post-natal care (PNC) (yes/no), exclusive breastfeeding (present/absent), complementary feeding practices (followed correct method of preparation of Sarbottam Lito or not), and immunization status (complete/incomplete according to child's age).

Data collection of primary data

As a part of the CHD field program, MBBS first-year students were provided in-depth 5-day training and orientation on the CHD questionnaire before primary data collection for tool validity. A standard CHD questionnaire developed by the Department of Community Medicine and Public Health was used for primary data collection. The tool was validated by the subject matter experts and has been updated

every academic year. The students were also trained in standard measurement of height, and weight, and calculation of nutritional status indicators. The tool was pre-tested among mothers of under-five children in Tokha municipality. The data collection was done under the direct supervision of the faculties of the Department of Community Medicine and Public Health.

The Nepali-translated questionnaire was administered to the mothers of under five children using a face-to-face interview technique. The data collection was done by using the Kobo toolbox, which is a freely available data collection and management software that supports both Android and iOS platforms. All the collected data was stored in a cloud server of the Kobo toolbox. The quality of data and any errors in data entry were monitored by the research team of the Department of Community Medicine and Public Health. We utilized the data collected for nutritional status in the CHD program for this study. We included the data of all the children under five years in a given household. For households with more than one child under five, the data of children were merged with the mother's data.

Statistical analysis

Since this study is a secondary data analysis, we extracted the data from the cloud server of the Kobo toolbox as an MS Excel file and used it for further analysis. We performed descriptive analyses like frequency, percentage, and mean with standard deviations to summarize the nutritional status of under-five children, including prevalence rates of malnutrition in terms of stunting, wasting, and underweight. The Chi-square test was applied to analyze the association between stunting, wasting and underweight with categorical independent variables like ANC visits, place of delivery, exclusive breastfeeding, and PNC visits. The p-value of less than 0.05 was considered statistically significant. Statistical Package for Social Sciences (SPSS) software was used for data analysis. Any missing data was adjusted by deletion or imputation after consultation with a statistical expert.

Ethical considerations

This cross-sectional study involved secondary data analysis which posed no direct harm to the participants. Researchers ensured the confidentiality and anonymity of the participants' data during secondary data analysis for this study. We obtained ethical clearance for secondary data analysis from the Institutional Review Committee of the Institute of Medicine, Tribhuvan University (Ethical clearance reference number: 643/080/081).

RESULTS

A total of 667 under-five children were surveyed in this study. About 55% were male and 44% were female. The mean age, weight, and height of the children were 27 months (SD=17.25), 11.49 kg (SD=3.32), and 82.94 cm (SD=13.75) respectively. Nearly 32% (95%CI: 28.3-35.8) of the children were stunted, 12.1% (95%CI: 9.7-14.7) wasted, and 13.9% (95%CI: 11.4-16.6) were underweight. About 40% of the mothers were married for the first time and 20% had their first child at less than 20 years of age. All the mothers had visited ANC clinics during the last pregnancy with 91% completing four or more visits. Most deliveries were conducted at health facilities (93.3%) and nearly 48% of the mothers had post-natal checkups. Most mothers exclusively breastfed their babies (72%) and fed colostrum (93%). Among those who could not exclusively breastfeed, the main reason was insufficient milk production (80%). The majority of the mothers (89%) had heard of Sarbottam Lito (Super Flour Porridge) and were able to correctly explain its preparation (94%). Immunization status was incomplete for 31% of the children according to their age (Table 1).

Table 1. Antenatal, delivery, post-natal characteristics and feeding practices of the mothers of under-five children (n=667)

Characteristics	Frequency	Percentage
Number of ANC visits during previous pregnancy		
Less than four	60	9.0
Four or more	607	91.0
Substance abuse during pregnancy		
Yes	11	1.6
No	656	98.4
Complications during previous pregnancy		
Yes	118	17.7
No	549	82.3
Place of delivery		
Government Health Institution	600	90.0
Home	32	4.8
Private Health Institution	22	3.3
Others	13	1.9
PNC visit done after previous delivery		
Yes	318	47.7
No	349	52.3
Complications in Postnatal period		
Yes	78	11.7
No	589	88.3
Fed colostrum to the baby		
Yes	622	93.3
No	45	6.7
Explained the method of Sarbottam Lito preparation correctly (n=593)		

Yes	558	94.1
No	35	5.9
Immunization status		
Complete	460	69.0
Incomplete	207	31.0

About 6.9% of the children were moderately wasted and 7.4% of the children were severely wasted. Nearly 16% of the children were moderately stunted and 17.7% of the children were severely stunted. The proportion of children who were moderately and severely underweight was 11% and 3.3% respectively. Children whose mothers were married before 20 years of age had a significantly higher prevalence of moderate (14% vs 9.1%) and severe underweight (4.7% vs 2.3%) compared to those whose mothers were married at 20 years of age or later. Children with mothers who had less than four ANC visits had a significantly higher prevalence of severe wasting (16.4%) compared to those with four or more ANC visits (6.5%). Mothers with a history of substance abuse during pregnancy had a significantly higher prevalence of moderately stunted (45.5%) children compared to mothers with no such history (15.3%). Children who were not exclusively breastfed had significantly higher severe stunting (23.6%) compared to children who were exclusively breastfed (15.4%) (Table 2).

Table 2. Nutritional status of under-five children (n=667)

Variables	Weight for Height Z (%)			Height for Age Z (%)			Weight for Age Z (%)		
	Normal	Moderate	Severe	Normal	Moderate	Severe	Normal	Moderate	Severe
Age (months)									
0-23	86.1	5.5	8.4	69.4	16.4	14.2	87.4	9.4	3.2
24-59	85.4	8	6.7	64.4	15.3	20.3	84.4	12.3	3.3
		p value=0.414			p value=0.139			p value= 0.495	
Sex									
Male	85.1	8.6	6.3	67.6	13.8	18.6	85.1	11	3.9
Female	86.3	4.8	8.8	65.1	18.3	16.5	86.5	11.1	2.4
		p=0.132			p=0.279			p=0.556	
Mother's age at marriage									
Less than 20	84.7	5.9	9.5	63.6	17.4	19	81.4	14	4.7
20 or more	86.3	7.6	6.1	68.4	14.7	16.8	88.6	9.1	2.3
		p=0.264			p=0.452			p=0.030	
Mother's age at first pregnancy									
Less than 20	86.7	7.1	6.2	61.8	19.5	18.7	81.7	12.7	5.6
20 or more	85.4	6.8	7.8	67.6	14.9	17.5	86.7	10.6	2.7
		p=0.851			0.381			0.20	
Number of ANC visits									
Less than four	78.2	5.5	16.4	72.7	10.9	16.4	85.7	11.9	3.4
Four or more	86.5	7.1	6.5	65.9	16.3	17.8	85.8	10.9	3.2
		p=0.047			p=0.516			p=0.902	
Substance abuse during pregnancy									
Yes	100	0	0	36.4	45.5	18.2	90.9	0	9.1
No	85.4	7	7.6	67	15.3	17.7	85.6	11.2	3.2
		p=1.00			p=0.023			p=0.231	
Place of delivery									
Health Institution	85.9	6.6	7.4	66.8	15.7	17.4	86	10.7	3.3
Home and others	82.1	10.3	7.7	61.9	16.7	21.4	81.8	15.9	2.3
		p=0.557			p=0.796			p=0.496	
Fed colostrum to the baby									
Yes	85.8	6.8	7.4	66	16.2	17.8	85	11.5	3.5
No	84.2	7.9	7.9	73.8	9.5	16.7	95.3	4.7	0
		p=0.816			p=0.47			p=0.201	

Exclusive breastfeeding									
Yes	85	7.8	7.2	68.8	15.8	15.4	86	10.1	3.9
No	87.4	4.6	7.9	60.7	15.7	23.6	85	13.3	1.7
		p=0.430			p=0.046			p=0.205	
Heard about Sarbottam Lito									
Yes	85.9	7.2	7	66.7	15.9	17.5	85.5	11.4	31
No	83.9	4.8	11.3	65.3	15.3	19.4	87.5	8.3	4.2
		p=0.384			0.917			0.611	
Immunization status									
Complete	86.3	7.2	6.4	65.2	16	18.8	86.2	10.4	3.4
Incomplete	84.3	6.2	9.6	69.4	15.3	15.3	84.7	12.3	3
		p=0.401			p=0.519			p=0.754	
Total	**85.7**	**6.9**	**7.4**	**66.5**	**15.8**	**17.7**	**85.7**	**11**	**3.3**

DISCUSSION

This study assessed the nutritional status of under-five children in Bidur municipality, an urban municipality in Nepal. Compared to the national figures as reported in the Nepal Demographic and Health Survey 2021 (Stunting 36%, underweight 27%, and wasting 10%), this study reported comparable prevalence for stunting (32%), wasting (12.1%) but a lower prevalence of underweight (13.9%).(4) Stunting indicates chronic or recurrent undernutrition and wasting is a key indicator of acute malnutrition due to recent weight loss. Underweight represents both acute and chronic malnutrition which can be affected by many contributing factors like low birth weight, dietary diversity, exclusive breastfeeding, complementary diet, family income, and poor immunization status (10). This could have contributed to the difference in prevalence in our study.

The Criminal Code Act 2017 of Nepal has declared 20 years as the minimum age of marriage for both girls and boys (11). Girls who marry early experience higher rates of anemia and malnutrition than those who marry late, as a result, children born to these mothers are likely to suffer from malnutrition as well (12). In this study, children of mothers who married early (less than 20 years) had a higher prevalence of moderate and severe underweight. ANC visits have shown a significant impact on reducing the likelihood of malnutrition among children in Bangladesh (13). In the same manner, children whose mothers had less than four ANC visits during pregnancy had a significantly higher prevalence of wasting (16.4%) in our study. Mothers with a history of substance use during pregnancy such as tobacco and alcohol had a higher prevalence of moderately stunted children. Other studies have also reported that fetuses exposed to substances during gestation showed stunted growth and deficits in other growth parameters (14). Various studies have established the relationship between exclusive breastfeeding and stunting. Exclusive breastfeeding has been found to protect children against stunting especially in low-income contexts as breast milk contains vital nutrients that reduce the factors that cause stunting (15,16). Children not exclusively breastfed had a higher prevalence of severe stunting in this study.

Ending all forms of malnutrition is a target of Sustainable Development Goals as nutrition is a critical part of health and development. Multisector Nutrition Plan (MSNP) of Nepal focuses on using nutrition-specific and nutrition-sensitive services to enhance maternal and child nutritional status (17). Local governments are responsible for creating an enabling environment and policy drive for the smooth implementation of MSNP (18). Evidence on the burden of undernutrition from studies like this can be utilized by the local governments for effective planning and implementation of nutrition-related programs.

This study had a few limitations. The cross-sectional nature of the study design is not enough to show a strong cause-effect relationship between dependent and independent variables. Mothers had to recall events from the past which is likely to introduce recall bias in the data. Since this study was based on an academic field activity, we could not include all the social, economic, biological, and environmental variables that could have affected the nutritional status. Also, this study has not analyzed overweight and obesity which are also considered as malnutrition.

CONCLUSION

The prevalence of stunting, wasting, and being underweight among under-five children were 32%, 12.1%, and 13.9% respectively in Bidur municipality. Early age at marriage, less than four ANC visits by the mother, history of substance use during pregnancy, and not exclusively breastfeeding were associated with different forms of malnutrition.

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Conflict of Interest

The authors declare no conflict of interest.

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Prevalence of Abuse and Its Associated Factors among Elder Population Living in Kawasoti Municipality of Nepal

Bharat Kafle[1], Preeti Bhattarai[1], Aman Shrestha[2], Umesh Raj Aryal[1], Lok Raj Joshi[3], Kapil Amgain[3], Sagar Koirala[3], Seshananda Sanjel[1]

ABSTRACT

Background: Elder abuse is a growing public health problems. To tackle the elder issues World Health Organization declare for the decade of healthy ageing from 2020 to 2030, where Nepal is not exception from this goal. Thus, study aims to assess the prevalence of abuse and its associated factors among elder population living in Kawasoti Municipality.

Methods: A community based cross sectional study was conducted, taking 422 elders who were 60 years and above. The face to face interviews were conducted from October 2018 to January 2019. The collected data were entered into EpiData 3.1 and was exported to SPSS 26 version. The logistic regression was performed to measure associated between overall abuse and its covariates.

Results: The overall prevalence of elder abuse was 43.8% and caregiver neglect was the most reported form of elder abuse. Study found that nuclear family [OR=0.42, 95% CI;0.18-0.97], illiterate [OR: 2.01, 95% CI; 1.11-3.96], family members have no migrated to another country [OR=0.57, 95% CI; 0.33-0.97], health condition was bad [OR= 1.92, 95% CI; 1.15-3.21], elder who did not depend on their daily activities on family members [OR=0.25, 95% CI; 0.12-0.52], and those who had consumed tobacco [OR= 1.91, CI; 1.19-3.06] were associated with elder abuse.

Conclusion: Finding suggests that good health, a nuclear family, literacy, family members not migrated to another country, and independence in daily activities strongly reduce elder abuse. To address this, it is essential to implement awareness programs, and ageing population for their economic sustainability activities, and healthy and active aging life.

Keywords: Elderly, mistreatment, family-based, Nepal

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[1]School of Public Health, Karnali Academy of Health Sciences, Jumla, Nepal
[2]Division of Gerontology, Department of Epidemiology & Public Health, School of Medicine, University of Maryland Baltimore, Baltimore, Maryland, United States of America
[3]School of Medicine, Karnali Academy of Health Sciences, Jumla, Nepal

Correspondence to:
Bharat Kafle
Email; bharatkafle29@gmail.com
ORCID ID 0000-0003-4113-0760

BACKGROUND

The increasing aging population has significantly changed the society all over the world.(1) Globally, increasing ageing population and survival rate are one of the human success stories.(2) According to a systematic review from various countries, one in six elder individuals had been abused in a community settings.(3) These suggest that elder abuse remained iceberg phenomenon in the community which indicates higher risk of abuse that actual at figure.(3) Elder abuse can cause financial hardships, social repercussions, and serious physical and mental health issues, including injury, cognitive decline, and the need for alternative care.(4)

WHO defined elder abuse as "a single or repeated act or lack of appropriate action, occurring within any relationship where there is an expectation of trust which causes harm

or distress to an elder person".(5) In Nepal, elder abuse is considered a social taboo that paradoxically make it challenging to identify cases of elder abuse.(6,7) As a result, it's often believed that elder abuse is uncommon in Nepal. Despite, this several earlier studies have shown that elder abuse is more prevalent in the country.(6–9) Recent census, showed that population aged 60 years and above has increased from 8.1% in 2011 to 10.2% in 2021, indicating that Nepal's population is aging(10) and other hand empirical evidence showed that elder abused increased recent decade varying prevalence, ranging from 49.1% to 61.7%.(7-9) Consequently, health system is unable to bring equilibrium in the high demand and supply of health services among the elder population which result to increasing government health expenditure in future.(11) To tackle the elder issues WHO declare for the decade of healthy ageing from 2020 to 2030, Nepal is not exception from this goal.(1) This study brings contributions towards this goal. Kawasoti municipality is one of the highly populous municipality among the Nawalparasi district and it hold top position among the Gandaki province. In which various studies not cover migration and elder abuse but this study try to find out the migration variable and elder abuse.(6-9) Thus, study aims to assess the prevalence of elder abuse and its associated factors.

METHODS

For reporting purposes, this study adheres to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) criteria.(12) This study was community based cross-sectional study conducted in Kawasoti Municipality. The total sample was obtained 422 households after adding 7% of non-response rate. Sample size was calculated by using formula $\frac{z2pq/*}{d2}$ (D.E). (13) Value at a specified confidence level (95% CI=1.96), P= Prevalence 0.8 (14), q= 1-p, d= 5%, and design effect=1.6. The study adopted three stage stratified cluster sampling. In first stage, out of seventeen wards six wards of the municipality were selected, at the second stage enumeration area was selected, enumeration areas constitutes of previous wards of village development committee. At the third stage households with elder were selected from each enumeration areas which was shown in (Figure 1). This study was conducted from October 2018 to January 2019 among population aged 60 years and above, with face to face interviews using interview schedule.

Outcome variable

Elder adult's ≥60 self-reported their behavioral experiences of facing any sort of abuse within the last three months. A series of 21 questions with yes/no responses were asked to assess six different types of abuse (physical, psychological, caregiver neglect, financial, legal, and sexual) they faced. Which adopted from earlier study of Nepal.(7,9) The first question, "Have you experienced some form of abuse in last three months?" was excluded, because of information provided regarding non-specific abuse. Overall abuse was define and determined at least any abuse specify of remaining six types of abuses included in this study.

Predictors

Sociodemographic factors were age, gender, ethnicity, religion, marital status, disability status, type of family, number of children, living arrangement, occupation, education status, availability of land, ownership of land, related to livelihood, depended on family, and members have migrated to another country. Gender was categorized either "male" or "female." Age, the numeric variable was categorized as "60 to 74" years, "75 to 84" years" and "above 85 years." Ethnicity was

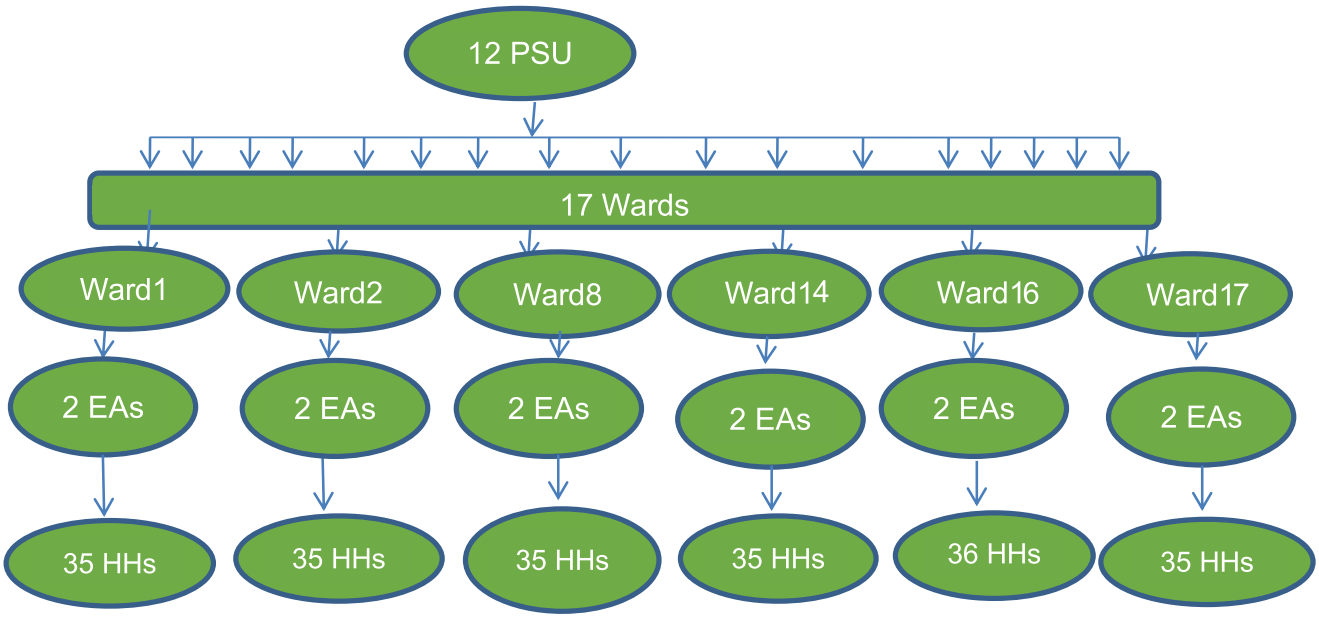

Figure 1. Sampling procedures applied in the study

categorized into "Brahmin/Chhetri", "Tarai Janajati", "Pahadi Janajati", and "Dalit." Religion was categorized into major religion of Nepal "Hindu", "Buddhist," and combining "Muslim," and "Christian" into "Others". Similarly, marital status was recoded into two categories: "married" and "Others which combined by "single or without partner;" "divorced," "widowed," and "separated." Disability status included "not disabled" and "disabled." Type of family categorized into "nuclear" and "joint". Number of children categorized into either elder had no child or one child categorized into "≤1", "two", and "three or more than three". Living arrangement was categorized into "son/daughter-in-law", "spouse", and "Others". Occupation categorized dichotomously "agriculture" and non-agriculture". Similarly, education status also dichotomously categorized "literate vs. illiterate". Availability of land, ownership of land, related to livelihood, depended on family, and members have migrated to another country were categorized into "yes" and "no". Alcohol consumption, tobacco use, and from any disease in the past one year were categorized into ("yes," and "no"), which were behavioral health factors. Health status was measured using self-reported health and was assessed by asking "How do you rate your health condition today?" The responses were: "good and "bad." Further, asked which system do you belief in treatment? Response which belief in allopathic was categorized into "modern" and response other else then allopathic were categorized into "alternative" health system of belief.

Data analysis

Data from EpiData 3.1 was exported to SPSS and analyses were performed using SPSS 26 version. All the variables described above were fitted in the initial model. Multicollinearity was checked for each categorical variables (table-2) with a tolerance of collinearity statistics cut-off point of ≥0.5. "Availability of land in household" showed multicollinearity with "ownership of land". Thus, the latter variable availability of land in household was removed from the model. For categorical variables, univariate statistics were expressed in frequency distribution and percentage, and one proportion method for confidence interval. Bivariate relationships between all categorical predictors and outcome variable were assessed using the Chi-Square test of independence; determined the association. Multivariable logistic regression provided the regression results of elder abuse experience.

Validity and reliability

Validity of the study were assessed by used self-reported series of 21 questions with yes/no responses which adopted from earlier study of Nepal.(7,9) Translation and back translation of tools (English-Nepali) was performed, peer-reviewed, expert consultation, and pre-testing were conducted to maintained validity whereas reliability of questionnaire was determined by internal consistency tested across twenty question items used in this study with Cronbach coefficient alpha score of 0.84, which indicated high reliability of this tool.(15)

Ethical approval

Ethical permission was obtained from the ethical review board of the Nepal Health Research Council (Reg. no. 652/2018). Administration permission was taken from the Kawasoti Municipality. Participants were explained about the aims of study and written permission were taken and confidentiality was maintained.

RESULTS

The overall prevalence of elder abuse was 43.8% [95% CI: 39.2-48.6]. Caregiver neglect was the most reported form of elder abuse 34.4% [95% CI: 29.9-39.0], followed by psychological abuse 31.5% [95% CI: 27.2-36.1], Financial abuse 13.3% [95% CI: 10.3-16.7], legal abuse 9.0% [95% CI: 6.5-12.0], physical abuse 6.4% [95% CI: 4.3-9.0], and sexual abuse 1.9% [95% CI: 0.1-3.5] (Table 1).

Table 1. Prevalence of Elder Abuse

Type of abuse	Prevalence (%)		Overall prevalence % (95% CI)
	Male	Female	
Caregiver neglect	13.7	20.6	34.4 (29.9-39.0)
Psychological	13.0	18.5	31.5 (27.2-36.1)
Financial	5.0	8.3	13.3 (10.3-16.7)
Legal	2.8	6.2	9.0 (6.5-12.0)
Physical	2.6	3.8	6.4 (4.3-9.0)
Sexual	0.5	1.4	1.9 (0.1-3.5)
Any abuse	17.5	26.3	43.8 (39.2-48.6)

More than half of the elder adults were female 55.0%, aged between 60-75 years 78.2%, and Hindu were 86.7%. Majority of the participants from "Brahamin/ Chhetri" ethnic groups 48.1% and "Tarai/Janajati" 22.3%. About 62.8% were married, 74.6% were lived in joint family, having children three and more than three were 82.9%, and living arrangement with son/daughter-in-law were 82.9%. Most of the elder occupation were agriculture 78.9%, 80.1% illiterate, 58.8% had land availability, not having land ownership were 55.5%, and elder not dependent on family were 74.4%. Members who have had migrated to another country were 43.8%. Approximately one third 37.7% elder consume alcohol, and more than half 53.1% use tobacco substances. Majority 79.4% of the respondent reported any form of disease in the past one year, 64.2% having good health condition, and 55.7% belief in modern health system. Among those experienced abuse following variables were statistically significant; type of family (p=0.002), education status (p=<0.001), availability of land

(p=0.011), ownership of land (p=0.002), depended on family (p=0.003), family member migrated to another country (p=0.008), tobacco use (p=0.012), any form of disease in the past one year (p=0.001), health conditions (p= <0.001), and belief in health system (p=0.002) (Table 2).

Table 2. Characteristics of Elder Adults Overall and Based on Abuse Experience

Characteristics	Overall n (%)	Experienced abuse Yes	No	p-value
Total	422 (100.0%)	185 (43.8%)	237(56.2%)	
Sociodemographic Factors				
Gender				0.067
Female	232 (55.0%)	111 (26.3%)	121 (28.7%)	
Male	190 (45.0%)	74 (17.5%)	116 (27.5%)	
Age in years (69.85±7.6 years)				0.065
60-74	330 (78.2%)	137 (32.5%)	193 (45.7%)	
75-84	76 (18.0%)	37 (8.8%)	39 (9.2%)	
85+	16 (3.8%)	11 (2.6%)	5 (1.2%)	
Religion				0.987
Hindu	366 (86.7%)	161 (38.2%)	205 (48.6%)	
Buddhist	35 (8.3%)	15 (3.6%)	20 (4.7%)	
Others	21 (5.0%)	9 (2.1%)	12 (2.8%)	
Ethnicity				0.629
Brahmin/ chhetri	203 (48.1%)	91 (21.6%)	112 (26.5%)	
Tarai janajati	94 (22.3%)	39 (9.2%)	55 (13.0%)	
Pahadi janajati	80(19.0%)	32 (7.6%)	48 (11.4%)	
Dalit	45 (10.7%)	23 (5.5%)	22 (5.2%)	
Marital status				0.397
Married	265 (62.8%)	112 (26.5%)	153 (36.3%)	
Others	157 (37.2%)	73 (17.3%)	84 (19.9%)	
Type of family				0.002*
Nuclear	107 (25.4%)	33 (7.8%)	74 (17.5%)	
Joint	315 (74.6%)	152 (36.0%)	163 (38.6%)	
Number of children				0.087
≤1	21 (5.0%)	12 (2.8%)	9 (2.1%)	
2	51 (12.1%)	16 (3.8%)	35 (8.3%)	
3+	350 (82.9%)	157 (37.2%)	193 (45.7%)	
Living arrangement				0.791
Son/daughter-in-law	350 (82.9%)	156 (37.0%)	194 (46.0%)	
Spouse	38 (9.0%)	15 (3.6%)	23 (5.5%)	
Others	34 (8.1%)	14 (3.3%)	20 (4.7%)	
Occupation				0.633
Agriculture	333 (78.9%)	144 (34.1%)	189 (44.8%)	
Non-agriculture	89 (21.1%)	41 (9.7%)	48 (11.4%)	
Education				<0.001*
Illiterate	338 (80.1%)	163 (38.6%)	175 (41.5%)	
Literate	84 (19.9%)	22 (5.2%)	62 (14.7%)	
Ownership of land				0.002*
Yes	188 (44.5%)	67 (15.9%)	121 (28.7%)	
No	234 (55.5%)	118 (28.0%)	116 (27.5%)	
Availability of land				0.011*
Yes	248 (58.8%)	96 (22.7%)	152 (36.0%)	
No	174 (41.2%)	89 (21.1%)	85 (20.1%)	
Related to livelihood				0.715
Yes	53 (12.6%)	22 (5.2%)	31 (7.3%)	
No	369 (87.4%)	163 (38.6%)	206 (48.8%)	
Depended on family				0.003*
Yes	108 (25.6%)	34 (8.1%)	74 (17.5%)	
No	314 (74.4%)	151 (35.8%)	163(38.6%)	
Members have migrated to another country				0.008*
Yes	185 (43.8%)	52 (12.3%)	41 (9.7%)	
No	237 (56.2%)	133 (31.5%)	196 (46.4%)	
Alcohol consumption				0.284
Yes	159 (37.7%)	75 (17.8%)	84 (19.9%)	
No	263 (62.3%)	110 (26.1%)	153 (36.3%)	
Tobacco use				0.012*
Yes	224 (53.1%)	111 (26.3%)	113 (26.8%)	
No	198 (46.9%)	74 (17.5%)	124 (29.4%)	
From any disease in the past one year				0.001*
Yes	335 (79.4%)	161 (38.2%)	174 (41.2%)	
No	87 (20.6%)	24 (5.7%)	63 (14.9%)	
Health condition				<0.001*
Good	271 (64.2%)	90 (21.3%)	181 (42.9%)	
Bad	151 (35.8%)	95 (22.5%)	56 (13.3%)	
Belief in health system				0.002*
Modern	235 (55.7%)	119 (28.2%)	116 (27.5%)	
Alternative	187 (44.3%)	66 (15.6%)	121 (28.7%)	

*Statistically significant

In the unadjusted model, age 60 to 75 years shows significance for abuse by 67% lower odds [OR=0.32, 95% CI; 0.11-0.95]. However, abuse was no significance while performing with adjusted model. Among the sociodemographic factors adjusted with the covariates shows only nuclear family had significant associated by 58% lower odds of abuse compare to joint family [OR=0.42, 95% CI; 0.18-0.97]. Socioeconomic variables during unadjusted model education, land ownership,

depended on the family member, and family member migrated to another country were significantly associated. Amid association of unadjusted model of socioeconomic variables education status and family member migrated to another country were retained association by adjusted model. Participants who were illiterate had more than twice the increased odds of abuse compared to those who literate [OR: 2.1, 95% CI; 1.11-3.96]. Those family member who have no migrated to another country had lower odds by 43% abuse [OR=0.57, 95% CI; 0.33-0.97]. Of the health and behavior related factors, health system, self-rated health condition, depended on daily living activities on family, suffer any form of disease in the past one year, and tobacco consumption showed significant association during unadjusted model after employed adjusted model self-stated health condition, depended on daily living activities on family, and tobacco were significant. Elder who believe their self-stated health condition bad was almost twice abuse compare to good health condition [OR= 1.92, 95% CI; 1.15-3.21]. Regarding depended on daily living activities on family, elder who did not depend had 75% lower odds of abuse [OR= 0.25, 95% CI; 0.12-0.52]. Elder who consumed tobacco faced double odds of abuse compare those who did not consumed [OR= 1.91, CI; 1.19-3.1] (Table 3).

Table 3. Unadjusted and Adjusted Odds Ratios (OR) for Factors Associated with Elder Abuse using Binary Logistic Regression

Characteristics	Unadjusted OR (95%CI)	[1]Adjusted OR (95%CI)
Sociodemographic Factors		
Age (ref= "85+ years")		
60-74	0.32 (0.11-0.95)	0.70 (0.19-2.58)
75-84	0.43 (0.14-1.36)	0.49 (0.13-1.91)
Gender (ref= "Male")		
Female	1.44 (0.98-2.12)	1.242 (0.78-1.99)
Type of family (ref= "Joint")		
Nuclear	0.48 (0.30-0.76)	0.42 (0.18-0.97)
Generation (ref= "three generation")		
Two generation	1.67 (1.05-2.64)	0.73 (0.32-1.68)
Others	2.21 (0.95-5.14)	1.97 (0.75-5.18)
Disability Status (ref= "With disability")		
Without disability	0.33 (0.21-0.51)	0.58 (0.33-1.01)
Socioeconomic Factors		
Education (ref= "literate")		
Illiterate	2.62 (1.54-4.47)	2.106 (1.110-3.96)
Land ownership (ref=No)		
Yes	0.54 (0.37-0.81)	0.70 (0.37-1.35)
Depended on family (ref=yes)		
No	0.50 (0.31-0.79)	0.72 (0.41-1.27)
Members have migrated to another country (ref=yes)		
No	0.54 (0.34-0.85)	0.57 (0.33-0.97)
Health and Behavior Related Factors		
Health system (ref=alternatives)		
Modern	1.88 (1.27-2.79)	1.21 (0.74-1.99)
your health condition (ref= good)		
Bad	3.41 (2.25-5.17)	1.92 (1.15-3.21)
Depended on your daily living activities on your family (ref= yes)		
No	0.18 (0.10-0.34)	0.25 (0.12-0.52)
Suffer from any disease in the past one year (ref= yes)		
No	0.41 (0.25-0.69)	0.67 (0.37-1.21)
Tobacco consumption (ref= no)		
Yes	1.65 (1.12-2.43)	1.91 (1.19-3.06)

DISCUSSION

The present study revealed that approximately 44 percent of elder reported that they had faced any kind of abuse and majority of the female participants reported the overall or any type of abuse. However, sex was not identified as statically significant in multivariable logistic model. The global prevalence of elder abuse was 15 percent.(3) Similarly, study conducted in the various Asian countries showed that the prevalence of elder abuse in China was 36.2 percent (16), India, Japan, and South Korea were (47 percent, 17.9 percent, and 6.3 percent respectively) (17), 13.6 percent was in Turkey (18), and Bangladesh was 62 percent. (19) National study from Rural and Urban exhibited 61.7 percent (9) and 49.10 percent. (7) The above data indicates that the prevalence of elder abuse was greater than the global, East Asia, and Western world but is similar to the South East Asian countries.

The current study found that the most common abuse was caregiver neglect and others were followed by psychological, financial, legal, physical, and sexual abuse respectively. Result was consistent with the global study. In contrast, the prevalence was less than the study conducted in the eastern part of Nepal but higher with the study conducted in Bangladesh.(3,9,19) This could be Nepalese society historically lived in joint family and that was gradually erode in this globalization era. Nonetheless, family has still rooted with the traditionally belief and culturally bounded with the elder take care in household setting. It assumed that the institutional care is taking disrespectful and abounding the parents. (7,9,20,21) Thus, Care takers who are engaged for their carrier development or economic progress, due to this they less prioritize to take care for elder in household settings which leads to perceived that they were neglected.

In line with the psychological abuse, findings consistent with the results of global as well as studies conducted in Nepal.(7,9,22,23) Most elders live with their children. Traditionally, daughters-in-law focused on household

chores and caring for children and elders. However, changing roles and responsibilities due to education and careers have created a gap between elders' expectations and caretakers' realities. This mismatch, leads to elder's feelings of psychological abuse.

Financial abuse was similar to the study conducted in Nepal with contrast of higher prevalence in Turkey and lower in global and China. (3,7,9,16,19) This rises mainly due to inheritance law on the land ownership, possessions handover, and allowance dispute with family members.(7,9) Similarly, result of physical abuse consistent with the study conducted in Nepal but contrast with various others studies.(3,7,16,22) In Nepalese society, elders might feel comfortable sharing experiences of physical abuse if they trusted to strangers. Similarly, legal abuse is consistent with the study conducted in Eastern Nepal (9),whereas higher in the study conducted in Urban western part of Nepal. (7) This might be Elders often hesitate to report abuse due to limited legal knowledge, fear of family discord, and societal pressure. Even when reported, legal intervention often leads to forced reconciliation, further victimizing the elder. (9) Furthermore, the sexual abuse of the present study was similar to a study conducted in Nepal with higher prevalence in global and Europe. (7,19,22)

The present study revealed that age group from 60 to 75 years showed significantly associated with unadjusted model by 67% lower odd of abuse, but not associated with adjusted model. However, the findings consistent with national as well as international studies. Increasing age and their changing behavior patterns in elders often lead to more frequent abuse. Elder who lived in nuclear family likely to have 58% lower odds to abuse as compared to joint family. Similar findings, were found from the various study conducted in Nepal but the result is contrast with the other study conducted in various settings of Nepal. (6,21) This might be due to that elder leaving in nuclear families, face fewer barriers in decision-making and power struggles, which leads towards happiness. (6)

Elders who are illiterate experience twice the odds of abuse as compared to literate. Consistent results were found in Nepal and Turkey which shows 2 times and 4 times higher odds of abuse respectively. (7,18) This association implies that education is essential to assess for identifying the abuse and obtaining legal assistance, which leads in lower susceptibility to abuse and empower from the vulnerability. (24,25) Those family members who have not migrated to another country had lower odds 43% to abuse. Consistent result showed by the study conducted in Nepal.(8) In this regard Youth migration is due to the economic globalization and system theory of migration which leads to create migrated from the low resource to the high resource country. Our study revealed that who are not migrated can easily take care of them that leads to share sorrow and happiness as compared to those who are migrated. Elder who believe their self-stated health condition bad was twice the abuse compare to good health condition. Results were consistent with the several study conducted in Nepal. (7,9) As well as similar findings was found by the study conducted in India. (26) The reason might be due to that family perceived burden of care taking, financial hardship for seeking treatment, need to allocate time to visit health institution, loss of opportunity cost due to caring of elder, and sometimes care takers loss their job which possess the abuse toward the elder. (21) Regarding not depend on daily living activities towards family, elder had lower odds of abuse. Result was consistent with the study conducted in Nepal. (8,9) As household settings are assumed to provide strong social, psychological, and financial support for elder. Family members need to create an enabling environment, assist during hospital visit, provide companionship, and manage diet and medication. Without this support, elder perceived abuse.(8,21) Participants consumed tobacco faced double odds of abuse compare to those who did not consumed. This result is supported by the study conducted in Nepal. (7) This could be due to family members blame for their smoking habits to cause disease which create elder misbehaving or bullying leads to perceived abuse. (9)

Significance of the study

Elder abuse response has been lagging due to a lack of recognition as a public health issue. In Nepal, the elder population is expected to increase significantly overcoming the decade, leading to higher direct costs associated with the elder abuse, primarily due to increased healthcare expenses for treatment and rehabilitation. So, this study urged for the stakeholders to address this critical issue.(27,28) Study sensitized and emphasized to empower the health and wellbeing financial security, economic independence, social connectivity, and self-endowment for elder. As well as creating supportive policy for caregiver, elder abuse reporting helplines, educational interventions are necessary to develop respect for elder adults among children and youth, for the prevention strategies. (26)

This study is not without limitation. Study explicitly exhibit cases for self-reported elder abuse, which does not incorporate family perspective that might differ than actual scenario. Underreporting of sensitive issues, qualitative perspective is not included, and only triangulated by observation which might not capture all issues. Additionally, tools used yes/no response may not provide actual answer, create response bias.

CONCLUSION

The study revealed that four in ten elder faced any type of abuse, women has high prevalent, and caregiver neglect was the most common. Further, study suggests that good health, nuclear family, literacy, family members not migrated to another country, and independence in daily activities strongly reduce elder abuse. To address this, it is essential to implement awareness programs, and ageing population for their economic sustainability activities, and healthy and active aging life. Elder abuse is a complex issue so, using an ecological model is needed to better understand this phenomenon and develop targeted plans and policies to improve family behavior towards elders.

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Mental Health Literacy and Associated Factors among Secondary School Students in Bhaktapur, Nepal

Sarita Duwal[1], Rajan Paudel[23*], Mohan Paudel[4], Manisha Dhaubanjar[5] Jyoti Nepal[6] Dilaram Acharya[7], Saraswati Dhungana[8]

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[1]Department of Public Health, Nepalese Army Institute of Health Sciences, Shree Birendra Hospital, Kathmandu, Nepal
[2]Central Department of Public Health, Institute of Medicine, Tribhuvan University, Kathmandu, Nepal
[3]Unit of Health Sciences, Faculty of Social Sciences, Tampere University, Finland
[4]NSW Agency for Clinical Innovation, Australia
[5] Iwamura College of Health Sciences, Bhaktapur, Nepal
[6]Research Project Coordinator, Department of Research and Development, Kathmandu University Hospital, Dhulikhel, Nepal
[7]Department of Medicine, Cumming School of Medicine, University of Calgary, AB, Canada
[8]Department of Psychiatry and Mental Health, Institute of Medicine, Tribhuvan University Teaching Hospital, Kathmandu, Nepal

Correspondence to:
Rajan Paudel (RP*)
ORCID: https://orcid.org/0000-0002-9894-5656
Central Department of Public Health, IoM, TU
Email: paudel.rajan@iom.edu.np

ABSTRACT

Introduction: Mental health problems like depression and anxiety are the leading contributors to the global burden of disease. Mental health problems are common in adults and children in Nepal, accounting for 13.2% and 11.2% of the population while only 21% sought for treatment. Evaluation of mental health literacy is important in assisting the development of intervention and policies toward preventing mental health problems. This study aimed to assess the mental health literacy among the secondary school students of Bhaktapur municipality, and identify the factors associated with it.

Methods: A cross-sectional descriptive study was conducted in December 2019 among 468 students of grade11 and 12. We selected the study sample using a two-stage cluster sampling technique. A self-administered questionnaire was used for the data collection using a modified mental health literacy scale. Collected data were entered in EpiData 3.1 and SPSS 17.0. Descriptive analysis was done to find out the level of MHL. Variables that were found statistically significant ($p<0.05$) in the univariate analysis were further analyzed using multiple linear regression method. Ethical approval was taken from the Institutional Review Committee of the Institute of Medicine, Nepal.

Results: The participants exhibited moderate level of mental health literacy score of 110.9 8 (SD=±11.11). This study shows that age below 18 years (β= 2.13, 95% CI= 0.093to4.164), science faculty (β= 6. 41, 95% CI= 3.71to8.57), internet source for health information (β=2.31, 95% CI= 0.21to4.41), part-time job (β= -6.78, 95% CI= -9.30to -4.25) and mental distress (β= -3.37, 95% CI= -5.27to -1.47) were significantly associated with MHL in the students.

Conclusions: Awareness of existing MHL levels in secondary school students is crucial for the evaluation of targeted educational interventions and for the further development and implementation of these interventions in the future. This study also emphasizes the need for school mental health programs and to include mental health literacy in the school curriculum.

Keywords: Mental health literacy, Health literacy, school students

BACKGROUND

Mental health problems are commonly occurring in many countries throughout the world. (1) Globally, an estimate of more than one in ten people is living with mental disorders while they remain widely under reported. (2) In South-East Asia the prevalence is even alarming, accounting for 122 per 1000 population. (3) A study in Nepal, revealed that the prevalence of mental disorders is even higher among adults and children which accounts for 13.2% and 11.2% respectively while only 21% of the adolescents aged 13 to 17 years with any form of mental disorders sought treatment. (4)

The World Health Organization (WHO) has identified an urgent need to accurately recognize mental illness

and implement proven and cost-effective. MHL is one such effective intervention strongly advocated by WHO. MHL can be more effective in practice, especially in school settings, by integrating it into the daily activities. Engaging students through interactive programs, peer discussions, and coping strategies can help them better identify and manage their mental health problems. (5) Mental health literacy refers to knowledge and attitudes regarding mental health that aid in recognition, management and prevention of mental health issues. (6) Interventions targeted at educating the public on mental illness and the benefits of seeking help have demonstrated lasting results in the areas of suicide and depression reduction. (7)

The national adolescents' development and health strategy (NADHS) 2018 also identifies psychosocial, emotional and mental health development and promotion as key intervention areas that include mental health in the school curriculum, recognizing disorders, anxiety, suicidality, skill development as key activities. (8) In Nepal, few studies on knowledge and attitudes towards mental illnesses have been conducted in specific populations like nurses, medical students and adults. (9,10) MHL can play a crucial role in reducing the stigma, identifying early interventions and promoting resilience associated with mental health issues in Nepal. Educating students about mental health can foster a more understanding and supportive environment. However, there are no published studies on factors that affect MHL outcome, including all its attributes.

This is the first study on the mental health literacy of students at secondary school in Nepal. This study looks beyond their ability to recognize mental health disorders and their opinions about them and fill the knowledge gap regarding the existing situation of mental health literacy especially focused on the secondary school students along with an assessment of predictors of mental health literacy.

METHODS

A descriptive cross-sectional study was conducted in three secondary schools of Bhaktapur municipality. Bhaktapur municipality is selected for the study as it lies in the core of the Kathmandu valley at the distance of 8 miles from the capital city, Kathmandu, which is the center of attraction for the higher level of education. The pilot study of National Mental Health Survey conducted in 2018 that included Bhaktapur districts showed that 11.2% adolescents of age 13 to 17 years had some form of mental disorders. Similarly, suicidality was also present among 8.7%. The study population was students of grade11 and 12. Data collection was done among 468 students from 26th December 2019 to 19th January 2020. Students present on the day of data collection were included in the study. The sample size was determined by using the formula for one sample situations with known proportion/prevalence with specified absolute precision i.e. n= z2 1-α p (1-p) /d2. A two-stage cluster sampling method was used, where at the first stage, out of total of 8 secondary schools, 3 schools were selected through Probability Proportionate to Size (PPS) sampling technique. In the second stage, from a total of 112 sections simple random sampling was used to select 4 to 5 class/sections from each school irrespective of faculty and grade. From the selected class/sections, only one student refused to participate in the study.

Study tools and data collection

A self-administered questionnaire technique was followed to collect data from students in the randomly selected classes/sections. The questionnaire was based on a literature review and divided into two main sections. The first section included information on socio-demographic characteristics and self-reporting questionnaire-20 (SRQ-20) from WHO 1994 to identify the presence of mental distress among participants. The SRQ-20 is used as a case-finding instrument as well. The items are scored using 0(meaning the symptom is not present) to 1 (symptom is present); the maximum score is 20. The literature suggests that the cut-off score for 'normal function' versus 'mental health problems' ranges from 5 to 11. The cut-off score used in this study is 6 as a previous study by Crowne T. et al. in 2014 used the same cut-off score. (11)

The second section included the validated tool i.e. Mental health literacy scale (MHLS) adapted after obtaining permission from the author. The modified MHLS replaced the questionnaire on knowledge on recognition of disorders like social phobia, personality disorder, dysthymia, agoraphobia, bipolar disorder with the questionnaire on Psychosis, suicidality, epilepsy and intellectual disorders. The modification was done based upon literature review and pilot survey of in mental health status in Nepal by NHRC in 2018. The mental health conditions included in the questionnaire were the common mental health problems prevalent among the adolescents in that pilot survey.

Similarly, knowledge on risk factors was also modified by the researcher by replacing the questions because in Nepal there is no national-level prevalence survey on mental health so far to give correct responses to the questions on the original scale. So, some questions in 1-15 were modified after intense literature review and pretesting was done for contextualization in the Nepalese context. The tools were finalized through appraisal and verification by research supervisors and suggestions from experts. Language expert was consulted during translation for comprehensibility and simplicity of language. Pretesting of the questionnaire

tool of each language was done among 55 students of similar age groups and grades of a school from a non-study area. The tool was revised based on the pre-test. The internal consistency of each subscale of the Likert scale was assessed using Cronbach's alpha (alpha) of 0.7. Data collection was done by a trained team of researchers.

After obtaining ethical approval from the Institutional Review Committee (IRC) of IoM and reference letter from Municipal education office, each school was visited for coordination and data collection. The objectives and sampling process were clearly explained to the principal and coordinators along with the ethical considerations. The required number of classes from each school was selected by lottery method. After the approval from the concerned school authority, students were briefed about the study objectives and requirement of parental written consent for students below 18 years of age. On the second visit, students who returned the approved written consent form were allowed to participate in the survey and those who were not interested in participating were requested to sit separately in the same classroom.

Data analysis

The collected data was systematically coded and entered in EpiData version 3.1. The entered data was exported to IBM SPSS version 17 where checking, cleaning, editing and analysis of the data was performed. Descriptive analysis was done to report frequency, percentage, mean, median and Standard deviation. Students t-test was done to understand the relationship between independent variables and MHLS measures. Variables that were found statistically significant ($p<0.05$) during the univariate analysis were checked for multicollinearity. A test of multicollinearity was performed to identify the correlation and strength of correlation between the independent variables. Multicollinearity was detected with the help of tolerance and its reciprocal called variance inflation factor (VIF). The value of tolerance less than 0.1 and the value of VIF 10 and above was considered problematic, thus identified as the existence of multi-collinearity. Multiple linear regression was done to determine significant factors associated with mental health literacy. For this enter method was used, and an alpha level of 0.05 was considered as the criterion for statistical significance.

RESULTS

Socio-demographic characteristics of respondents

Most of the students participated in this study are female being 264. The mean age of the participants was 16.91 years (SD=1.1 years, range=14-21 years). Two third of the students were in Grade11 (67.3%). The majority of the students (58.1%) belonged to science. The most widely used source of health information by the students was the internet (71.2%). Only 14.5% of students participated in mental health programs. Very few participants reported personal history of mental illness (1.7%) while most of them had some form of mental disorders (42.7%). Family history of mental illness was reported by 4.7% of the students. Complete socio-demographic information is presented in Table 1.

Table 1: Socio-demographic characteristics of respondents

Characteristics	Number	(%)
Age Group		
<18 years	350	74.8
≥18 years	118	25.2
Gender		
Female	264	56.4
Male	204	43.6
Grade		
Grade 11	315	67.3
Grade 12	153	32.7
Faculty		
Science	272	58.1
Management	90	19.2
Humanities	89	19.0
Education	17	3.6
Ethnicity		
Janajaati	292	62.4
Brahmin/Chhetri	139	29.7
Other disadvantaged *	37	7.9
Religion		
Hindu	368	78.6
Buddhist	85	18.2
Christian	12	2.6
Others(unspecified)	3	0.6
Smoking		
Never	457	97.6
Ever smoked	11	2.4
Alcohol consumption		
Never	381	81.4
Ever consumed	87	18.6
Substance abuse		
Never	462	98.7
Ever consumed	6	1.3
Source of health information		
Internet	333	71.2
Television	61	13.0
Books	33	7.1
Radio	21	4.5
Newspaper	11	2.4
Health magazines	8	1.7

Participation in mental health program and workshop	400	85.5
No	68	14.5
Yes		
Personal history of mental illness		
No	460	98.3
Yes	8	1.7
Self-reported Mental distress (SRQ-20 tool)	268	57.3
No	200	42.7
Yes		
Family history of mental illness		
No	446	95.3
Yes	22	4.7
Educational status of father		
Illiterate	29	6.2
Can read and write	110	23.5
Primary education	45	9.6
Lower secondary	51	10.9
Secondary	139	29.7
Higher secondary and above	94	20.1
Educational status of mother		
Illiterate	130	27.8
Can read and write	121	25.9
Primary education	52	11.1
Lower secondary	45	9.6
Secondary	84	17.9
Higher secondary and above	36	7.7

Mental health literacy scale

The mean score for the mental health literacy scale was 110.98 (SD=±11.11, minimum=78.00 and maximum=143.00, 95% CI=109.97-111.99. Skewness (-0.172, SE= .113), Kurtosis (.265, SE=.225). Shapiro-Wilk test was performed and was significant at 95% CI, p> 0.05 that means the data is normally distributed.

Mental health literacy in each dimension of MHL

Above 80% of the students could identify disorders like Generalized anxiety disorder, depression, suicidality and psychosis (Table 2: Ability to recognize mental disorders) being likely as per the symptoms given in the questionnaire. However, the knowledge on the risk factors was limited. Where most of the students (52%) perceived mental illnesses are caused by wrong thinking. (Table 2: Knowledge of riskfactors of mental disorders). Positive thinking, good interpersonal relationship and healthy lifestyle will help to prevent mental illness are perceived by 89% as remedies for avoiding mental illnesses. Also, the same percentage of students feel comfortable seeking help from health care providers for any information on mental illnesses. Similarly, 55 % of the participants showed willingness to make friends with people with mental illnesses. Results pertaining to knowledge and attitude of mental health in each dimension s of MHL are as shown in Table 2.

Table 2: Mental health literacy in each dimension of MHL (n= 468)

	Overall participant responses for each MHL item	
MHL categories	**Likely/very likely n (%)**	**Unlikely/Very unlikely n (%)**
Ability to recognize mental disorders		
Generalized anxiety disorder	394(84.2)	74(15.8)
Depression	402(85.9)	66(14.1)
Suicidality	387(82.7)	81(17.3)
Psychosis	420(89.7)	48(10.3)
Mental retardation	334(71.4)	134(28.6)
Drugs dependence	363(77.6)	105(22.4)
Epilepsy	305(65.2)	163(34.8)
Knowledge of risk factors of mental disorders		
Mental illness is caused by wrong thinking*	244(52.1)	224(47.9)
All mental illnesses are caused by external stressors*	264(56.4)	204(43.6)
If a family member has mental illness, then other members also may have the illness	227(48.5)	241(51.5)
Knowledge of professional help available		
If someone is threatening to hurt someone or themselves, is it okay for a counsellor to tell and get help from others?	334(71.4)	134(28.6)
If your problem is not life-threatening, is it okay for a counsellor to tell others about your problem because they want others to help you too? *	252(53.8)	216(46.2)

	Helpful/ very helpful n (%)	Unhelpful / very unhelpful n (%)	
Knowledge about self-help treatments			
Getting better sleep helps someone who is feeling nervous, anxious, or depressed?	405(86.5)	63(13.5)	
Avoiding all activities or situations that make a person nervous or depressed will help them feel better? *	242(51.7)	226(48.3)	
Positive thinking, good interpersonal relationship and healthy lifestyle will help to prevent mental illness?	420(89.7)	48(10.3)	
	Agree/Strongly agree n (%)	Neither agree nor disagree n (%)	Disagree/Strongly disagree n (%)
Knowledge about how to find mental health information			
I know where to find information about mental illness			
I know how to use the computer or telephone to find information about mental illness	349(74.6)	46(9.8)	73(15.6)
I am comfortable going to health provider to get information about mental illness	388(82.9)	23(4.9)	57(12.2)
I have access to resources (e.g.doctors, friends, counsellor, internet, TV) that I can use to look for information about mental health illness	421(89.9)	16(3.4)	31(6.6)
	398 (85)	27(5.8)	3(9.2)
	Agree/strongly agree n (%)	Neither agree nor disagree n (%)	Disagree/strongly disagree n (%)
Attitude which facilitates help -seeking and recognition			
People with a mental illness could get over it if they wanted to*			
A mental illness is a sign of personal weakness*	120(25.6)	105(22.4)	243(51.92)
A mental illness is not a real medical illness*			
People with a mental illness are dangerous*	187(40.0)	90(19.2)	191(40.81)
It is best to avoid people with a mental illness so that you don't develop this problem*	82(17.5)	110(23.5)	276(58.97)
If I had a mental illness, I would not tell anyone*	111(23.7)	144(30.8)	213(45.5)
Seeing a mental health professional means you are not strong enough to manage your own problems *	66(14.1)	84(17.9)	318(67.9)
If I had a mental illness, I would not get help from a mental health professional*	37(7.9)	60(12.8)	371(79.3)
I believe getting help for mental illness from a professional would not work*	84(17.9)	63(13.5)	321(68.6)
	66(14.1)	45(9.6)	357(76.3)
	48(10.3)	61(13.0)	359(76.7)
	willing / definitely willing n (%)	Neither willing nor unwilling n (%)	unwilling/ definitely unwilling n (%)
How willing would you be to do following activities with someone with mental illness?			
To move next door	175(37.4)	106(22.6)	187(40.0)
To spend an evening hanging out	157(33.5)	88(18.8)	223(47.6)
To make friends	260(55.6)	76(16.2)	132(28.2)
To work closely	171(36.5)	101(21.6)	196(41.9)
To vote for a politician	78(16.7)	59(12.6)	331(70.7)
To marry someone in your family	63(13.5)	111(23.7)	294(62.8)
To hire him/her if you were employer	205(43.8)	66(14.1)	197(42.1)

Note: *Reverse Scoring

Factors associated with mental health literacy

The study variables (age group, science faculty, source of health information, religion, part-time job, participation in mental health program, alcohol consumption, mental health status, educational status of both parents) which exhibited significant association with mental health literacy at p<0.05 during bivariate analysis (t-test) were further subjected to multiple linear regression.

The mental health literacy for the participants was positive and significantly associated with faculty at p<0.001 and age and source of information at p<0.05. It was negative but statistically significantly associated with a part-time job and mental distress at p<0.001.

Table 3: Factors associated with MHLS

Variables	regression coefficient β	t	p- value	95% CI for β
(Constant)	106.94	70.58	<0.001**	103.96 - 109.92
Age				
<18 years	2.13	2.05	.040*	0.093 - 4.16
≥18 years (ref)				
Faculty				
Science	6.14	4.96	<0.001**	3.71 – 8.57
Non-science (ref)				
Religion				
Hindu	0.75	0.58	.62	-1.62 – 3.13
Non- Hindu (ref)				
Source of Health information				
Internet	2.31	2.16	.031*	-0.21 – 4.41
Non-internet (ref)				
Part- time job				
Yes	-6.78	-5.28	<0.001**	-9.30 - -4.25
No (ref)				
Participation in mental health program				
Yes	1.90	1.48	.139	-0.62- 4.43
No (ref)				
Mental distress				
Present	-3.37	-3.48	.001**	-5.27 - -1.47
Absent (ref)				
Educational status of father				
Secondary and above	-0.88	-0.75	.454	-3.19 – 1.43
Below secondary (ref)				
Educational status of mother				
Secondary and above	-1.24	-1.00	.316	-3.66 – 1.19
Below secondary (ref)				
Alcohol consumption				
Yes	-1.90	1.48	.139	-0.62- 4.43
No (ref)				

*Statistically significant at p<0.05 at 95% CI, ** statistically significant at p<0.001 at 95% CI

DISCUSSION

Mental health problems are often untreated for many years, leading to increased relapses, suicidal attempts, reduced remission rates and worsening overall outcomes while early recognition and treatment of mental disorders improved the quality of life. (12) The Overall MHL in the students was found to be lower (mean score of 110.98) than the students of Australian University and UK University's which were found to be 127.38 and 122.88. (13,14). This variation could be due to the selection of the sample population. The study in Australia and UK was done among the university level students that included the bachelor's and master's degree students and age group included above 16 years. The current MHL score was slightly higher than a study conducted among Iranian people (102.75) and Korean college students (106.8). (15,16) This shows that MHLS for the current study is slightly higher than that of the students from other parts of Asia. However, further study is required that includes students from the diverse background than just including higher secondary school students. University level students would have made good comparisons with these studies.

A study in Nepal using a depression case vignette revealed that only 16.9% of participants could correctly identify the depression syndromes. (17). Another study among Portuguese youth aged 14-24 years found only 27.2%. (18) which is lower than the present findings. This could be because of the use of the scale-based measure in the present study while the previous study used a vignette-based measure. In the present study the ability to recognize GAD 984.2%), drugs dependence (77.6%) and depression case scenario (85.9%) are lower than the study in the United States using the same tool. (19) This recognition could prevent suicide and early help-seeking which might be due to the exposure to the programs of mental health intervention.

In the present study, the cause of mental illnesses was attributed to wrong thinking (52%) and external stressors (56%), and family history (48.5%). This exhibits a lack of knowledge about risk factors and causes. Knowledge of available professional treatment and their effectiveness could enhance the utilization of mental health services. Seeking help from health professionals was thought of as not being strong enough to solve their own problems by 17.9% of the respondents. This highlights that there are some participants who have negative thinking regarding professional help available and these participants require mental health literacy interventions.

People with mental illness experience stigma and discrimination in society as well as in health care system. People who stigmatize mentally ill people have a tendency to maintain a distance with them due to fear

of them being dangerous or catching same illness which is consistent with our study. (20, 21) This stigmatizing attitude prevails in most societies and such social distance would further exacerbate the conditions of the person with mental illness as well as it is a major obstacle to early and successful treatment. (22) A higher degree of mental health literacy was related to less stigma and social distance. (23) Therefore, interventions should be directed towards the anti-stigmatizing attitude development of the people. Such interventions were found to reduce negative stereotypes and the reserve shown towards mentally handicapped can be reduced. (24,25)

Factors associated with mental health literacy

This study found statistically significant difference in MHL between the age group below 18 years and above 18 years. Participants below the age 18 years are found to have MHL higher than the students belonged to age >18 years with mean score of 111.77 and 108.64 respectively. Most of the research has found differences in mental health literacy in age but the results are mixed as some studies have found better knowledge among older adults while some have found better among young adults. (13)

In current study students having part-time job had lower level of MHL (102.33) than not doing part-time job (113.43) and statistically significant which is contrast to the study in Iran. (15)The contradictory finding could be due to the selection of the study population where Iranian respondents are adult with mean age 32 years while, in current study mean age is 16 years. In this study the MHL is found significantly different in Hindu (112.20±10.41) than in non-Hindu (106.49±12.45) at p<0.001where 78.6% were Hindu. A study in Malaysia found similar findings where Muslims were found to have higher level of MHL (107.96) than in non-Muslims (100.84) where Muslims were 81.6%. (26) In both studies the respondents with majority in religious group were found to have higher literacy.

Most of the students in current study used internet as source of health information (71.2%) and their MHL was significantly higher than those who are non-internet users at p<0.05. This suggests that the use of internet for mental health information is best way to reach these young adults. However, problems with internet-based sources include information overload, poor information quality, potential harm and lack of scientific evaluation. (18,27) Similarly, those who participated in mental health programs had higher MHL compared to those who had not participated. This difference is again statistically significant at p<0.001 in bivariate analysis. This emphasizes that MHL program should be targeted to the young adults as mental health educational interventions were associated with statistically significant improvements in attitude towards providing help, social association with a person with mental health condition and improved recognition. (24)

This study found that individual with personal history of mental illness had low level of MHL but no statistically significant relation was found which is contrast to the study conducted in Iran and United States. (19,28) The possible explanation for the present study could be that the study population being the adolescents who are less sensitive for family related matters or due to lack of exposures. SRQ-19 revealed that around 152 (42.7%) students were having mental distress. In a study in UK university students 48.4% of students indicated mild, moderate, or severe mental disorder. (29) Statistically significant difference in mean MHL is found among those who have and don't have distress in SRQ-20. Those who have mental distress are found to have lower MHL compared to those who have no distress. These findings reveal that early identification of the problem is necessary while improving their knowledge and attitude on mental health literacy would prevent them from being stigmatized.

The pilot study of national mental health survey of Nepal has identified 0.7% of the adolescent aged 13-17 years had current substance use disorder while 7.3% of age above 18 years had such disorders. (4) Substance use and mental health problems have significant relationships. The use of substances and their associations with MHL have not been studied so far elsewhere. Present study has tried to identify the relationship between substance use and MHL. MHL was found to be significantly lower among those who consume alcohol compared to non-consumers. This difference is significant in bivariate analysis. While smokers have a low level of knowledge compared with non -smokers. Similarly, those who have used drugs tend to have higher MHL than those who are non-users. As the study is done in the Bhaktapur municipality where alcohol consumption among the ethnic community is most common, so the alcohol consumption might have confounding effect on MHL in bivariate analysis. Thus, further research should be done to explore such relationship with particular focus on the users of alcohol, smoking and drugs to reach to the conclusion.

The educational status of both parents was significantly associated with MHL level of participants. Parents with education below secondary level had their children low level of MHL while parents with secondary or above level of education had their children comparatively higher MHL. This could be because individuals with higher education are generally more exposed and well informed about mental health than their counterparts. Similar findings have been found in other parts of the

world, where increasing parental education levels have been significantly associated with higher mental health literacy levels. (30) A national survey in Australia reported that having tertiary education was significantly associated with higher mental health literacy score. (31) Similarly, MHLS score was found to be higher among those with advanced education in another study. (26) So, the higher educated parents could have contributed to the MHL level of participants.

Limitation of the study

This study has several limitations. The use of SRQ-20 tool is just a screening tool for mental health problems but not a diagnostic tool. So further research using a diagnostic tool could reveal the actual mental health status of students. Participants completed the questionnaire in exam setting, yet there remains possibility that some participants responded to items in a way they considered more socially desirable. Since, very few studies have been conducted in this area in Nepal, we had limited comparisons within the country. The study was done in a single municipality of Bhaktapur district which is relatively an urban area. So, it couldn't be generalized for the rural areas. However, the results of this study can serve as a foundation for future research and policy development.

CONCLUSION

This study revealed a moderate level of mental health literacy among the students with poor knowledge on risk factors and stigmatizing attitude. The mental health literacy for the participants was positive and significantly associated with faculty at $p<0.001$ and age, source of information at $p<0.05$. It was negative but statistically significantly associated with part-time job and mental distress at $p<0.001$. Students who have participated in mental health programs exhibit higher mental health literacy. Therefore, mental health educational interventions should be implemented for the improvements in attitude towards providing help, social association with a person with mental health condition and improved recognition. The roles of teachers, communities, and policymakers could be creating safe environments, building support networks, raising awareness, developing comprehensive policies and allocating resources. This is the first study on the mental health literacy of students at secondary school in Nepal. This study looks beyond their ability to recognize mental health disorders and their opinions about them and fill the knowledge gap regarding the existing situation of mental health literacy especially focused on the school children along with an assessment of predictors of mental health literacy.

List of abbreviations

MHL: Mental Health Literacy; MHLS: Mental Health Literacy Scale; SRQ: Self-reported questionnaire; IRC: Institutional Review Committee; PPS: Probability Proportionate to Size.

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Contributions

SDuwal and RP developed concept, worked on methods, did data analysis and drafted the manuscript. SDuwal worked on the data acquisition. SDhungana worked on the concept and methods of the study. SDuwal, RP, MP, MD, JN, DA and SDhungana reviewed, edited and finalized the manuscript.

Conflict of interest

Authors declare no conflicts of interest.

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Ethical statement

Ethical approval for the study was received from Institutional Review Committee (IRC) of Institute of Medicine, Tribhuvan University [Ref. 213 (6-11) E2 076/077]. Original copy of the ethical approval is submitted as the supplementary files. Permission was also obtained from Bhaktapur Education Section of Bhaktapur municipality office and respective school administrations. Data were collected from the respondents after obtaining consent from their parents (for students under 18 years) and respondents after explaining the purpose and procedure of the study. Confidentiality was maintained and voluntary participation was ensured.

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Anxiety and Depression among Reproductive Aged Women with Fertility Problem and Its Associated Factors: A Hospital-Based Cross-Sectional Comparative Study

Sushan Man Shrestha[1], Samir Shrestha[2]

ABSTRACT

Introduction: The infertility is one of the growing public health issues in Nepal and the anxiety and depression related to this problem is not much studied.

Objective: This study aims to find status of anxiety and depression among the reproductive aged women having fertility problem and its associated factors.

Methods: A cross-sectional comparative study was conducted in Kathmandu from November 2019 to July 2020 with a sample size of 177 respondents including a group of 86 women with fertility problem and another group of 91 women without fertility problem using simple random sampling. Hospital Anxiety and Depression Scale was used to access the anxiety and depression of the respondents. Chi Squared test and multivariate logistic regression was applied to find the association of anxiety and depression with socio-demographic, personal and health related variables.

Results: The status of no, mild, moderate and severe anxiety were 52.7%, 24.2%, 17.6% and 5.5% respectively in fertile group and 30.2%, 23.3%, 14.0% and 32.6% in infertile group. Similarly, the status of no, mild, moderate and severe depression were 64.8%, 29.7%, 4.4% and 1.1% in fertile group and 50.0%, 14.0%, 8.1% and 27.9% in infertile group respectively. From multivariate logistic regression, anxiety was found to be statistically significant between with occupation [AOR 0.407 (0.203-0.817)], perceived income stress [AOR 2.124 (1.062-4.249)] and fertility status [AOR 2.463(1.254-4.838)] and depression was found to be statistically significant with difficulties in relationship between couple [AOR 8.216(2.365-28.548)].

Conclusions: This study revealed occupation status, perceived income stress and fertility status as the factors associated to anxiety and difficulties in relationship between couple as the factor associated with depression. The findings will be useful to improve the situation of anxiety and depression among infertile women in relation to both public health and clinical practice.

Keywords: Infertility, anxiety, depression

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Check for updates

[1] Central Department of Public Health, Institute of Medicine, Tribhuvan University
[2] Department of Health Services, Ministry of Health and Population, Government of Nepal

Correspondence to:
Sushan Man Shrestha
Central Department of Public Health , Institute of Medicine
Tribhuvan University
Kathmandu, Nepal
Email: sushan.shrestha@gmail.com

BACKGROUND

The issue of infertility is an emerging problem in Nepal and it is considered one of the neglected public health issues in the world. (1,2) Infertility is actually considered as stressful life event and anxiety and depressive symptoms are usual responses to the life crisis of the infertile women. (2) As defines by WHO, -ICMART, infertility is "a disease of the reproductive system defined by the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse". (3) It is estimated that one couple out of every ten couples has been facing this problem (4). The estimation of infertility in reproductive aged women and couples around the world who are experiencing difficulty in conceiving a child range from

approximately 8-15 % worldwide. (4-6) Regarding South Asia, the World Fertility Survey estimated infertility as 4% in Bangladesh, 6% in Nepal, 5% in Pakistan and 4% in Sri Lanka. (7)

Problems related to infertility faced by women in their life including distress may lead to various stress related problems. (8) Stress could be leading to the mental health issues for infertile people as the magnitude of it's effects depends on personal coping behaviors. Infertility is a stressor that affects both husbands and wives but it is more stressful for women, though only few studies have included men. (9) Infertility is often associated with a stress or psychological strain that may lead to manifest in anxiety and depressive symptoms which can be both a cause and a consequence of the disorder. (10,11)

Despite the information on physical and emotional burdens were well studied regarding infertility, there remains a substantial gap in research focusing on the mental health challenges confronted by these women specially in the country like Nepal. The aim of this study is to assess the status and prevalence of anxiety and depression among the reproductive aged women having fertility problem with compare to the women not having fertility problem. It also intends to identify its associated factors regarding socio-demographic, personal and health related characteristics.

METHODS

A cross-sectional comparative study was carried out between November 2019 and July 2020 to investigate the status of anxiety and depression among the reproductive aged women with and without fertility problem. The respondents were selected from health institutions with infertility care services and obstetrics & gynecology services. The study was conducted in Vatsalya Natural IVF, Naxal and Out Patient Department of obstetrics & gynecology, Tribhuvan University Teaching Hospital, Maharajgunj, Kathmandu after having all the ethical procedure and approval to conduct study.

The total of 182 sample size for this study was calculated by using the formula for two comparative groups using statulator.com and the reference was taken with prevalence of depression 19 % in fertile and 41 % in infertile group. (12) The confidence level and power was taken at 0.95 and 0.85 respectively and non-response rate was adjusted at 10%. Five responses from infertile group were discarded due to incompleteness. The sample size of 177 reproductive aged women were taken in this study with 86 women with fertility problem and another group of 91 women without fertility problem.

The respondents were selected from the daily OPD register using simple random sampling method from both health institutions separately. Data were collected for from each of the respective study sites.

The data was collected through a questionnaire to access the information about the study. The study variables are addressed in the questionnaire in accordance with the objectives of the study. Dependent variables considered in this study are the status of anxiety and depression. The independent variables taken in this study are mainly divided into socio-demographic, personal and health related variables. The age group, ethnicity, religion, residential status, education, occupational status, perceived income stress, duration of marriage, previous history of abortion or miscarriage, perceived support from husband and difficulties in relationship between couple are taken as independent variables. Hospital Anxiety and Depression Scale (HADS), which was already validated in both English and Nepali language was used to determine the anxiety and depression of the respondents. In this tool, there were subscales containing 7 items for both anxiety and depression. Each item is rated on a four-point scale ranges from 0-3 (3 indicating maximum symptom severity), and the scores are summed. The subscale therefore has a summed score with a potential range from 0 to 21. The score from 0-7 indicates no condition, 8-10 mild condition, 11-`14 moderate condition and 15-21 severe condition for both anxiety and depression. Face to face interview technique was used for data collection. The study did not take husband or male partner in the study even though infertility is the concern of the couple. (13)

The data was collected by researchers and manually check for incompleteness and inconsistency, then entered in EpiData 3.1, and exported to SPSS 25.0 version for analysis. After cleaning the data, it was analyzed using the descriptive and inferential statistical tools. Chi squared test and multivariate logistic regression techniques were applied to test the statistical significance (P-value less than 0.05 was considered statistical significance).

Ethical Approval was taken from Ethical Review Board of Nepal Health Research Council (Ethical clearance reference number: 2027) and Institutional Review Committee of Institute of Medicine (Ethical clearance reference number: 222/076/077). Ethical principles as per guidelines were strictly followed.

RESULTS

A group of 86 women with fertility problem and another group of 91 women without fertility problem were taken in this study among which 71.4% of the respondents in fertile group were below the age 35 whereas in infertile group 75.6% were below this age (P-value =0.53). Similarly, ethnicity of the respondents was distributed with 37.4% and 30.2% Janajati in the fertile and infertile Groups (P-value =0.53). Regarding

the religion, the 86.8% in fertile and 89.5% in infertile group belongs to Hindu respectively (P-value =0.58). The distribution of respondents according to residential status reported, 41.8% of respondents in fertile group were living in their own house while 53.5% belongs to infertile group (P-value =0.12). Concerning educational status, it was found that 69.2% of the respondent are below the bachelor level in fertile group but in contrast, only 38.4% are below bachelor level in infertile group (P-value <0.01). While examining the occupational status, the distribution of economically active group with compare to home-maker group was found to be statistically significant with 68.1% homemaker in fertile group and 45.3% in infertile group (P-value <0.01). In response to the perceived stress about income, both groups have similar distribution with 63.7% and 67.4% in fertile and infertile groups (Table 1)

Table1: Socio-Demographic characteristics of the respondents

	Fertile Group n = 91 # (%)	Infertile Group n = 86 # (%)	P-value
Age group			
Less than 35	65 (71.4)	65 (75.6)	0.53
35 and above	26 (28.6)	21 (24.4)	
Ethnicity			
Janajati	34 (37.4)	26 (30.2)	0.32
Non-janajati	57 (62.6)	60 (69.8)	
Religion			
Hindu	79 (86.8)	77 (89.5)	0.58
Non-hindu	12 (13.2)	09 (10.5)	
Residential Status			
Own house	38 (41.8)	46 (53.5)	0.12
Rented house	53 (58.2)	40 (46.5)	
Education			
Below bachelor	63 (69.2)	33 (38.4)	<0.01
Bachelor and above	28 (30.8)	53 (61.6)	
Occupation			
Economically Active	29 (31.9)	47 (54.7)	<0.01
Home maker	62 (68.1)	39 (45.3)	
Perceived income stress			
Negligible or minimal stress	33 (36.3)	28 (32.6)	0.60
Mild or high stress	58 (63.7)	58 (67.4)	

The duration of marriage is categorized in less than 10 years and 10 years or above. Regarding this characteristic, a contrast outcome was seen with 56% of the respondents in fertile group have the marriage duration less than 10 years whereas this portion is 72.1% in infertile group ((P-value = 0.03). About the question regarding previous history of abortion or miscarriage, the responses from both groups are almost similar with 34.1% and 33.7% of having history of abortion or miscarriage in fertile and infertile group respectively (P-value = 0.96). In response to the perceived support from the husband, 75.8% and 84.9% have reported adequate support from their husband in fertile and infertile group respectively (P-value = 0.13). While asking about the difficulties in the relationship between the couple, only minimal responses i.e. 13.2% and 12.3% reported the presence of difficulties in fertile and infertile group (P-value = 0.94) (Table 2).

Table2: Personal and health related characteristics of the respondents

	Fertile Group n = 91 # (%)	Infertile Group n = 86 # (%)	P-value
Duration of marriage			
Less than 10 years	51 (56.0)	62 (72.1)	0.03
10 years or above	40 (44.0)	24 (27.9)	
Previous history of abortion or miscarriage			
Having history of abortion or miscarriage	31 (34.1)	29 (33.7)	0.96
No history of abortion or miscarriage	60 (65.9)	57 (66.3)	
Perceived support from Husband			
Adequate support	69 (75.8)	73 (84.9)	0.13
No or minimal support	22 (24.2)	13 (15.1)	
Difficulties in relationship between couple			
Present	12 (13.2)	11 (12.8)	0.94
Not present	79 (86.8)	75 (87.2)	

This table shows the status of anxiety and depression among fertile and infertile group. The significance association were found with both anxiety and depression status between the fertile and infertile group. The distribution of no, mild, moderate and severe anxiety and depression were 52.7%, 24.2%, 17.6% and 5.5% respectively in fertile group and 30.2%, 23.3%, 14.0% and 32.6% in infertile group. Whereas the distribution of no, mild, moderate and severe depression were 64.8%, 29.7%, 4.4% and 1.1% in fertile group and 50.0%, 14.0%, 8.1% and 27.9% in infertile group respectively. The pattern showed with higher to lower distribution in the case of both anxiety and depression in fertile group whereas in infertile group the severe anxiety and depression seems remarkably high (Table 3).

Table3: Status anxiety and depression among the respondents

	Anxiety			Depression		
	Fertile group	Infertile group	P-value	Fertile group	Infertile group	P-value
Not any	48 (52.7)	26 (30.2)	<0.01	59 (64.8)	43 (50.0)	<0.01
Mild	22 (24.2)	20 (23.3)		27 (29.7)	12 (14.0)	
Moderate	16 (17.6)	12 (14.0)		4 (4.4)	7 (8.1)	
Severe	5 (5.5)	28 (32.5)		1 (1.1)	24 (27.9)	

The association of socio-demographic characteristics and status of anxiety and depression is described. The parenthesis indicates the percentage distribution regarding presence of anxiety and depression with their respective totals for every group of the categories. Regarding anxiety, no significant association were found with age group, ethnicity, religion, residential status (P-value =0.04) and education. Only occupation (P-value <0.01) of the respondents and their perceived income stress were found to have significant association with anxiety. Similarly, age group, ethnicity, religion, residential status, education and perceived income stress showed no significant association with depression while occupational status (P-value <0.01) showed the significant relationship with depression (Table 4).

Table 4: Association of anxiety and depression with socio-demographic characteristics

	Anxiety Present	P-value	Depression Present	P-value
Age group	n = 103		n = 75	
	# (%)		# (%)	
Less than 35	74 (56.9)	0.57	53 (40.8)	0.47
35 and above	29 (61.7)		22 (46.8)	
Ethnicity				
Janajati	64 (54.7)	0.19	51 (43.6)	0.65
Non-janajati	39 (65.0)		24 (40.0)	
Religion				
Hindu	89 (57.1)	0.40	65 (41.7)	0.60
Non-hindu	14 (66.7)		10 (47.6)	
Residential Status				
Own house	50 (59.5)	0.73	41 (48.8)	0.10
Rented house	53 (57.0)		34 (36.6)	
Education				
Below bachelor	58 (60.4)	0.51	44 (45.8)	0.31
Bachelor and above	45 (55.6)		31 (38.3)	
Occupation				
Economically Active	54 (71.1)	<0.01	41 (53.9)	<0.01
Home maker	49 (48.5)		34 (33.7)	
Perceived income stress				
Negligible or minimal stress	29 (47.5)	0.04	26 (42.6)	0.96
Mild or high stress	74 (63.8)		49 (42.2)	

The prevalence of anxiety among fertile and infertile group is found to be 47.3% and 69.8%, and the prevalence of depression is 35.2% and 50.0% respectively. Factors such as fertility status, perceived support from husband, self-reported difficulties in relationship between couple have significant association both anxiety and depression whereas previous history of abortion or miscarriage seems significant relationship with depression. The factor duration of marriage showed no significant association with both anxiety and depression (Table 5).

Table 5: Association of anxiety and depression with personal and health related characteristics

	Anxiety Present	P-value	Depression Present	P-value
Fertility Status				
Fertile	43 (47.3)	<0.01	32 (35.2)	0.04
Infertile	60 (69.8)		43 (50.0)	
Duration of marriage				
Less than 10 years	67 (59.3)	0.69	52 (46.0)	0.19
10 years or above	36 (56.3)		23 (35.9)	
Previous history of abortion or miscarriage				
Having history of abortion or miscarriage	38 (63.3)	0.32	33 (55.0)	0.02
No history of abortion or miscarriage	65 (55.6)		42 (35.9)	
Perceived support from Husband				
Adequate support	77 (54.2)	0.03	55 (38.7)	0.04
No or minimal support	26 (74.3)		20 (57.1)	
Difficulties in relationship between couple				
Present	19 (82.6)	0.02	19 (82.6)	<0.01
Not present	84 (54.5)		56 (36.4)	

For multivariate logistic regression analysis, the variables with p-value upto 0.10 in bivariate analysis were included. The VIF for all the selected variables for multivariate analysis is found to be less than 2 and the Nagelkerke R square is found to be 0.207 for anxiety and 0.205 for depression. Occupation [AOR 0.407(0.203-0.817)], perceived income stress [AOR 2.124 (1.062-4.249)] and fertility status [AOR 2.463 (1.254 - 4.838)] were found to be statistically significant for anxiety whereas only self-reported difficulties in relationship between couple [AOR 7.220 (2.037 – 25.595)] was found to be statistically significant for depression (Table 6).

Table 6: Anxiety and depression with socio-demographic, personal and health related characteristics using multivariate logistic regression

Anxiety	COR	AOR	P-VALUE (AOR)
Occupation (reference category – Economically active)	0.384 (0.204 – 0.721)	0.407 (0.203-0.817)	0.011
Perceived income stress (reference category - Negligible or minimal stress)	1.944 (1.036 – 3.647)	2.124 (1.062-4.249)	.033
Fertility Status (reference category-Fertile)	2.576 (1.389 - 4.776)	2.463 (1.254 - 4.838)	0.009
Perceived support from Husband (reference category - No or minimal support)	0.410 (0.179 – 0.937)	0.423 (0.164 -1.094)	0.076
Difficulties in relationship between couple (reference category – Not present)	3.958 (1.286 – 12.179)	2.446 (0.692 -8.641)	0.165
Depression			
Occupation (reference category – Economically active)	0.433 (0.235 – 0.798)	0.545 (0.272 -1.093)	0.087
Fertility Status (reference category-Fertile)	1.844 (1.009 – 3370)	1.734 (0.878 -3.425)	0.113
Previous history of abortion or miscarriage		1.885 (0.931 – 3.815)	0.078
Perceived support from Husband (reference category - No or minimal support)	0.474 (0.224 – 1.004)	0.769 (0.300 -1.968)	0.584
Difficulties in relationship between couple (reference category - Not present)	8.313 (2.693 – 25.658)	7.220 (2.037 – 25.595)	0.002
Residential status (reference category – Own house)	0.604 (0.331 – 1.102)	0.584 (0.294 -1.160)	0.125

DISCUSSION

This study assessed the prevalence of anxiety and depression among the fertile and infertile women of reproductive age group and associated factors related to them. The prevalence of anxiety and depression in this study is found to be 69.8% and 50.0% in infertile group, whereas the fertile group the figures are found to be 47.3% and 35.2%. A study by Benbella et al. revealed 55% of the women with infertility problem had depression and 45.6% had mild to severe anxiety. (14) Other studies reported similarly levels of depression in infertile women with a rate 68% in India and 62% in Ghana. (15,16) In a study conducted by Guerra et al., 67% of infertile women had anxiety. (17) A study assessing anxiety in infertile women found different levels of mental pressure in 83.8% of infertile women, in which moderate or severe types in 25%.(14) Similarly, study in Iran showed quiet higher level i.e. 86.8 % of anxiety among infertile women. (18) In this study, 23.1% fertile and 46.5% infertile women had anxiety. This shows the prevalence of anxiety and depression among infertile women is quite similar to the study from other countries.

The distribution socio-demographic and personal characteristics in this study among fertile and infertile women were found similar except the educational status, occupational status and duration of marriage. In this study no significant relationship were found regarding age, education level, religion, ethnicity and residential status with anxiety and depression. Ogawa M et al also reported no significant relationship between age with anxiety depression. (19) But in another study, age was reported negatively associated with anxiety while there was no significant relationship between depression. (20) A study reported a significance relationship with age, education and occupation with depression and anxiety. (21)

In this study, anxiety was found significantly associated with occupation but depression was not significant in multivariate analysis. A study by Facchinetti F et al. reported increased vulnerability of stress is associated with low income. (22)

The perceived support from Husband was found not significantly associated to anxiety and depression in this study. Similarly, in a study, men's perceived support did not seem to influence their partners' stress. (23) Hidehiko M et al. showed anxiety and depression in childless Japanese women were associated significantly with lack of husband's support and feeling stress which is consistent with our study. (24)

In this study, duration of marriage and previous history of abortion or miscarriage was found not significant with both anxiety and depression and similar finding had been reported in a study from Bangladesh. (25)

Though this study showed the significant association of occupation, perceived income stress and fertility with anxiety and difficulties in relationship between couple with depression, there are certain limitations of this study. Since the cross-sectional design was adopted, it is not sufficient to explain the casual relationship among the study variables. The status of anxiety and depression was measured by using Hospital Anxiety and Depression Scale, it may be differently correlate with the clinical findings for anxiety and depression.

CONCLUSION

Anxiety in relation to fertility was associated to occupation, perceived income stress and fertility status. Likewise, depression was associated with self-reported difficulties in relationship between couple among the reproductive aged women visiting in the hospital settings of Kathmandu. The prevalence of anxiety and depression regarding infertile women were 69.8% and 50.0%, and regarding fertile women were 47.3% and 35.2% respectively for the same settings. The findings will be valuable for enhancing the management of anxiety and depression among infertile women, with implications for both

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Conflict of Interest

The authors declare no conflict of interest.

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Anxiety in Patients Diagnosed with COVID-19 in Tertiary Level Hospital, Kathmandu: A Cross-Sectional Study

Alisha Rijal[1], Juna Ramtel[2], Sita Rijal[3], Susheela Subedi[1], Rajesh Karki[4]

ABSTRACT

Background: The rising cases and mortality of COVID-19 has led to stress and fear of uncertainty among COVID-19 patients.

Objective: The study aimed to assess anxiety in patients diagnosed with COVID-19 in tertiary level hospital at Kathmandu.

Methods: A descriptive cross-sectional study was conducted among 159 COVID-19 patients at a tertiary level hospital. Stratified random sampling technique was used to select sample from COVID general wards. Face to face interview was used to assess level of anxiety using Generalised Anxiety Disorder- seven (GAD-7). SPSS 26.0 version was used to analyse the data. Chi-square test was applied to measure the association between level of anxiety and socio-demographic, source of information and hospital related information ($p < 0.05$).

Results: Among the 159 COVID-19 patients, 37.7% were aged 51-70 years, with a mean age of 50.42 ± 16.32 years. More than half (61.6%) of the respondents experienced varying degrees of anxiety. Specifically, 42.1% reported mild anxiety, 18.9% reported moderate anxiety, and 0.6% reported severe anxiety. Anxiety among the respondents was associated with socio-demographic factors such as age, religion, educational status, and the number of days of hospital stay.

Conclusion: The COVID-19 pandemic has caused increased varying degree of anxiety. Hence, adequate intervention and evaluation into mental health awareness, and psychosocial support is necessary.

Keywords: Anxiety, COVID-19, patients, tertiary care

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[1]Department of Nursing, Yeti Health Science Academy, Purbanchal University, Kathmandu, Nepal
[2]Tribhuvan University Teaching Hospital, Maharajgunj, Kathmandu, Nepal
[3]Om Health Science Campus, Purbanchal University, Kathmandu, Nepal
[4]Central Department of Public Health, Institute of Medicine, Tribhuvan University, Maharajgunj, Kathmandu

Correspondence to:
Rajesh Karki
Central Department of Public Health, Institute of Medicine, Tribhuvan University
Kathmandu, Nepal
Email: karkirajesh2022@gmail.com

INTRODUCTION

COVID-19 has affected more than 220 countries worldwide. Nepal has also been hit hard by the second wave of COVID-19 pandemic with total of five hundred eighty-five thousand confirmed cases and seven thousand deaths. (1)

As the cases were rising, fear, worry and stress were normal responses to the perceived or real threats due to COVID-19 pandemic. Also, the change in daily life like working from home, online classes, lack of social contact with family and friends has increased the stress and anxiety in general people. (2,3) One of the biggest concerns was the increasing trend of COVID-19 cases and the mortality rate due to COVID. (2)

Various factors were linked with development of anxiety during COVID-19 pandemic. Uncertainty related to the disease spread, mis-information of COVID-19 contact and transmission of virus, (4) the stigma related to COVID-19, (5) lack of social support, the displacement of the family, death of a loved one, socio-economic loss, lack of mental preparedness for disaster. (6)

Several studies were conducted to assess anxiety in COVID-19 patients worldwide. In developed countries like USA and developing countries like Ecuador and Wuhan, the prevalence of anxiety was less than one third among COVID-19 patients. (7-9) The prevalence was found to be more than one third in China and Egypt. (10,11) Majority of the COVID-19 patients in Iran had reported severe anxiety. (12) In Nepal, study done by Devkota et al., (13) very few reported anxieties and more than half of the COVID patients had anxiety in the study done at Makwanpur. (14)

The psychiatric symptoms in COVID-19 patients are likely under evaluated and undertreated as the time spend with the patients is limited and also physicians prioritize physical illnesses than psychological issues. (15) Psychological well-being plays important role in recovery of the COVID patient. (10) Psychological concerns like fear and anxiety about the COVID-19 complications and its long-term effect need to explore more on COVID-19 patients. Therefore, this study aims to assess anxiety in patients diagnosed with COVID-19 at a tertiary-level hospital in Kathmandu.

METHODS

A descriptive cross-sectional design was used to assess anxiety among COVID-19 patients in the COVID wards of Tribhuvan University Teaching Hospital (TUTH), Maharajgunj, Kathmandu, a tertiary hospital designated for COVID-19 treatment. As of June 2021, TUTH had 279 beds allocated for COVID-19 patients, with over 200 patients being treated. The study area was stratified into three wards: Suresh Wagle COVID Centre (SWCC), COVID A, and COVID Isolation B. Proportionate stratified random sampling was employed to ensure representativeness across these wards. The sample size was calculated using Cochran's formula n0 = Z2pq/d2, (16) resulting in 159 respondents. Based on the proportion of beds allocated to each ward, 61 patients were selected from SWCC, 59 patients from COVID A, and 39 patients from COVID Isolation B.

Male and female patients diagnosed with COVID-19 and admitted for at least three consecutive days were included in the study. Patients previously diagnosed with severe psychiatric illness and those with any physical illness that contribute to anxiety were excluded.

Reliable and valid Generalized Anxiety Disorder-7 (GAD-7) scale was used as a tool. The GAD-7 has a total score range of 0-21, where scores below 5 indicate no anxiety, scores of 5-9 indicate mild anxiety, scores of 10-14 indicate moderate anxiety, and scores above 15 indicate severe anxiety. (17,18) Face to face interviews were conducted by following health safety measures from both the sides. Each respondent took 15-35 minutes for response. The data were collected during morning and evening shifts from September to October, 2021.

Descriptive statistics (frequency, percentage, mean, and standard deviation) were used to summarize anxiety levels, while the Chi-square test was employed for inferential analysis. Anxiety levels were categorized into 'no anxiety symptoms' and 'anxiety symptoms' (including mild, moderate, and severe levels). (18) All analyses were conducted using SPSS version 26.

Ethical considerations

Ethical clearance was obtained from Institutional Review Committee (IRC), YHSA (2077-078-056). Permission letter was obtained from administration of TUTH for data collection. The letter received from hospital was submitted to the nursing officers for formal permission to collect the data from the nurses. Individual informed written consent was taken from all the respondents who participate in the study. Participants' right to refuse at any time during data collection were assured and accepted. The confidentiality was maintained by keeping information in such a way that only researcher could assess them and would not be disclosed to other than research purpose. Anonymity was ensured by writing code number instead of names in the questionnaire.

RESULTS

Table 1 describes the socio-demographic characteristics of the respondents. More than one third (37.7%) of the respondents belonged to age groups of 51-70 years with mean and standard deviation 50.42±16.32. More than half were female. More than half (59.7%) belonged to Hinduism and more than one third (37.7%) were Brahmin and Chhetri. More than two third (68.6%) of the respondents were married and less than half (40.9%) had education above the higher secondary. Around one third (35.2%) of them were working as service holder. More than half (58.5%) were residing permanently inside the valley and had monthly income of 31000-45000 per month.

Table 1: Socio-demographic information of respondents (n= 159)

Variables	Frequency	Percentage
Age		
Mean±SD = 50.42±16.32		
< 30 years	28	17.6
31-50 years	49	30.8
51-70 years	60	37.7
above 70 years	22	13.8
Gender		
Male	79	49.7
Female	80	50.3

Ethnic groups		
Dalit	30	18.87
Janajati	51	32.07
Madheshi	16	10.07
Muslim	2	1.26
Brahmin/Chhetri	60	37.73
Religion		
Hinduism	95	59.7
Buddhism	34	21.4
Christianity	24	15.1
Islam	6	3.8
Marital Status		
Married	109	68.6
Unmarried	31	19.5
Others*	19	11.9
Educational Level		
Illiterate	27	17.0
Primary Level	20	12.6
Secondary Level	17	10.7
Higher secondary level	30	18.9
Above	65	40.9
Occupation Status		
Agriculture	4	2.5
Business	38	23.9
Service	56	35.2
Student	7	4.4
Daily wages	13	8.2
Dependent	41	25.8
Address		
Inside valley	93	58.5
Outside valley	66	41.5
Monthly family income		
16,000 - 30,000	25	15.7
31,000 - 45,000	79	49.7
46,000 and above	55	34.6

*Widow, divorced

The main accesses for the COVID-19 related information are health workers and television which accounts for 88.7% and 85.5% respectively. Almost all of the respondents spend less than 4 hours to access information regarding COVID-19 whereas only 3.8% spend more than 4 hours (Table 2).

Table 2: Use of mass media (n =159)

Variables	Frequency	Percentage
Mass Media to access COVID-19 information*		
Television	136	85.5
Newspaper	111	69.8
Radio	103	64.8
Social media	128	80.5
Health workers	141	88.7
Others#	79	49.7
Time spent on Mass media/day to access COVID-19 information		
0-1 hour	52	32.7
1-2 hour	50	31.4
2-3 hour	51	32.1
more than 4 hour	6	3.8

*Multiple response, #friends, neighbours, co-workers

Approximately more than half (52.2%) of the respondents' family members were infected with COVID-19 among them 36.8% were their children. And 44.7% stayed hospital for more than 5 days (Table 3).

Table 3: Hospital related information of respondents (n= 159)

Variables	Frequency	Percentage
Family member infected with COVID-19		
Yes	76	47.8
No	83	52.2
Infected family members		
Parents	16	21.1
Siblings	9	11.8
Children	28	36.8
Spouse	16	21.1
other family members	7	9.2
Duration of Hospital stay		
3 days	28	17.6
4 days	33	20.8
5 days	27	16.9
more than 5 days	71	44.7

Most of the (61.6%) of the respondents had anxiety whereas more than one third (42.1%) had mild anxiety and only 18.9% had moderate anxiety (Table 4).

Table 4: Level of anxiety of respondents (n= 159)

Level of anxiety	Frequency	Percentage (%)
No anxiety	61	38.4
Mild anxiety	67	42.1
Moderate Anxiety	30	18.9
Severe anxiety	1	0.6

Table 5 demonstrates that religion, educational level, and length of hospital stay were significantly associated with anxiety symptoms among participants ($p < 0.05$). Specifically, individuals identifying as Hindu were more likely to experience anxiety compared to those of other religious affiliations ($\chi^2 = 4.59$, $p = 0.03$). Participants with primary or preparatory education levels reported significantly higher anxiety prevalence than those with secondary education or above ($\chi^2 = 6.31$, $p = 0.01$).

Moreover, longer hospital stays were linked to increased anxiety, as patients hospitalized for five or more days were significantly more likely to exhibit anxiety symptoms than those with shorter stays ($\chi^2 = 9.18$, $p = 0.002$). In contrast, age, gender, ethnicity, marital status, and monthly income showed no significant association with anxiety symptoms ($p > 0.05$).

Table 5: Association between level of anxiety and socio-demographic variables

Variables	Anxiety symptoms	No Anxiety symptoms	χ^2	p-value
Age				
Less than 50 years	40(54.1%)	34(45.9%)	3.36	0.06*
More than 50 years	58(68.2%)	27(31.8%)		
Gender				
Male	49(62%)	30(38%)	0.01	0.92
Female	49(61.3%)	31(38.8%)		
Ethnicity				
Brahmin/ Chhetri and Janajati	72(64.9%)	39(35.1%)	1.62	0.20*
Others**	26(54.2%)	22(45.8%)		
Religion				
Hinduism	65(68.4%)	30(31.6%)	4.59	0.03*
Others***	33(51.6%)	31(48.4%)		
Marital status				
Married	68(62.4%)	41(37.6%)	0.08	0.77
Others****	30(60.0%)	20(40.0%)		
Educational Status				
Primary and preparatory	36(76.6%)	11(23.4%)	6.31	0.01*
Secondary and Above	62(55.4%)	50(44.6%)		
Days of hospital stay				
<5 days	45(51.1%)	43(48.9%)	9.18	0.002*
≥5 days	53(74.6%)	18(25.4%)		
Monthly income				
Below 30 thousand	14(56.0%)	11(44.0%)	0.39	0.52
Above 30 Thousand	84(62.7%)	50(37.3%)		

* Significance level set at $p < 0.05$, **: Dalit, Madhesi, Muslism, ***: Buddhism, Christainity, Islam, ****:Unmarried, Divorce, widow

DISCUSSION

The aim of this study was to assess the prevalence and factors associated with anxiety among hospitalized COVID-19 patients in the COVID wards of a tertiary hospital in Kathmandu. Most (61.6%) of the respondents experienced varying degrees of anxiety, with more than half (42.2%) reporting mild anxiety. This result aligns with studies conducted in the USA, Ecuador, China, and Nepal. (7-9,19) However, the prevalence observed in this study was significantly higher than that reported in studies from Egypt (39.1%) and China (34.74%). (10,11) Moderate anxiety was found in 18.9% of the respondents, which exceeds the prevalence reported in a study from Western Nepal. (19) Only one patient (0.6%) exhibited severe anxiety, which is consistent with the findings of Zandifer et al., (12) and BC et al., (20) but contrasts with a study conducted in Wuhan, China, where a higher prevalence of severe anxiety was reported. (9)

The socio-demographic factors examined in this study included age, gender, ethnicity, religion, marital status, educational level, occupation, monthly income, and time spent on social media. Hospital-related factors, such as whether a family member was infected with COVID-19 and the duration of hospital stay, were also assessed. The association between anxiety and these variables were explored.

The results indicated that age, religion, educational status, and duration of hospital stay were significantly associated with anxiety among COVID-19 patients. Conversely, no significant association was found between anxiety and factors such as gender, ethnicity, occupation, marital status, and having a family member infected with COVID-19.

Age was identified as a significant factor associated with anxiety in studies by Sahu et al., (4) and Saddik et al. (19) However, two studies conducted in Nepal found no association with age. (20,21) The discrepancy may be due to differences in the age ranges of the COVID-19 patients studied.

Similarly, gender was associated with anxiety in this study, which aligns with findings from India, (4) Nepal, (21) and a multicounty study. (22) However, in our study, neither gender nor occupational status was associated with anxiety, contrary to findings from Wuhan where age was identified as a significant factor. (9,23)

Educational level was identified as a factor associated with anxiety in a study from India, (4) which is consistent with our findings. The lack of association between having a family member infected with COVID-19 and anxiety in our study aligns with the results of Kong et al. (10) The duration of hospital stay was associated with anxiety in our study, supported by the studies of Omar et al., (22) and Saddik et al., (19) but this finding contrasts with studies by BC et al., (20) and Shrestha, Thapa, and Katuwal, (21) who did not find such an association. Additionally, the association of age with anxiety and the non-association of occupation with anxiety are supported by a study conducted in Nepal. (13)

Data collection relied on face-to-face interviews, potentially introducing biases related to respondent recall and social desirability. Additionally, the study's sample size may limit the generalizability of findings.

CONCLUSION

This study found that anxiety was prevalent among nearly half of hospitalized COVID-19 patients. Factors such as age, religion, educational level, and length of hospital stay were significantly associated with anxiety levels. These findings underscore the importance of considering these factors when assessing and managing anxiety in this patient population. Further research is required to explore the underlying mechanisms linking these variables to anxiety and to develop targeted interventions.

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Conflict of interest

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Prevalence and Determinants of Exclusive Breastfeeding among Working Mothers of Infants Aged 6 to 12 months: A Hospital-Based Cross-Sectional Study in Kathmandu, Nepal

Rojina Basnet[1], Rajesh Karki[1], Roshani Poudel[1]

ABSTRACT

Background: Exclusive breastfeeding, a vital infant feeding practice, may be influenced by workplace factors and women's labor force participation. This study aims to identify prevalence of exclusive breastfeeding practices and associated factors among working mothers with infants aged 6 to 12 months.

Methods: A hospital-based cross-sectional study took place from February 2016 to April 2016, involving 250 working mothers at Kanti Children's Hospital, Kathmandu. Mothers were purposively selected and underwent face-to-face interviews using a structured questionnaire. Descriptive statistics, including frequencies, percentages, mean, median, and standard deviation, presented study findings. Multivariate logistic regression analysis identified significant factors associated with exclusive feeding ($p < 0.05$).

Results: In the total sample, the majority of mothers (49.0%) were aged 30-35 years, with a mean age of 29.93 (± 2.79) years. Approximately one-third (33.0%) practiced exclusive breastfeeding, and the majority (52.0%) were employed in academic sectors. While all mothers had access to maternity leave, only 1.6% took a 6-month leave. More than half of the mothers (56%) exhibited poor knowledge of exclusive breastfeeding, and 76% expressed a positive attitude towards workplace breastfeeding. Factors associated with increased exclusive breastfeeding included good knowledge, longer maternity leave, a complete history of postnatal check-ups, and the availability of breastfeeding facilities in the workplace.

Conclusion: Our data indicate a low prevalence of exclusive breastfeeding among working mothers. We recommend the effective implementation of government policies regarding maternity leave and breastfeeding facilities in the workplace. This includes advocating for exclusive breastfeeding, ensuring that both public and private organizations comply with maternity leave provisions, providing adequate breastfeeding facilities at workplaces, and enhancing awareness about the importance of exclusive breastfeeding for the health of both mother and child.

Keywords: Exclusive breastfeeding, working mother, maternity leave, Nepal

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Check for updates

[1] Tribhuvan University, Institute of Medicine, Central Department of Public Health
Kathmandu, Nepal

Correspondence to:
Rojina Basnet
Tribhuvan University, Institute of Medicine, Central Department of Public Health,
Kathmandu, Nepal.
Email: rojinabasnet4@gmail.com, rojina.basnet@cdph.tu.edu.np

BACKGROUND

Optimal infant nutrition is crucial, with breast milk providing essential nutrients and immunity, reducing infection risks and infant mortality (1,2). Exclusive breastfeeding (EBF), recommended from birth to six months, excludes all liquids except breast milk, promoting healthy growth and development. The WHO advocates EBF for six months to ensure optimal health (3). Children exclusively breastfed have significantly lower risks of diarrhea and acute respiratory disease, potentially saving 1.9 million children globally (4). EBF is also part of the cost-effective initiatives of the SUN movement in Nepal (5).

Despite the benefits of exclusive breastfeeding, work status, whether full-time or part-time, can impact breastfeeding practices (6). Early return

to work within six months postpartum significantly hinders breastfeeding continuation (7). Globally, around 830 million women lack adequate maternity protection, with 80% in Africa and Asia (8). Continuing breastfeeding upon return to work is a woman's right, contingent upon hygienic nursing facilities. Balancing exclusive breastfeeding is especially challenging for working women compared to non-working counterparts (9), often leading to discontinuation due to limited childcare time (10).

In Nepal, while breastfeeding is widespread, exclusive breastfeeding rates have dropped from 70% to 56% between 2011 and 2022 (11). Despite 60% of mothers being employed, the government offers only a 90-day maternity leave, insufficient for the recommended six months of exclusive breastfeeding (12). Returning to work poses a major challenge to sustaining breastfeeding, especially for women in low-wage jobs lacking flexible schedules (13). Research on workplace breastfeeding in Nepal remains limited (14). This study aims to explore factors influencing exclusive breastfeeding in the workplace, providing insights to improve practices and inform policy. The findings will aid policymakers in refining maternity leave policies to better support breastfeeding mothers.

METHODS

A quantitative cross-sectional study was conducted at the Immunization clinic of Kanti Children's Hospital, situated in Maharajgunj, Kathmandu, Nepal, serving as a pediatric healthcare facility. Established in 1963 with assistance from the USSR government, the hospital initially functioned as a general facility with fifty beds. In 1968, the management of Kanti Hospital was transferred from the USSR government to the Ministry of Health of Nepal (15).

The study's sample size was determined using the formula n = Z^2pq/d^2, assuming a proportion (p) of exclusive breastfeeding among working mothers at 0.5 (16), with a margin of error of 6.5 %. Accounting for a 10% allowance for non-response, the final sample size was set at 250. During data collection, we visited the study site and purposively selected respondents with children aged 6-12 months who were currently working.

Data collection employed a self-constructed structured questionnaire, prepared based on a previous study on a similar topic (9,17–21). The questionnaire encompassed demographic and occupational characteristics, as well as questions related to knowledge, attitude, and practices. Knowledge was assessed using 12 statements with Yes/No responses. Respondents who had given correct responses to at least 70% of the questions were categorized as having good knowledge; otherwise, they were considered to have poor knowledge (22). Attitude was measured using a 5-point Likert scale. For negative statements, a score of 5 was given to strongly disagree, and 1 was given for strong agreement, while it was reversed for positive statements. The total score was calculated from the responses, with scores below 80% categorized as negative and scores above 80% as positive (22). Similarly, the practice of exclusive breastfeeding (EBF) was assessed using six questions covering the timing of breastfeeding initiation, the introduction of complementary feeding, and the duration of extended breastfeeding

In this study, exclusive breastfeeding is defined as feeding only breast milk for at least six months, except for ORS and syrups (vitamins, medicines, minerals); early initiation of breastfeeding means starting within one hour after delivery, and complementary feeding is defined as introducing any food or liquid, including non-human milk and solid or semi-solid foods, to the baby after six months. Experts validated the final questionnaire, and a pre-test was conducted among 10% of the total sample size for tool reliability among the respondents with similar characteristics visiting immunization clinic of Tribhuvan University Teaching Hospital. All data were collected through face-to-face interviews conducted between February 2016 and April 2016.

The collected data were entered into EpiData version 3.1 and analyzed using SPSS 17.0. Descriptive statistics, including frequencies, percentages, mean, median, and standard deviation, were employed for presenting study findings. The Chi-Square test assessed associations between independent variables and exclusive breastfeeding. Odd s ratios, with a 95% confidence interval and a significance level of $p < 0.05$, measured the strength of association between exclusive breastfeeding and other independent variables. Covariates with a p-value of less than 0.05 were included in the multivariable logistic regression analysis. To evaluate the model's fit and the fulfillment of necessary assumptions, the Hosmer-Lemeshow goodness-of-fit test and the Nagelkerke R-squared test were utilized and the values found were 0.999 and 0.468, respectively.

Approval was obtained from the Institutional Review Committee of the Institute of Medicine [Ref. No: 158(6-11-02)/072/073] and Kanti Children Hospital (Ref. No: 075). The study's purpose was explained to all participants, and informed written consent was obtained from each participant. Confidentiality was ensured by conducting interviews with mothers in a designated separate room provided by the hospital authority. Study participants were given the option to decline participation.

RESULTS

Demographic and occupational characteristics of the respondents

Out of the 250 participants, the majority (49.0%) were aged between 30 and 35, with a mean age of 29.93 (±2.79) years. Additionally, most respondents (60.0%) had male children, and a significant portion (66.4%) had more than one child. The majority of mothers (64.4%) resided in joint families, held a bachelor's degree (54.8%), and worked in academic sectors (38%). Furthermore, 58% reported the absence of breastfeeding facilities in their workplaces, and only 1.6% had maternity leave extending up to six months.

Similarly, the majority of respondents (69.2%) opted for government health institutions as their place of delivery, and a substantial number (71.2%) had a complete record of postnatal care check visits (Table 1).

Table 1: Demographic and occupational characteristics of the respondents

Variables	Frequency	Percent
Age of the mother		
20-24	9	3.6
25-29	104	41.6
30-34	122	48.8
35-39	15	6.0
Sex of child		
Male	151	60.4
Female	99	39.6
Parity of mother		
One	166	66.4
More than one	84	33.6
Family type		
Nuclear	89	35.6
Joint	161	64.4
Education level		
Secondary	4	1.6
Higher secondary	37	14.8
Bachelor	137	54.8
Masters or above	72	28.8
Occupation		
Academic sector	90	36.0
NGO	66	26.4
Banking sectors	38	15.2
Government sector	23	9.2
Hospital (Government/ Private)	21	8.4
International Non-Governmental Organization	8	3.2
Army/Police	4	1.6
Place of Delivery		
Government Institutions	173	69.2
Private hospital	77	30.8
Complete PNC check up		
Yes	178	71.2
No	72	28.8
Maternity leave time period		
45 days	73	29.2
75 days	2	0.8
14 weeks	3	1.2
2 months	140	56.0
3 months	26	10.4
4 months	2	0.8
6 months	4	1.6
Presence of breastfeeding facilities in office		
Yes	105	42.0
No	145	58.0

Prevalence of exclusive breastfeeding practices

A majority (67.2%) of the respondents did not exclusively breastfeed their children for up to six months. Instead, 49.40% introduced complementary foods, and 35.11% introduced formula milk to their children. Mothers employed in academic sectors exhibited a higher rate of exclusive breastfeeding, with nearly 52.0% (Table 2).

Table 2: Exclusive breastfeeding and introduction of complementary foods

Variables	Frequency	Percent
Practice of exclusive breast feeding		
Yes	82	32.8
No	168	67.2
Additional food given before six months (n =168)		
Jaulo or Daal and Rice	10	5.95
Lito	83	49.40
Formula Milk	59	35.11
Plain Water	16	9.5

Respondents' knowledge about breastfeeding

Twelve questions were posed to assess knowledge about breastfeeding. The majority of respondents correctly affirmed that colostrum should be given to the child (98.8%), breast milk quenches thirst but doesn't promote weight gain (97.6%), EBF helps children grow better (77.2%), and EBF saves children from illnesses (72.0%). However, only 13.2% of respondents accurately acknowledged that breast milk reduces healthcare costs, and only 17.2% correctly responded that a child should not be given additional food before six months (Table 3).

Table 3: Knowledge about breast feeding

Statements	Correct answers (%)
EBF means being fed exclusively on breast milk without providing anything else, except doctor-prescribed medicine and oral rehydration solution, for the first six months	111 (44.4)
EBF saves children from illnesses	180(72.0)
EBF helps children grow better	193(77.2)
Breast milk contains everything a baby needs for the first six months	139(55.6)
EBF reduces the chance of the return of a mother's monthly bleeding	93(37.2)
EBF reduces the likelihood of mothers getting pregnant soon	118(47.2)
Breast milk is clean, safe, convenient, and affordable	118(47.2)
Breast milk reduces healthcare costs	33(13.2)
Breast milk only quenches thirst but does not contribute to an increase in the baby's weight	244(97.6)
Mixed feeding before six months can make a baby healthy	155(62.0)
A child should be given additional food before six months	43(17.2)
The initial milk, i.e., colostrum, should be given to the child	247(98.8)

Respondents' attitude toward breastfeeding

In assessing the attitudes of mothers toward breastfeeding, eight questions were administered. The majority of respondents (70.0%) expressed agreement with the idea that Exclusive Breastfeeding (EBF) is an effective means to reduce family expenses. A significant portion (58.8%) believed that women desiring to breastfeed their infants should refrain from working outside the home, and 53.2% perceived that full-time or part-time work status creates challenges for EBF.

Similarly, a substantial majority (67.6%) disagreed with the notion that breastfeeding or expressing breast milk in the workplace would interfere with work productivity. Additionally, 50.4% disagreed with the statement asserting that breastfeeding is old-fashioned, and formula feeding is a symbol of wealth. Furthermore, a majority (59.0%) strongly disagreed with the idea that there would be weight gain due to extra food demand during breastfeeding, and 58.0% strongly disagreed with the assertion that breastfeeding negatively affects the shape of the breast (Table 4).

Table 4: Attitude towards breast feeding

Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
EBF is a good way to decrease family expenses.	72 (28.8)	175(70.0)	2(0.8)	0.0	1(0.4)
Work status, whether it is full time or part time, makes it difficult for EBF.	29(11.6)	133(53.2)	0.0	80(32)	8(3.2)
Breastfeeding or expressing breast milk in the workplace will interfere with work productivity.	1(0.4)	8(3.2)	0.0	169(67.6)	72 (28.8)
Women should not breastfeed or express breast milk at work because it would be embarrassing to co-workers.	0.0	51(20.4)	1(0.4)	111(44.4)	87(34.8)
Women who want to breastfeed their infants should not work outside the home.	2(0.8)	147(58.8)	0.0	42(16.8)	59(23.6)
Breastfeeding is old-fashioned, and formula feeding is a symbol of wealth.	0.0	3(1.2)	0.0	126(50.4)	121(48.4)
Breastfeeding does not make the shape of the breast bad.	0.0	9(3.6)	4(1.6)	92(36.8)	145(58.0)
There will be weight gain due to extra food demand during breastfeeding.	3(1.2)	54(21.6)	2(0.8)	42(16.8)	149(59.0)

Respondents' level of knowledge and attitude toward exclusive breastfeeding

Based on the obtained scores, more than half (56.8%) of the respondents demonstrated poor knowledge of exclusive breastfeeding, while 43.2% exhibited good knowledge. Similarly, the majority (76.4%) held a positive attitude towards breastfeeding practices, with 23.6% expressing a negative attitude (Table 5).

Table 5: Knowledge and attitude patterns among participants in exclusive breastfeeding practices

Variables	Frequency	Percent
Level of knowledge		
Good knowledge (≥ 70% score)	108	43.2
Poor knowledge (< 70% score)	142	56.8
Level of attitude		

Positive attitude (≥ 80% score)	191	76.4
Negative attitude (<80% score)	59	23.6

Multivariate analysis

In the bivariate analysis, factors such as mode of delivery, place of delivery, sex of the child, parity, position in the office, and support from co-workers were not found to be significantly associated with exclusive breastfeeding. However, the percentage of exclusive breastfeeding was higher among those who delivered in government hospitals (68.7%) and those who had normal vaginal deliveries (59.0%) compared to those who delivered in private hospitals or had cesarean sections.

Variables that were significant in bivariate analysis were only transferred to multivariate analysis. It was found that mothers who used to visit home during break time to breastfed and those who were not discriminated against in the workplace due to their breastfeeding status were significant in the bivariate analysis. However, these variables did not remain significant after adjusting for other factors in the multivariate analysis. Thus, We found that the odds of the prevalence of exclusive breastfeeding were significantly higher among respondents with maternity leave of 3 months or more (AOR = 2.7, 95% CI 1.1-6.4), the availability of breastfeeding facilities in the office (AOR = 7.0, 95% CI 2.0-24.7), those who had a complete history of PNC visits (AOR = 3.5, 95% CI 1.5-8.5), and those with good knowledge of exclusive breastfeeding (AOR = 2.0, 95% CI 1.4-2.0) (Table 6).

Table 6: Multivariate analysis of selected variables with exclusive breast-feeding practice

Variables	Crude Odds Ratio (COR) (95% CI)	P value	Adjusted Odds Ratio (AOR) (95% CI)	P value
Maternity leave time period				
Less than 3 months (Ref.)				
3 months or more	2.4(1.2-5.0)	0.016	2.7(1.1-6.4)	0.028*
Presence of breastfeeding facilities in the office				
No (Ref.)				
Yes	8.8(4.8-16.1)	<0.001	7.0(2.0-24.7)	0.002*
Complete PNC check-up				
No (Ref.)				
Yes	5.0(2.3-10.6)	<0.001	3.5(1.5-8.5)	0.005*
Knowledge of respondents				
Poor knowledge (Ref.)				
Good knowledge	5.0(3.0-9.0)	<0.001	2.0(1.4-2.0)	<0.001*
Visiting home for breastfeeding				
Yes	1.889 (1.035-3.448)	0.037	0.889 (0.401-1.971)	0.771
No	Ref			
Discrimination in the office				
Yes	Ref			
No	0.634 (0.575-0.700)	<0.001	0.072 (0.001-0.178)	0.998

* Ref- Reference, * Significant at <0.05

DISCUSSION

Our study underscores the fundamental role of breastfeeding in child rearing, particularly during the critical first 1000 days from pregnancy to a child's second year. This period is pivotal for major developmental milestones and the overall well-being of the child, with breast milk serving as a key nutritional source that supports the child's immune system development, extending its benefits beyond the breastfeeding period.

In the context of Nepal, where breastfeeding is nearly universal, our study revealed that approximately 33% of working mothers practiced exclusive breastfeeding, with a median duration of 4 months. This result contrasts with findings from a 2014 German review article indicating that about 22% of working mothers practiced exclusive breastfeeding for six months (23). However, it is noteworthy that our result is higher than the national prevalence of exclusive breastfeeding, which includes both working and non-working mothers (70% NDHS 2011, 57% MICS 2014, 56% NDHS 2022) (11,23,24), as well as a study conducted in Kathmandu where exclusive breastfeeding for six months was reported at 12% (14including suboptimal breastfeeding practices, are associated with stunting. Rate of stunting was highest in the Mid-western region and lowest in the Eastern region of Nepal. This study aimed to assess the breastfeeding practices in these two regions, as well as to identify factors associated with partial breastfeeding. Methods: We conducted a health facility-based cross-sectional study in the Mid-western and Eastern regions of Nepal from December 2017 to May 2018. Investigators administered a pre-Tested questionnaire among consecutive 574 mother-infant dyads at different levels of health facilities. We dichotomized the breastfeeding pattern to partial breastfeeding and full (exclusive or predominant).

In terms of attitudes, our study found that a substantial majority (76.4%) of respondents had a positive attitude towards exclusive breastfeeding. Although slightly lower than similar studies in Saudi Arabia (90%) and Ethiopia (91.8%), this positive shift in attitudes could

be attributed to improved urban health services (25,26). ANC clinics, in particular, seem to play a crucial role in shaping maternal attitudes, with counseling on infant feeding and breastfeeding contributing to enhanced knowledge and positive attitudes.

Our multivariate analysis identified several significant factors influencing exclusive breastfeeding practices. Mothers with maternity leave exceeding three months were nearly three times more likely to exclusively breastfeed compared to those with shorter maternity leave, aligning with findings from a study conducted in Brazil (20). Furthermore, mothers reporting the presence of breastfeeding facilities in the office were seven times more likely to exclusively breastfeed, consistent with a study in the UK (27). Additionally, respondents with a complete history of ANC visits and knowledge about exclusive breastfeeding exhibited significantly higher odds of practicing exclusive breastfeeding, a result consistent with a study in South West Ethiopia (28).

This hospital-based cross-sectional study was conducted in a single facility. Due to limitations in the study area, a restricted sample size, and the purposive selection of mothers, the study findings may not be broadly applicable to a larger population.

CONCLUSION

Early initiation, exclusive breastfeeding for six months, and continued breastfeeding up to 2 years are pivotal for a child's well-being, fostering cognitive development, and promoting mental health. Despite their significance, the prevalence of exclusive breastfeeding practice among working mothers was observed to be low. Factors such as the duration of maternity leave, mothers' education, availability of breastfeeding facilities in the workplace, and a history of complete postnatal care visits were identified as significant contributors to exclusive breastfeeding practices.

As the Safe Motherhood Act 2075 of Nepal, stated for the provision of 98 days of maternity leave and mandates breastfeeding facilities in the workplace, we recommend evaluating the implementation and effectiveness of these provisions. While the Act sets important standards, it is crucial to assess whether the actual practices and support provided align with these regulations and adequately meet the needs of working mothers. These policies should be rigorously implemented, particularly in private organizations. Additionally, knowledge about exclusive breastfeeding should be enhanced among working mothers through educational initiatives.

Furthermore, we propose conducting a mixed-methods study with a broader study area and a larger sample size, encompassing mothers from both formal and informal sectors. This approach will enable the exploration of diverse factors influencing breastfeeding practices.

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Prevalence and Associated Factors of Computer Vision Syndrome among Undergraduate Students of Kathmandu Valley, Nepal: A Web-Based Cross-Sectional Study

Snehi Bajracharya[1], Prashamsa Bhandari[2], Sujata Shakya[2,3]

ABSTRACT

Background: Computer Vision Syndrome is a collection of vision and eye-related problems like headache, blurred or double vision, eye strain, fatigue, and teary eyes, which can occur when using digital devices. It is one of the most significant public health concerns of the twenty first century. The objective of this study is to determine the prevalence of computer vision syndrome, common symptoms experienced, and preferred preventive measures while identifying socio-demographic, knowledge, and practice-associated risk factors among undergraduate students of Kathmandu Valley, Nepal.

Methods: A web-based cross-sectional study was conducted from December 2020 to March 2021. A non-probability convenience sampling method was used to collect data from 320 participants via an electronic survey. The factors associated with computer vision syndrome were analysed using bivariate and multivariate logistic regression models. The adjusted odds ratio was calculated at a 95% confidence interval, and $p < 0.05$ was considered statistically significant.

Results: The prevalence of computer vision syndrome was found to be 65% (95% CI: 59.5%-70.2%). The most frequently reported symptoms were tired eyes, headache, and eye itchiness. Participants living in a nuclear family (p=0.033) showed significant association with the prevalence of computer vision syndrome.

Conclusion: Computer Vision Syndrome is a common health issue among undergraduate students. Therefore, it is important to make university students aware of the health implications and preventive measures.

Keywords: Computer vision syndrome; Kathmandu; prevalence; students

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Check for updates
[1]School of Public Health, Texas A & M University, Texas, USA
[2]Central Department of Public Health, Institute of Medicine, Tribhuvan University, Kathmandu, Nepal
[3]Unit of Health Sciences, Faculty of Social Sciences, Tampere University, Tampere, Finland

Correspondence to:
Sujata Shakya
Email id: sujata_8@iom.edu.np

BACKGROUND

Over the past years, advancements in computer technology and innovations have remarkably impacted education, health, development, and more. Every other person uses computers in the form of laptops, tablets, personal computers, and cell phones.(1) There has been a significant rise in health issues related to prolonged computer usage.(2) Prolonged computer use can cause a vision problem called Computer Vision Syndrome (CVS), a collection of vision and eye-related problems resulting from the use of digital devices.(3) These can include headache, blurred/double vision, eye strain, fatigue, teary eyes, light sensitivity, burning sensations, and dryness on the ocular surface.(4) Prolonged use of computers for three or more hours per day, poor lighting, screen glare, improper viewing distances, poor seating posture, uncorrected vision problems can cause CVS.(5)

Computer Vision Syndrome (CVS) is one of the most significant global public health concerns of the 21st century, with almost 70% of computer users experiencing symptoms.(6) It is also a rapidly growing public health concern in developing countries.(7) The COVID-19 pandemic has forced

us to rely heavily on digital devices and virtual learning platforms for work, education, and entertainment.

The integration of Information and Communication Technology (ICT) has significantly transformed the educational landscape in Nepal, replacing traditional teaching methods.(8) While there have been some studies on CVS among medical students, no research includes students of other discipline as per the researcher's knowledge.(8,9) Despite the digital revolution in education and the global pandemic, a comprehensive study has yet to be conducted in Nepal to assess the association of prolonged digital device usage with the eye health of students of different discipline. Therefore, this study aimed to fill this gap by investigating the prevalence of CVS and exploring associated factors among undergraduate students in the Kathmandu Valley.

METHODS

Study type and participant description

This web-based descriptive cross-sectional study was conducted among the undergraduate students of Kathmandu Valley. The duration of the study was four months from December 2020 to March 2021. The study population included undergraduate students of all academic years and faculties from Tribhuvan University, Pokhara University, Purbanchal University, and Kathmandu University in Kathmandu Valley between the ages of 18 and 30.

Sample size and sampling

The sample size was determined using the formula $n=z^2 * p * (1-p) / e^2$. The confidence interval was set at 95%, the margin of error at 5%, and the non-response rate at 10%. The estimate was based on the prevalence of digital eye strain, which was 69.5%.(10) The calculated sample size was 359. A non-probability convenience sampling method was used to select the participants who were approachable through social media.

Data collection method

The study utilized self-administered questionnaire to gather sociodemographic data, information on CVS symptoms, knowledge of CVS, and details on computer usage. The tool was developed based on the similar studies conducted among university students in Malaysia and Nepal.(8,11) The initial draft tool was revised based on consultation of the experts and the supervisor. The first part of the tool includes socio-demographic information which consists of age (18-21 years, 22-29 years), sex (male/female), ethnicity (Brahmin/Chhetri, Janajati, Madhesi), marital status (single/married), family type (nuclear/joint), university attendance (Kathmandu, Tribhuvan, Pokhara, Purbanchal), current academic year (1st, 2nd, 3rd, 4th, 5th), and faculty of study (Engineering and technology; medical and health science; commerce, humanities and others; natural and agricultural sciences). To assess knowledge, 16 questions were asked about the causes, symptoms, and preventive measures for CVS, with each correct response yielding one point. The sum of correct answers was used to determine the overall knowledge scores of the participants on a scale of 0-16. Scores were classified as 'below median' and 'median and above'. The questionnaire also included questions related to computer use practices, such as the duration of computer use (>2 years, 1-2 years, <2 years), number of hours per day (>10, 6-10, 2-5), device type (big, small, or both), frequency of posture changes (no posture change, after 2 hours, every 1-2 hours, every 30 minutes), and frequency of breaks taken (no breaks, after 2 hours, 30 minutes-2 hours, before 30 minutes). The data collection tool was prepared with reference to other similar studies.

The prevalence of CVS was determined based on the symptoms experienced intermittently or continuously for at least one week during the past twelve months, with tiredness, redness, watering, itchiness, and headache being assessed as symptoms. Students who reported experiencing at least two symptoms were considered as having presence of CVS and the remaining were categorized as absence of CVS.(11,12)

The data was collected on Google Forms. The first page of the survey included information about the study and its purpose. The survey link was shared with the participants through social media platforms such as WhatsApp and Facebook.

Statistical analysis

Google Forms data were automatically recorded in Google Sheets. Before exporting to Statistical Package for the Social Sciences (SPSS) version 26 (IBM) for analysis, all collected data were systematically compiled, coded, checked, and edited in MS Excel 2016. Data analysis was done using descriptive and inferential statistics. Descriptive analysis was reported in mean, standard deviation, frequency, percentage, and its 95% CI where applicable. The factors associated with CVS were analysed using bivariate binary logistic regression. The variables with p-value less than 0.1 in bivariate logistic regression were further entered into the multivariate logistic regression model. The adjusted odds ratio was calculated at a 95% confidence interval, and $p < 0.05$ was considered statistically significant.

Ethical Approval

All participants were required to sign a form indicating their consent to participate in the study. The Institutional Review Committee at Tribhuvan University's Institute of Medicine (IOM) granted ethical approval for conducting the study with IRC number 371(6-11)E2077/078. The consent form was included in

the questionnaire. Confidentiality was maintained at all stages to protect the participants' personal information.

RESULTS

Characteristics of the study participants

A total of 320 responses were received during the study period. There were no missing data. More than half of the participants (54.7%) were between 18 and 21 years, with the mean age of 21.5 (±1.9) years. Males made up more than half of the participants (51.6%), and most of them (96.9%) were unmarried. Majority belonged to Brahmin/Chhetri ethnic group (63.7%) and nuclear family (80.3%). Half of them (47.8%) were from Kathmandu university, where majority (34.1%) were in their fourth year and were from engineering and technology backgrounds (45.3%) (Table 1).

Table 1: Socio-demographic characteristics of the participants.

Characteristics	Number (n=320)	Percentage (%)
Age (years)		
18-21	175	54.7
22-29	145	45.3
Sex		
Male	165	51.6
Female	155	48.4
Ethnicity		
Brahmin/Chhetri	204	63.8
Janajati	99	30.9
Madhesi	17	5.3
Marital Status		
Single	310	96.9
Married	10	3.1
Family Type		
Nuclear	257	80.3
Joint	63	19.7
University		
Kathmandu University	153	47.8
Tribhuvan University	119	37.2
Pokhara University	36	11.2
Purbanchal University	12	3.8
Academic Year		
1st Year	41	12.8
2nd Year	95	29.7
3rd Year	42	13.1
4th Year	109	34.1
5th Year	33	10.3
Faculty		
Engineering and Technology	145	45.4
Medical and Health Science	83	25.9
Commerce, Humanities, and Other	67	20.9
Natural and Agricultural Sciences	25	7.8

About half (50.6%) of the participants had below median level of knowledge on CVS . Majority (89.0%) had been using computers for more than 2 years where relatively few participants (8.8%) used it for less than 2 hours. Regarding preventive measures, 18.1% and 29.1% of the participants did not take break and change posture respectively (Table 2).

Table 2: CVS awareness, computer use and ergonomics practices.

Characteristics	Number (n=320)	Percentage (%)
Level of Knowledge		
Below Median	162	50.6
Median and Above Median	158	49.4
Commonest type of devices used		
Using of both devices (big screen and small screen)	204	63.7
Using one of the two devices (big screen or small screen)	116	36.3
Duration of computer use (years)		
More than 2	285	89.0
1– 2	22	6.9
Less than 1	13	4.1
Average duration of computer use per day (hours)		
More than 10	39	12.1
6 – 10	111	34.7
2 – 5	142	44.4
Less than 2	28	8.8
Frequency of posture change while working on the computer		
Doesn't change posture	93	29.1
After 2 hours	28	8.7
Every 1-2 hours	83	25.9
Every 30 minutes	116	36.3
Frequency of breaks while working on the computer		
Doesn't take break	58	18.1
After 2 hours	43	13.4
30 minutes – 2 hours	127	39.7
Before 30 minutes	92	28.8

Prevalence of Computer Vision Syndrome (CVS)

The prevalence of CVS among the undergraduates reporting two or more symptoms was 65.0% (CI: 59.5%-70.2%). The tiredness of the eyes (76.6%), headache (57.2%), and itchiness of the eyes (27.2%) were the most common symptoms (Figure 1).

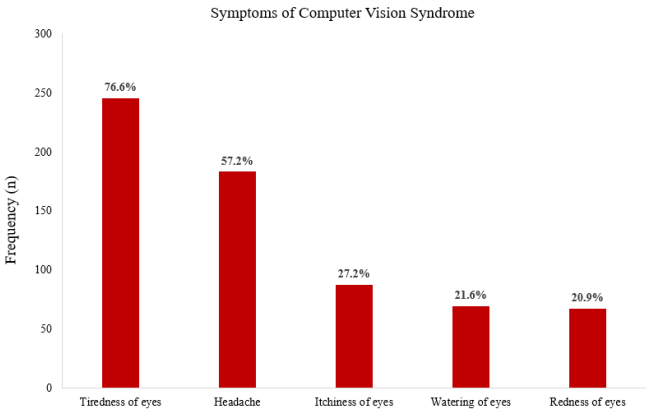

Figure 1. Symptoms of Computer Vision Syndrome

Preventive Measures for CVS

More than half of the participants (55.3%) practised measures for CVS prevention. They mostly took a break while remaining seated (32.5%) followed by closing their eyes (26.6%) and looking at far objects in between (19.7%) (Table 3).

Table 3: Type of measures taken to prevent CVS

Type of measures taken to prevent CVS	Number (n=320)	Percentage (%)
Take a break but remain seated	104	32.5
Close your eyes	85	26.6
Blink more frequently	51	15.9
Massage the eyes	53	16.6
Use eye drops	53	16.6
Looking at far objects in between computer uses	63	19.7

Factors associated with Computer Vision Syndrome

The unadjusted models indicated significant associations of the prevalence of CVS with sex (COR: 1.58, CI: [0.99-2.51]), marital status (COR: 0.22, CI: [0.06-0.86]), family type (COR: 0.52, CI: [0.27-0.97]), knowledge level (COR: 0.50, CI: [0.32-0.81]), devices used (COR: 1.95, CI: [1.21-3.13]), duration of devices used (COR: 6.88, CI: [1.85-25.60]), average use of devices per day (COR: 5.58, CI: [2.33–13.37]), changes in posture (COR: 2.02, CI: [1.129-3.62]) and in-between breaks (COR: 3.17, CI: [1.36-7.36]). However, after adjusting for potential confounders, only family type remained significantly associated with the prevalence of CVS (AOR: 0.47, CI: [0.24-0.95]).

Table 4: Association between independent variables and computer vision syndrome.

Characteristics	CVS		COR (95% CI)	AOR (95% CI)
	Present n (%)	Absent n (%)		
Sex				
Female	109 (70.3)	46 (29.7)	1.58 (0.99–2.51)	1.66 (0.96–2.85)
Male	99 (60)	66 (40)	Ref	
Marital Status				
Married	3 (30)	7 (70)	0.22 (0.06–0.86)	0.23 (0.05–1.05)
Unmarried	205 (66.1)	105 (33.9)	Ref	
Family Type				
Nuclear	160 (62.3)	97 (37.7)	0.52 (0.27–0.97)	0.47 (0.24–0.95)*
Joint	48 (76.2)	15 (23.8)	Ref	
Level of Knowledge				
Below Median	69 (42.6)	93 (57.4)	0.50 (0.32–0.81)	0.62 (0.36–1.07)
Median and Above	43 (27.2)	115 (72.8)	Ref	
Commonest type of devices used				
Both devices (big screen and small screen)	144 (70.6)	60 (29.4)	1.95 (1.21–3.13)	1.71 (0.99–2.95)
One of the two devices	64 (55.2)	52 (44.8)	Ref	
Duration of computer use (years)				
More than 2	192 (67.4)	93 (32.6)	6.88 (1.85–25.60)	2.30 (0.46–11.42)
1– 2	13 (59.1)	9 (40.9)	4.82 (1.03–22.57)	1.46 (0.22–9.58)
Less than 1	3 (23.1)	10 (76.9)	Ref	
Average duration of computer use per day (hours)				
More than 10	27 (69.2)	12 (30.8)	4.75 (1.67–13.50)	1.49 (0.41–5.39)
6 – 10	69 (62.2)	42 (37.8)	3.47 (1.44–8.37)	1.75 (0.58–5.30)

2 – 5	103 (72.5)	39 (27.5)	5.58 (2.33–13.37)	2.74 (0.94–7.97)
Less than 2	9 (32.1)	19 (69.9)	Ref	
Frequency of posture change				
Doesn't change posture	67 (72)	26 (28)	2.02 (1.13–3.62)	1.74 (0.82–3.67)
After 2 hours	24 (85.7)	4 (14.3)	4.71 (1.54–14.43)	3.20 (0.83–12.36)
Every 1 – 2 hours	52 (62.7)	31 (37.3)	1.32 (0.74–2.34)	1.06 (0.49–2.26)
Every 30 minutes	65 (56)	51 (44)	Ref	
Frequency of breaks				
Doesn't take break	38 (65.5)	20 (34.5)	1.60 (0.81–3.15)	1.10 (0.46–2.63)
After 2 hours	34 (79.1)	9 (20.9)	3.17 (1.36–7.36)	1.98 (0.68–5.75)
30 minutes – 2 hours	86 (67.7)	41 (32.3)	1.76 (1.01–3.07)	1.46 (0.71–3.01)
Before 30 minutes	50 (54.3)	42 (45.7)	Ref	

DISCUSSION

This study investigated the prevalence rate and factors associated with computer vision syndrome among undergraduate students. The prevalence of two or more symptoms of CVS among the students was 65.0%. This finding aligns to that of studies conducted in Ghana and Saudi Arabia.(11,12) This consistency might be attributable to the comparable characteristics of respondents in terms of computer usage and the timing of the conduction of these studies amid the early stages of the COVID-19 pandemic — when virtual education was more prevalent as a method of teaching and learning, fostering increased screen time among students. However, in our study, the prevalence rate was found lower than that reported in studies from India (80.3%) and Malaysia (89.9%).(13,14) This variance could be attributed to methodological differences, as those studies defined CVS prevalence based on the presence of at least one symptom, whereas in our study it was defined as the presence of two or more symptoms among students. According to our results, the top five debilitating symptoms of CVS were tiredness of eyes, headache, itchiness, watering and redness of eyes. This is consistent with reports from similar studies.(7,5,11)

In terms of preventive measures, the most common practice was taking breaks while remaining seated during computer use, followed by closing eyes, blinking frequently, massaging the eyes, using eye drops and looking at distant objects between computer use sessions. Ideally, limiting digital device use would be the best preventive measure. However, given the necessity of online activities for work and education, particularly for students, this is not feasible. Therefore, while it is important to adopt preventive measures during digital screen use, individuals should also focus on reducing other screen-related activities, such as watching TV and browsing social media, to compensate for essential commitments that require screen use.

Typically, students in nuclear families are more likely to engage in problematic/ excessive use of screen and internet because of fewer family members and reduced social interaction, leading to more time spent on digital devices.(15,16) However, our results indicated the opposite findings showing higher odds of developing CVS among the students from joint or extended families compared to those from nuclear families. This might be because joint families might have limited living space, which can result in suboptimal ergonomic setups for computer use. Especially during the COVID-19 lockdown, all the family members might have had to share finite space all day for a long period of time due to restricted external movement, which might have led to poor ergo-ophthalmic practices such as poor posture, improper viewing distances, and inadequate lighting conditions, exacerbating CVS symptoms in students.17 Additionally, it is quite possible that in a joint family setting, the presence of more adults and older siblings using screen media extensively could influence the younger adults in the family to also increase their screen time.(18) Our study found no significant association between taking breaks, changing posture, and the prevalence of CVS, similar to the findings of Tawil et al. and Abudawood et al.(19,20) respectively. Additionally, we did not observe a significant association between the prevalence of CVS and the number of daily hours spent using digital devices. This contradicts several studies that report an increased odds of having CVS with increased time of daily computer use.(14,21) Although only about half of the participants practised preventive behavioural measures and around one fourth of the students took regular breaks of the recommended duration while using digital devices; still the hours spent per day using digital devices were not seen to be associated with CVS occurrence. Further research with well-defined variables is needed to confirm these findings.

Knowledge regarding the prevention, causes and symptoms of CVS showed no significant association with CVS prevalence in this study group. This finding contradicts a study conducted in Mozambique, where having good knowledge of safe use of computer and preventive measures were found to be protective for

the occurrence of CVS.(22) Conversely, a study in Saudi Arabia reported that those students who were aware of the 20/20/20 rule had higher odds of having CVS.(19) This suggests that merely having knowledge about ergonomics is insufficient; the application of this knowledge is crucial for preventing CVS. However, in our study, only half of the participants had knowledge score above median reference, and, only half practiced preventive measures, despite the study population being undergraduate students who are expected to understand and apply such knowledge. Therefore, it is essential to incorporate ergonomic use of digital devices into curricular lectures and foster an environment that encourages the application of this knowledge.

This study includes students at different universities of Kathmandu Valley; thus, the findings can be generalized to all the students of the valley. It has still a few limitations. Since it was an online study, only participants who had access to the internet and could access the survey requests posted on various platforms could participate. There was a chance of information bias since we used online self-administered questionnaire. Additionally, many factors that may have an association with CVS like distance of screen when used, digital device brightness/contrast adjustment, glare experience and antiglare device use could not be considered in this study. Future studies should include these factors to ensure more comprehensive analysis.

CONCLUSION

The study concluded that majority of the undergraduate students experienced two or more symptoms of computer vision syndrome, the most common of which was tiredness of the eyes. Type of family, that is, joint family was the most determinant factor for CVS. As digital integration is growing in the education sector, it is important to make university students aware of the health implications and preventive measures.

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Conflicts of interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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Behavioral Risk Factors for Non-Communicable Diseases (NCDs) among Adolescents in Mahalaxmi Municipality of Lalitpur District, Nepal: A School-Based Cross-Sectional Study

Aman Gurmaita[1], Sujata Shakya[1,2]

ABSTRACT

Background: Non-communicable diseases (NCDs) are the leading causes of global mortality, with high prevalence in low- and middle-income countries. In Nepal, adolescents face rising NCD risk factors such as smoking, alcohol use, and poor diet.

Objective: To assess the prevalence of behavioural risk factors for non-communicable diseases and their association with socio-demographic characteristics among school-going adolescents of Mahalaxmi municipality of Lalitpur District, Nepal.

Methods: This cross-sectional descriptive study assessed the behavioural risk factors for non-communicable diseases among school adolescents in Mahalaxmi municipality, Lalitpur District. We used stratified random sampling to select 316 students from grades 11 and 12. We used Global school-based student health survey (GSHS) tools to collect data. We estimated prevalence of NCD risk factors among school adolescents. Binary logistic regression was applied to determine the factors associated with prevalence of NCDs risk factors.

Results: The prevalence of behavioural risk factors related to major non-communicable diseases including unhealthy diet, insufficient physical activity, alcohol consumption, and tobacco consumption are 99.4%, 94.3%, 7.9% and 6.6% respectively. The prevalence of at least two risk factors is 94.9%. The female school going adolescents were more likely to have prevalence of NCD risk factors (AOR: 6.12; 95% CI: 1.64, 22.80).

Conclusion: This study revealed a high prevalence of behavioural risk factors for non-communicable diseases (NCDs) among school adolescents, including unhealthy diets and insufficient physical activity. Majority of the participants had at least two NCD risk factors, which tends to persist into adulthood. To address this, the study recommends holistic, evidence-based interventions targeting these risk factors. Schools and local authorities should implement health education regarding healthy diet and physical activity, promotion of extracurricular activities, and nutritional programs in schools, and enforcement of laws against selling alcohol and tobacco to adolescents.

Keywords: Adolescents; Nepal; non-communicable diseases; risk factors

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[1]Central Department of Public Health, Tribhuvan University Institute of Medicine, Kathmandu, Nepal
[2]Unit of Health Sciences, Faculty of Social Sciences, Tampere University, Tampere, Finland

Correspondence to:
Sujata Shakya
Email: sujata_8@iom.edu.np

BACKGROUND

Chronic diseases, sometimes referred to as non-communicable diseases (NCDs), are characterized by a protracted course and are brought on by a confluence of genetic, physiological, environmental, and behavioural factors. More than three quarters of all NCD fatalities worldwide (31.4 million) occur in low- and middle-income countries (LMICs), which are disproportionately affected by NCDs. Adults are at risk for developing NCDs due to risk factors such less nutritious food intake, physical inactivity,

exposure to tobacco use, and alcohol consumption which are detrimental to health (1).

The main public health issue in Nepal is currently shifting from infectious diseases to non-communicable diseases (NCDs). However, there is still gap in the concrete evidence in many parts of the country regarding the prevalence of NCDs and the underlying risk factors (2). People make harmful decisions during their adolescence and early adulthood that will impact many aspects of their lives in the future, including their longevity, health status, and expense of healthcare. The social and physical surroundings, as well as the way they live, learn, play, and work have a significant impact on these decisions (3). The main risk factors for NCD development in adolescence include negative behaviours and lifestyle, in particular, smoking, alcohol and drug use, unhealthy diet, and metabolic syndrome (4).

Adolescence is a transitional stage, and the health of adolescents is greatly influenced by their family, environment, and social environment (5). This makes this group a crucial target for early prevention (6) Schools are ideally situated to serve as role models, advocates, and reinforcers of good behaviors for kids and teenagers. Since the kids and teenagers spend most of their day in school, they can easily access the institutions health-related instructional activities. Schools serve as health hubs by disseminating knowledge on and encouraging healthy practices among students (7).

METHODS

Study design and participant selection

This was a descriptive cross-sectional study conducted among school students studying in grade 11 and 12 of Mahalaxmi Municipality of Lalitpur district. Lalitpur District was selected since there are limited studies conducted in this area. Out of total 12 schools in the municipality, 3 public and 3 private schools were selected randomly through lottery method. In both grades 11 and 12, an average of 48 Students from each public school and 58 students from each private school were chosen based on the proportionate distribution of the students in the selected public and private schools. Therefore, 45% students from public schools and 55% students from private schools were selected. Altogether, 316 students (142 from public schools and 174 from private schools) were randomly chosen based on the list of the students in the schools. In case of multiple sections in any grade, one section was randomly selected for the study.

Sample Size and sampling technique

Sample size was calculated by using the Cochrane's formula. We determined the sample size to be 316 under the following assumptions: finite population (N) of 1814, 95% confidence interval, a design effect of 2, an NCD prevalence (p) of 11.2% (8), allowable error (d) of 5% and a 10% non-response rate. We used cluster sampling to select the participants in which each school was considered as a cluster.

Variables and measures

The dependent variable for the study was the prevalence of NCD behavioural risk factors. It refers to the existence of at least two or more (out of the four) NCDs risk factors in an individual at the time of the data collection. The risk factors included: alcohol consumption, tobacco use, unhealthy diet, and physical inactivity (9). Alcohol consumption was defined as the current use of alcohol (at least one drink of alcohol on at least one day during the previous 30 days (9). Tobacco use was considered as currently using any tobacco product at least 1 day during the previous 30 days (9). Unhealthy diet includes having any of the following diet: Eating fruits and vegetables less than 5 times a day, eating from fast-food restaurants one or more days, and drinking carbonated soft drinks one or more times per day during the past 7 days (9). Sufficient physical activity was defined as being physically active at least 60 minutes per day during the past 7 days considering any type of physical activity that increased the heart rate and breathing of adolescents. Adolescents that practiced physical activities less than five times weekly were considered physically inactive (9).

The independent variables include socio-demographic characteristics which include age (in years; 15-17/18 or above), sex (male/female), grade (11/12), religion (Hindu/Buddhist/Christian/others), ethnicity (Brahmin/Chhetri/Janajati/Dalit/others), types of school (public/private), education of father and mother (uneducated/primary/secondary/higher secondary or above). Religion, ethnicity and education were re-categorized into dichotomous categories for carrying out logistic regression analysis.

Data collection technique and tool

After getting permission from the school authorities, informed written consent was obtained from the parents/guardians through class teachers and the forms were received back the following day. The next day, the self-administered questionnaire was provided to the students. Participants were made clear about the purpose of study and the value of their responses. Students were explained about importance to respond to each question and assured of maintaining confidentiality of the information and anonymity of the participant's identification. The seating arrangement

was made according to examination pattern to avoid information contamination. Any school's authority and teachers were not allowed to stay in the classroom while students were filling the given questionnaire. Students were given 15-20 minutes to complete the form. The data collection tool was adapted from the Global School-based Student Health Survey 2015 conducted by World Health Organization. The questionnaire has been validated for Nepal and is already used in Nepal in another study (9). The tool was revised and simplified to make it easy to understand by the participants.

Data analysis

The collected data were entered and analyzed in the IBM SPSS version 27 to make easy entry and appropriate data processing. It was carried out in two phases where univariate analysis was carried out at first to assess the frequency and percentage of each variable, and bivariate and multivariate binary logistic regression analyses were performed to understand the socio-demographic factors associated with the behavioral risk factors. We estimated the adjusted odds ratio along with a 95% confidence interval.

Ethical approval

Permission from the school authorities, voluntary written informed consent from the students aged 18 years and above, written consent from each parent of the participants aged below 18 years, and participant's assent for those students. The confidentiality of the information provided was strictly maintained. An ethical approval was obtained from the Institutional Review Committee of Tribhuvan University Institute of Medicine [275(6-11)E2080/081]. Onsite information about common NCDs, their common risk factors and guidance to avoid them was provided to the participants if needed after completing data collection.

RESULTS

Socio-demographic characteristics of school-going adolescents

In this study, altogether 316 adolescent students studying in grade 11 and 12 participated from public (142) and private schools (174). The mean age of the participants was 17.48 (±1.41) years. More than half of the participants were of 17-18 years age group (61.1%), female (56.3%), and studying in grade 11 (56.0%). Brahmin/Chhetri (51.9%) was the major ethnic group followed by Janajati (31.6%). Most of the participants were Hindu (84.8%) by religion. Majority of the fathers were educated up to at least higher secondary level (36.7%), whereas nearly half (43.3%) of the mothers were uneducated (Table 1).

Table 1: Socio-demographic characteristics of school-going adolescents (n=316)

Individual Characteristics	Number	Percentage (%)
Age (in years)		
15-17	176	5.7
18 or above	140	44.3
Sex		
Male	138	43.7
Female	178	56.3
School type		
Public School	142	44.9
Private School	174	55.1
Grade		
11	177	56.0
12	139	44.0
Ethnicity		
Brahmin/ Chhetri	164	51.9
Janajati	100	31.6
Dalit	34	10.8
Others	18	5.7
Religion		
Hindu	268	84.8
Buddhist	16	5.1
Christian	30	9.5
Others	2	0.6
Education of Father		
Uneducated	82	26.0
Primary level	73	23.1
Secondary level	45	14.2
Higher secondary level or above	116	36.7
Education of Mother		
Uneducated	137	43.3
Primary level	59	18.7
Secondary level	45	14.2
Higher secondary level or above	75	23.7

Prevalence of behavioural risk factors among school-going adolescents

In Figure 1, among the four behavioural risk factors related to major non-communicable diseases including unhealthy diet, insufficient physical activity, alcohol consumption and tobacco consumption, the most prevalent behavioural risk factors were unhealthy diet (99.4%) and insufficient physical activity (94.3%).

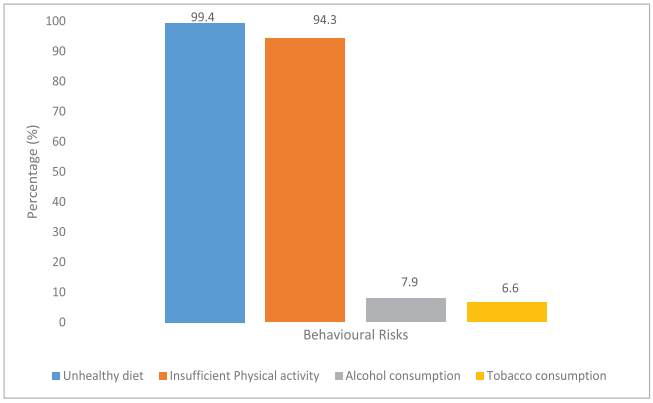

Figure 1. Prevalence of behavioural risk factors among school-going adolescents (n=316)

Prevalence of clustered behavioural risk factors among school-going adolescents

Occurrence of at least two behavioural risk factors is said to be clustering of behavioural risk factors. The study had shown that all of the participants had at least one risk factor, 94.9% had at least two risk factors and about three percent had all four behavioural risk factors (Figure 2).

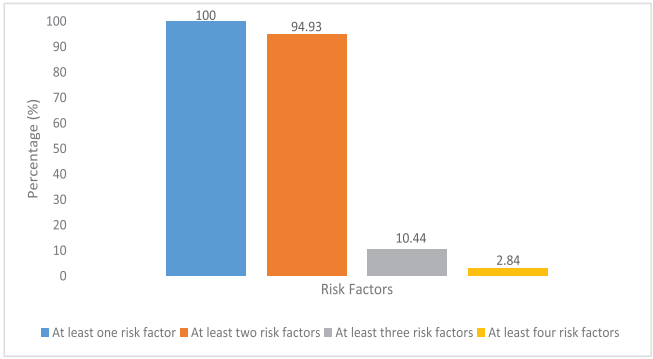

Figure 2. Prevalence of clustered behavioural risk factors among school going adolescents (n=316)

Behavioural risk factors associated with socio-demographic characteristics

Sex of the participants was significantly associated with the prevalence of NCD risk factors. The odds of prevalence of at least two risk factors was 6.12 (AOR: 6.12; 95% CI:1.64, 22.80) times higher among female students compared to male after adjusting for age, grade, religion and ethnicity (Table 2).

Table 2: Behavioural risk factors associated with socio-demographic characteristics

Socio-demographic characteristics	At least 2 risk factors n (%)	Less than 2 or no risk factors n (%)	COR (95% CI)	AOR (95%CI)
Age (in years)				
15-17	171 (97.2)	5 (2.8)	Ref	
18 or above	129 (92.1)	11 (7.9)	0.34 (0.11-1.01)	0.62 (0.19-1.99)
Sex				
Male	125 (90.6)	13 (9.4)	Ref	
Female	175 (98.3)	3 (1.7)	6.06 (1.69-21.73)	6.12 (1.64-22.80)
Grades				
11	172 (97.2)	5 (2.8)	Ref	
12	128 (92.1)	11 (7.9)	0.33 (0.11-0.99)	0.36 (0.11-1.16)
Religion				
Hindu	257 (95.9)	11 (4.1)	2.71 (0.89-8.20)	1.87 (0.55-6.31)
Others	43 (89.6)	5 (10.4)	Ref	
Ethnicity				
Brahmin/ Chhetri	160 (97.6)	4 (2.4)	3.42 (1.08-10.87)	3.24 (0.95-11.00)
Others	140 (92.1)	12 (7.9)	Ref	

DISCUSSION

This study aimed to identify the behavioural risk factors related to NCDs among school-going adolescents in Mahalaxmi municipality of Lalitpur District, Nepal. The finding demonstrates the burden of behavioural risk factors and highlights the disproportionate distribution of those factors across socio-demographic factors including age, sex, grade, religion, ethnicity, school type, and parental education. The study considered four behavioural risk factors including unhealthy diet, tobacco consumption, alcohol consumption and insufficient physical activity.

We found the prevalence of insufficient physical activity 94.3% and unhealthy diet 99.4%, which are much higher than the earlier studies conducted in the similar population by Tandan K et. al. (72.3% and 41.1% respectively) (9) and Hallal PC et. al. (insufficient physical activity, 80.3%) (10). This might be an indication of the increasing prevalence which is attributed to changing life style, computerized technology, and shifting from outdoor to indoor games. In this study, prevalence of unhealthy diet is 99.4% which is more than twice the study conducted in Kathmandu district (41.1%) (9). The reasons behind such significantly high proportion could be shifting dietary habit towards ready-made food, difficulty in managing time for food and urbanization. In the same way, alcohol consumption remained another health risk behaviour. We found that 7.9% of the participants were current alcohol users, which was slightly higher compared to a nation-wide survey (5.0%) (8) and lower compared to the data of Kathmandu district (14.8%) (9). Southeast Asian countries, particularly Bangladesh

(1.4%), Indonesia (2.5%), and Myanmar (0.9%) had a lower percentage of alcohol users in adolescents, but the pooled prevalence among adolescents in low- and middle-income countries is remarkably higher (25%) than the current study (11). Our study showed that 6.6% of the adolescents consumed tobacco which is lower compared to other studies conducted in Kathmandu (7.8%) (9), Bara (25.3%) (12) and Nepal nationwide (15.1%) (13) . The reason for lower proportion of alcohol and tobacco users might be that being the socially unacceptable behaviour, the adolescents did not wish to express that they consume alcohol or tobacco.

The prevalence of two or more behavioural risk factors was highly prevalent in the study participants, that is, 94.9% had at least two risk factors and the most frequent behavioural risk factors were unhealthy diet (insufficient fruit and vegetable and processed food consumption) and insufficient physical activity which were found similar in a nationwide school survey (8). High occurrence of clustering of behavioural risk factors among the study participants highlights the need to design integrative intervention to tackle this behavioural risk. Female students were found to have higher odds for the NCD risk factors in this study. This finding is not supported by other study in Nepal (9). However, a study in Bangladesh found higher prevalence of behavioural risk factors among women than men, which is similar to our study (14). Unlike our study, higher age was the most significant factor for the prevalence of behavioural risk factors in other studies (9,11).

This study has certain limitations. Although most of the adolescents could be captured in schools, this school-based study may not represent those who are not in school during the study period or who do not go to school. Secondly, information on the behavioral risk factors of NCDs is self-reported which might have led to under or overestimation. The social desirability bias related to information on alcohol and tobacco consumption might have occurred.

CONCLUSION

The findings suggest that the behavioural risk factors, particularly unhealthy dietary behaviour (including insufficient consumption of fruit and vegetables and processed food consumption) and insufficient physical activity were highly prevalent among the school-going adolescents. This study has shown that the prevalence of behavioural risk factors were distributed across socio-demographic characteristics. Almost all the study participants had at least one of the NCD related behavioural risk factors. This is a serious issue, as many of these risky behaviours acquired during adolescence tend to persist in the adulthood and each additional risk factor leads to increased future health risks. Female adolescents had higher likelihood of having behavioural risk factors. This signifies the preventive interventions to the adolescents, especially targeting to the females.

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Conflicts of interest

No conflict of interest was declared in this study.

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Factors Affecting Job Satisfaction among the Biomedical Equipment Technicians Working in Health Sector of Nepal: A Mixed-Methods Study

Salomi Paudel[1], Pravin Paudel[1], Rabindra Bhattarai[1], Rita Thapa[2]

ABSTRACT

Background: Job satisfaction is a vital concern for both managers and academics. Biomedical Equipment Technicians (BMETs) exemplify technical professionals and have also been affected by the factors of job satisfaction. This research is mainly focused on the job satisfaction of BMETs working in government and private health facilities to determine the factors affecting job satisfaction in their present scenario.

Methods: We distributed questionnaires to all 148 Biomedical Equipment Technicians (BMETs) in Nepal, with 91 of them responding for quantitative data. Additionally, we gathered qualitative data from 6 BMETs from 6 health facilities, evenly split between urban and non-urban regions, with 3 facilities from each type. In total, 18 interviews (6 FGD with the department in charges, 6 interview with the Medical Superintendent/biomedical engineer and 6 interview with BMETs of each facility) were conducted across these 6 health facilities. Our analysis included a descriptive examination of the survey data and a comparison of job satisfaction factors between the government and private sectors. Furthermore, we utilized NVivo 12 to code the qualitative data based on themes.

Results: The data shows that there is no significant difference in job satisfaction between BMETs in the government and private sectors overall. However, it does reveal that BMETs in government hospitals tend to be more satisfied with their earnings compared to those in the private sector. While the overall levels of satisfaction and dissatisfaction are similar for both groups of participants for most of the factors of job satisfaction.

Conclusion: Overall, BMETs find enjoyment in their work, showcasing their dedication to their roles despite the various unsatisfactory factors present in hospital settings in both government and private sectors.

Keywords: Job satisfaction, health facilities, BMETs.

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Check for updates

[1]Nick Simons Institute, Sanepa, Lalitpur, Nepal
[2]Western University, Canada

Correspondence to:
Salomi Paudel
BMET Instructor/Trainer, Nick Simons Institute, Lalitpur Sanepa, Nepal
Email: , salomi@nsi.edu.np

BACKGROUND

With the necessity of increasing equipment repair and maintenance in the hospitals of Nepal, the National Health Training Center started a year course of biomedical equipment training with support of development partners in 2004 AD. Since 2014, the training program has been upgraded to an eighteen-month academic course of Diploma in Biomedical Equipment Engineering (DBEE) affiliated under Council for Technical Education and Vocational Training (CTEVT). (1) A continuous partner in hospital service of Nepal, Nick Simons Institute, has been instrumental in developing, promoting and deploying BMETs in district level hospitals to enhance rural healthcare services. (2) The prime responsibilities of BMETs include a) maintaining and repairing biomedical equipment b) processing equipment-related orders, and c) documentation as well as recommend hospital administration on equipment procurement.

The National Health Sector Strategic Plan (2022-2030) and the National Strategy on Human Resources for Health (2021-2030) highlight the importance of production and deployment of BMETs for the availability of biomedical equipment. (3) Their permanent consumption in public hospitals is yet to be practiced, creating a confidence gap among the BMETs currently deployed through external development partners and government sources. (4)

Among 245 BMETs graduated till 2022 AD, 89 were working in the government sector and 59 in the private sector, remaining either unemployed or outside of the health sector. This opens the area to study on the job satisfaction of BMETs as a large portion is not in the health sector. Job satisfaction has an impact on the general life and productivity as satisfied employees have better mental and physical well-being. (5) It has been considered vital for the retention of health workers in the rural and remote areas of the country. (6) Thus, the current study attempts to identify the level of job satisfaction among these cadres and explore the factors affecting job satisfaction.

METHODOLOGY

Study design

We designed a mixed-methods study, whereby triangulating the qualitative and quantitative data obtained from the BMETs with the participants from the selected hospitals.

Study procedure and participants selection

A tracking of the BMETs (245 BMETs had been graduated till 2022 AD) was done to identify their status in the country at the initiation of the study. We identified 148 BMETs working in both public and private health sector as the main study population.

For quantitative survey, questionnaire was sent to all 148 BMETs where the major variable was job satisfaction which included other factors such as pay, promotion, benefits, rewards, supervision, operating procedure, co-workers, nature of work and communication together with independent variables as age, working period, salary, and the type of facility.

Semi-structured interviews and focus group discussions (FGDs) were carried out with BMETs and health facility personnel at selected hospitals. A total of 12 in-depth interviews were conducted with BMETs and 6 with medical superintendents or biomedical engineers from the hospitals. Additionally, 6 FGDs were organized with department incharge, including those in charge of the operating theater, radiology, emergency department, nursing, and hospital management.

The hospitals where BMETs were deployed were selected using a purposive sampling method to ensure representativeness based on criteria such as geography, political divisions, ownership, and hospital levels. Within the qualitative data collection, we interviewed 6 BMETs; 4 from government hospitals (comprising 2 permanent and 2 temporary BMETs) and 2 from private hospitals. Hospital personnel were included in qualitative interactions to gather their perceptions and opinions regarding job satisfaction of BMETs. Overall, 12 in-depth interviews, 6 with BMETs and 6 with medical superintendents/biomedical engineers, along with 6 FGDs, were conducted at their own respective hospitals. The qualitative guidelines for both FGDs and KII were designed based on the pay and benefits, working environment, training and promotion and overall work satisfaction as the main areas which were related with job satisfaction. The contents in the IDI included, demographic information, job role and responsibilities, perceptions of job satisfaction, training and professional development, challenges faced, support and resources, career advancement and opportunities, and suggestions for improvement. Whereas the contents of FGD were, collective perspectives, group dynamics and roles, common challenges, job satisfaction themes, training needs, interdepartmental relationships and recommendations.

6 BMETs posted hospitals were purposively selected from a mix of urban and non-urban health facilities. (7) Kathmandu and Lalitpur as urban sites and Sankhuwasabha, Nawalpur and Jhapa as non-urban sites. Urban areas in this study are characterized by high population density and significant infrastructure development while non-urban areas, are rural areas, characterized by lower population density and more open space. (8) This included 4 government hospitals (2 permanent and 2 temporary BMETs) and 2 private hospitals (1 BMETs from each).

Table 1: Sites for qualitative study

Study sites	Government Hospital with Temporary BMET	Government Hospital with Permanent BMET	Private Hospitals
Urban sites	Kanti Children Hospital 350 bedded (Kathmandu) (5*, 2**)	National Trauma Center 200 bedded (Kathmandu) (7*, 2**)	Nepal Medicity Hospital 750 bedded (Lalitpur) (4*, 2**)
Non-urban sites	District Hospital Sankhuwasabha (Sankhuwasabha) (7*, 2**)	Prithvi Chandra Hospital (Nawalpur) (5*, 2**)	Purbanchal Cancer Hospital (Jhapa) (7*, 2**)

*Number of participants in FGD, **Number of participants in KII

Data collection instruments and procedures

For assessing the job satisfaction, we adopted Paul Spector's Job Satisfaction questionnaire already validated in health sector employees in Nepal. It consists of the nine facets of job satisfaction; pay, promotion, benefits, rewards, supervision, operating procedure, co-workers, nature of work and communication together with age, working period, salary, and the type of facility. (9) For the quantitative data, a questionnaire was sent to 148 BMETs via email, and responses were received from 91 of them. The lower response rate may be attributed to the sensitivity of the subject matter (job satisfaction), as well as factors such as lack of time or fear of potential consequences which significantly impacted our outcome which we knew while conducting qualitative survey as we had to withdraw from some of the hospitals as not allowed for study. We acknowledge, Job satisfaction of the BMETs who didn't participate in the study might be different.

Topic guides were developed for qualitative interactions through an iterative process which included the possible factors that could influence the job satisfaction like perceptions on financial/non-financial benefits, working environment, team support, job description in the hospital, supervision, further growth areas. A pre-test of the topic guide was conducted at Bharatpur Cancer Hospital, where a temporary BMETs had been deployed. This allowed us to adjust in the topic guide like incorporating an introductory section aimed at making participants more comfortable before we start the core interview. A team of experienced researchers were provided one day orientation on the purpose and topic guides before field visits. The duration of data collection was 5 months from August 2022 to December 2022.

Data analysis

The survey consisted of a job satisfaction scale by Paul Spector (9) for the quantitative study. In which job satisfaction's original category was converted into a continuous scale of binary form (0 and 1) as; [(strongly disagree" and "disagree" as 0 (which is not satisfied) and "Agree" and "strongly agree" as 1 (which is satisfied) leaving "don't know" and refuse to answer)]. (10) This was for the positive statements, however vice versa for negative statements. It was done for ease of analysis. The descriptive analysis for frequency, percentage, mean and standard deviations was performed while ANOVA test was used to identify the difference among the categories of participants. A Karl Pearson's correlation test was done to identify the correlation between the type of health facility BMETs were working and the Job Satisfaction score while a comparative analysis between the private and government facilities was conducted.

All the interviews and FGDs were recorded, subsequently transcribed, and then translated into English language. To ensure the accuracy of the translation process, five pages from two randomly chosen transcripts were back translated into Nepali and meticulously compared with the original recordings for consistency and fidelity of meaning. For the qualitative analysis, the translated interviews were coded into their respective themes. The thematic analysis was facilitated using NVivo software, which allowed for systematic organization and examination of the data. All the codes of the qualitative data from in-depth interviews and focused group discussions generated 4 main themes: pay and benefits, working environment, training and promotion, and overall work satisfaction through a deductive approach.

Ethical consideration

The field researchers obtained written informed consent from participants after clearly explaining the purpose, procedure, and potential risks associated with the study during the interviews. The researchers ensured that participation was voluntary and informed participants that they could withdraw from any or all sections of the interview at any time. For the quantitative survey conducted via mailed questionnaires, a section for informed consent was attached where they had to indicate their agreement by checking "yes I agree to participate" before proceeding to further sections. The whole form was obtained from the participants and assured if they had agreed before inclusion for data entry and analysis. The study participants were assured of the privacy and confidentiality of their information through anonymous reporting of the study findings. Furthermore, the ethical approval for conducting study was obtained from the Nepal Health Research Council (NHRC) with Reference Number: 64/2022.

RESULTS

Job satisfaction among the participants by categories

The average job satisfaction score of the participants was 62.38%±14.7 ranging from minimum of 24.2% to maximum 87.1%. Among the participants categories, BMETs of less than 25 years old were more satisfied while the satisfaction level decreased with the increase in age, except in the 40 years and above age group. Higher satisfaction was observed among participants with experience of 13-24 months and lowest among 60 months and above experience, but not much variance found among categories. Participants with salary scale NRs 50,000 and greater were the most satisfied compared to other participants. However, the difference observed among all the categories was not statistically significant ($p<0.05$).

Table 2: Satisfaction score by participant categories

Categories	N	Mean	Std. Dev.	Minimum	Maximum	P-value
Age (in years)						
Less than 25	35	66.9	13.0	36.1	87.0	0.4
26 to 30	34	62.1	15.8	30.6	87.1	
31 to 35	11	53.3	15.2	24.2	76.0	
36 to 40	7	52.4	7.8	38.9	61.3	
40 and above	4	61.7	16.2	50.0	85.7	
Total	91	62.2	14.8	24.2	87.1	
Service Period (in months)						
0 to 12	29	64.8	16.7	24.2	87.0	0.3
13 to 24	8	67.6	18.5	36.1	87.1	
25 to 36	13	63.8	12.7	40.6	85.7	
37 to 48	12	59.9	11.7	40.7	86.4	
38 to 60	15	60.4	12.0	30.6	76.9	
60 and above	14	57.7	16.0	30.6	86.7	
Total	91	62.4	14.8	24.2	87.1	
Salary Scale (in NRs thousand)						
Less than 20	7	62.0	16.2	37.5	81.8	0.2
20 to 35	50	61.1	14.6	30.6	87.1	
36 to 50	28	61.5	15.2	24.2	87.0	
Greater than 50	6	75.3	7.0	66.7	86.4	
Total	91	62.2	14.8	24.2	87.1	

Participants based on the different facets of job satisfaction

The 9 facets of satisfaction were also analyzed in which BMETs were most satisfied with the nature of the work they are doing and least satisfied with the portion of opportunities they are getting in their work, with the overall satisfaction of 62.4%. BMETs seem much less satisfied also with the rules and procedures on their workstation.

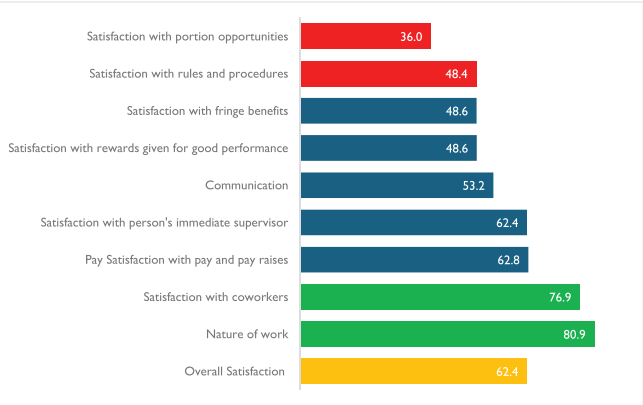

Figure 2: Percentage of clients who were satisfied by the satisfaction items.

Differences based on type of health facility of BMET

To observe any differences and relation among the participant's job satisfaction score and type of facility they were working independent t-test and the correlation test was conducted private facilities in which Pearson's correlation test was conducted.

Table 3: Independent t-test based on type of facilities

Facility Type	N	Mean	Std. Dev.
Government	54	62.1	13.9
Private	37	62.8	15.9

Characteristics	Levene's Test for Equality of Variances		t-test for Equality of Means			
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Equal variances assumed	0.9	0.3	-0.2	89	0.8	-0.7
Equal variances not assumed			-0.2	70.3	0.8	-0.7

The results show that the mean difference between the two groups is -0.6881. The t-statistic is -0.218 with a p-value of 0.339. The p value is greater than 0.05, indicating the mean difference is not statistically significant.

Table 4: Pearson correlation between satisfaction score and satisfaction item scores

Items	Pearson Correlation coefficient (r)	Sig. (2-tailed)	N
Facility type	0.02	0.8	91

The Pearson Correlation between facility type and satisfaction score is 0.023, indicating weak positive relation but not statistically significant. So, we fail to reject the null hypothesis can say that there is no significant difference between satisfaction among government and private BMET employees.

Satisfaction comparison among BMETs from government and private facilities

The individual questions for each of the nine facets of job satisfaction were analyzed in relation to type of health facilities. The table below shows the top five and bottom five satisfaction categories for participants.

Table 5: Top five satisfied items from Government vs Private facilities workers

Items from Government	Percentage	Items from Private	Percentage
I like doing things I do at work	96	I like my supervisor	90
I like people I work with	94	I like people I work with	85
I feel a sense of pride in doing my job	94	I like doing things I do at work	84
I enjoy my coworkers	92	My supervisor is quite competent in doing his/her job.	83
My job is enjoyable	90	I enjoy my coworkers / I feel a sense of pride in doing my job	82

Table 6: Top five unsatisfied items for Government vs Private facilities workers

Items from Government	Percentage	Items from Private	Percentage
I don't feel my efforts are rewarded the way they should be	36	I have too much to do at work	42
My supervisor shows too little interest in the feelings of subordinates	33	My supervisor shows too little interest in the feelings of subordinates	31
There are benefits we do not have which we should have	30	There are benefits we do not have which we should have	27
There is really, too little chance for promotion on my job	24	Raises are too few and far between	26
I have too much to do at work	24	There is really, too little chance for promotion on my job	21

In general, the main subjects of satisfaction and dissatisfaction for the participants from both government and private hospitals were the same, but there was difference in terms of proportion.

Qualitative findings

For qualitative analysis four thematic areas were identified; a) pay and benefits, b) working environment, c) training and promotion, and d) overall work satisfaction which are presented in this section:

A) Pay and Benefits

In general, BMETs working in the government hospital were more satisfied than those from the private hospitals. Moreover, the BMETs deployed through NSI (a development partner in health sector) are perceived to be more satisfied than the BMETs working as government permanent staff. "He is deployed by NSI in this hospital. NSI is supporting the deployed staff very well with the handsome payment in the remote district hospitals." KII_GTM_NUr.

The permanent government staff receive benefits such as medical insurance and festival allowances but do not receive overtime pay. On the other hand, temporary government staff do not receive any such facilities. Private staff, however, enjoy technical allowances as part of their benefits.

"He has the salary of government level with an additional support of 5-7 thousand per month as motivation from the hospital development committee." KII_GPM_Nur

"Not satisfied or even motivated here, especially salary, I would have more motivated if the salary is high even just up to the government level." IDI_PB_Ur

"In my view they should be satisfied with the benefits. They do have technical allowance and night duty allowance as well." KII_SuP_Ur

B) Working environment

The working environment is an important factor for the job satisfaction of employees. We segregated it into three components: co-workers and supervisors, workload, and availability of equipment.

Most of the BMETs working either in the government or private hospitals were satisfied with their co-workers and supervisors. However, a few BMETs mentioned that they were not satisfied with the administrative staff as

they do not prioritize BMETs in the hospital.

"I work with doctors and nurses, so they know my work, but the management people don't know about work. At the time of evaluation, which is done by the management people, they don't know what I accomplished." IDI_GTB_Ur

Workload was another major factor identified for job satisfaction. Almost all hospitals had only one BMETs, they would always be on-duty and must be stand by for unforeseen emergencies to repair equipment. On one hand, it highlights their workload, while on the other, it underscores their significance within the hospital, ultimately contributing to an increased workload. Thus, mixed responses were observed.

Availability of spare parts or infrastructure for maintenance and repair has affected the satisfaction of BMETs. Both the government and private hospitals did not have spare parts for the equipment and BMETs could not repair them at the time needed. Participant from government hospital said, "May be because it is government hospital, situation might be same everywhere. Though it is big hospital, the equipment as well as parts are lacking. I cannot repair when needed." IDI_GPB_Ur

Participant from private hospital reported, "Difficulties in the work is spare parts. When something breaks down, we fix it what we can but if we must change the spare parts, it is hard." IDI_PB_Ur

Thus, BMETs in both the government and private sector are dissatisfied because of the lack of spare parts and management.

C) Training and Promotion

Despite the importance of refresher training mentioned by the equipment users and the supervisors, most of the BMETs involved in the study said that they haven't had chance to get training related biomedical equipment maintenance. One of the BMETs working in government hospital said, "I haven't got any training from here." IDI_GPB_Ur

However, some of them said that during the installation of equipment in the hospitals, the vendors give orientation regarding the handling and basic maintenance of medical equipment.

One BMET working in the private hospitals said, "I didn't get any trainings till now, but we learn something from the vendor when the equipment breaks down and also in the installation." IDI_PB_Ur

In contrast, one of the BMET supervisors said, "If the government has training for BMET and we got his name we will send him for sure, but hospital itself hasn't started training for BMETs yet." KII_GPM_Nur

This reveals the dissatisfaction among the BMETs as their skill has not been refined according to technology and time. The participants suggested improving job satisfaction by provision of in-service training on medical equipment, HTM training, involving BMETs in preparing technical specifications and logistics process for medical equipment in the deployed health facilities.

Participants felt no chance for promotion or is rare for them. For their career to progress they need to study further but being a local, facility wants to retain for longer halting BMETs career growth: "May be because I am local, they haven't prioritized me. If there was anyone else instead of me, they might have prioritized. So, I feel I am less prioritized because of being local." IDI_GTB_NUr

Whereas even the permanent government BMETs reported, "We don't have good promotion, growth, or scholarship system and all. There should be provision of scholarships for our further study to upgrade from technician to engineer as the upgrade of hospital demands higher technical HR. This can boost the career and we can show performance too." IDI_GPB_NUr

In Private hospitals promotion is difficult as well, one of the BMET from private hospital quoted, "I don't think I will get any promotion or anything. In today's scenario I think I will work here, get the experience, and then get upgrade if possible if not I will go to abroad." IDI_PB_Ur. And this clearly pictures the higher dissatisfaction of them.

D) Overall work satisfaction

In-depth interviews with BMETs working in both the government and private hospital, disclosed that they have passion to work in biomedical field and enjoy what they are doing despite dissatisfaction in various factors in their job. As one of the government hospital's BMET quoted, "Satisfaction is when I do my work but sometimes, they ask me to do work other than biomedical, so I get down." IDI_GTB_Ur

The scenario is found to be same for the private hospitals, one of the BMETs from the private hospital quoted as, "I enjoy my work itself; I came in this field because I have passion for this." IDI_PB_Ur

As a BMET work satisfaction is however equally dependent on the successful repairment of the equipment as one of the BMET from government hospital quoted as, "But sometimes I feel bad when I feel I could have fixed this equipment if I were in urban area, like availability of spare parts and other parts. So, some of the equipment are piled up here or should be sent to Kathmandu for repairment, this makes me sad sometimes." IDI_GTB_NUr

Defined job description was also one of the major

reported causes for dissatisfaction among government BMETs. "We must have proper job description in which it is written, we must do this and that. The only solution is, if we can work with full authority for the equipment only it will be better." IDI_GPB_Ur

Hence, it is found that in some government hospitals BMETs are satisfied with the work they do as it is their passion whereas some BMETs are dissatisfied because they don't even know what their responsibilities are, the ceiling of their obligation.

DISCUSSION

One of the primary responsibilities of Biomedical Equipment Technicians (BMETs) is to maintain this equipment, and their effectiveness in this role directly influences public perception of healthcare quality and the overall reliability of health services in hospitals. A prevailing sense of dissatisfaction has driven an increased reliance on healthcare facilities, even among those with limited financial means. (11)

Today's hospitals rely heavily on various types of medical equipment for diagnosing, monitoring, and treating patients. It is nearly impossible to deliver effective health services without these essential tools. (12) However, Nepal encounters problems with out-of-date and poorly maintained facilities and equipment. (13) Nepal Ministry of Health and Population (2022) emphasize the importance of periodic repair and maintenance of medical equipment, particularly focusing on preventive and corrective measures, which is directly related to the job satisfaction of BMETs. (14)

Our study includes BMETs in Nepal working in government and private sector. The research provides valuable insights into their overall job satisfaction, which stands at 62%. Among various factors assessed, BMETs in the government sector expressed the highest satisfaction rate (96%) regarding the nature of their work, also, in the interview BMETs from government sector expressed their passion for the work and stated that they enjoy their work. Conversely, BMETs in the private sector reported that 90% are satisfied with their supervisors. However, there are notable areas of dissatisfaction.

Government BMETs are most dissatisfied (36%) with the rewards they receive for their efforts. All the professionals seek recognition and appreciation for their contributions, yet BMETs in the government sector often go unnoticed despite their significant efforts in the healthcare field. (15) A specific example of this neglect is their lack of membership in the Nepal Health Professional Council (NHPC) which is the responsible body for registration of all the health professionals specially paramedics, in the country. (16) To date, BMETs have been advocating for their rightful acknowledgment within this council.

In the private sector BMETs face the highest dissatisfaction (42%) concerning their workload in health facilities. They have also stated in the interview, being high workload as one of the major issues, according to Nepal's labor laws, maximum working hours are 8 hours daily and 48 hours weekly but in case BMETs in private sector they must work more than 8 hours because of lack of staffs. (17)

In our study, government BMETs generally report higher levels of job satisfaction compared to their private-sector counterparts, primarily due to the superior benefits and facilities available to them, alongside with a standard salary of approximately Rs.35000. To add, it is worth noting that BMETs are also employed by the Nick Simons Institute for government hospitals, where they receive competitive salaries, as mentioned by several supervisors. (18) One of the studies reveals, the paramedical staff are happier in government hospital due to high salary as compared to private hospital and less work. (19) As per Imperial Law Associates, the minimum wage for workers as of 2080 B.S. is set at least at NRs 17,300. (20) Even some of the BMETs in the private sector still earn below this minimum wage, contributing to their dissatisfaction regarding compensation, which is a valid concern. When it comes to relationships with co-workers, both government and private BMETs report satisfaction. On the other hand, both groups express dissatisfaction regarding the availability of spare parts in their hospitals.

Additionally, both government and private BMETs are unhappy about the absence of proper job description and with the opportunities for training and promotion. (21) One of the studies highlighted that, Job descriptions are important for each worker as they are a guideline for the work expected of them, the skills required, and possible ways to achieve promotion. (22) This points out the importance of job description in the job which is absent in case of BMETs. In addition, although the "Progress of Health and Population Sector, 2022/23" report emphasizes the need to enhance the capacity for maintaining biomedical equipment at the local level through training for BMETs at provincial hospitals, with technical support by the Nick Simons Institute, no additional training has been provided to BMETs at the provincial level as of July 2023. (23)

Despite all these challenges, BMETs from both sectors share a strong passion for their work. A notable 90% of government BMETs enjoy their jobs, while 84% of private BMETs also find satisfaction in their work. With these findings, we can conclude that there is no significant difference in job satisfaction levels between government and private BMETs. Both groups

experience satisfaction and dissatisfaction regarding various factors, though the percentages differ.

Limitations

Our study encountered significant limitations, including difficulty in securing private organizational participation due to the sensitivity surrounding job satisfaction, which led to a lower-than-expected response rate. Despite efforts to clarify objectives and ensure confidentiality, some private organizations prohibited the study to avoid workflow disruptions. Additionally, the small sample size of 91 participants was attributed to tracking and recruitment challenges, restricted the study's findings.

CONCLUSION

The research highlights more than average job satisfaction (62.38%) among the BMETs attributed to factors such as age, years of service, and salary. These are not significantly different among private and government hospitals. A key concern is their dissatisfaction with salary levels, despite the structural support they receive from their work environment and colleagues. It becomes evident that the concerned authority should enhance BMETs effectiveness through comprehensive training programs to upgrade their skills. Additionally, well-defined job descriptions are essential for BMETs to perform their roles while being focused and confident on their job. Ultimately, promoting the contributions of BMETs within the healthcare sector is vital to improve their working conditions and ensure high-quality service in medical equipment management.

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Review Article

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Exploring Concepts and Debates Surrounding Nutraceuticals in Nepal, A Scoping Review Article

Chetan Karki Pyakurel[1], Rojina Basnet[2], Roshani Poudel[2]

ABSTRACT

Background: Nutraceuticals are the products derived from herbs, dietary supplements, specific diets, and processed foods, offering health benefits beyond basic nutrition and even the potential to prevent or treat diseases. The global surge in nutraceutical usage has brought attention to both their potential benefits and scientific enquiry regarding their safety and efficacy. This article had tried to find out about the concepts and debates surrounding Nutraceuticals in Nepal.

Methods: The study reviewed 17 articles sourced from Google Scholar, Google, and PubMed between December 25, 2023, and January 25, 2024. It included a diverse array of sources such as cross-sectional and longitudinal studies, qualitative research, reviews, and other types of publications. Articles were managed using Zotero for de-duplication and assessment. All authors independently reviewed titles and abstracts, with discrepancies resolved through discussion and additional studies identified from reference lists.

Results: In Nepal, the nutraceutical sector is growing rapidly, driven by increased health consciousness, traditional herbal knowledge, and a rising demand for natural products. However, challenges such as adulteration, contamination, and mislabeling of products highlight the need for stringent regulations and robust quality control measures. The country's regulatory framework, guided by the Dietary Supplement Guideline and the Drug Act, aims to ensure consumer safety and product integrity. Despite these measures, implementation and enforcement issues persist, including limited resources, inadequate market surveillance, and the prevalence of unregistered products. Controversies regarding the scientific support for health claims, the integration of traditional knowledge, and the ethical implications of nutraceutical marketing persist.

Conclusion: This review emphasizes the need for comprehensive studies and regulatory improvements to validate the safety and efficacy of nutraceuticals in Nepal. By fostering collaboration among researchers, academia, and industry, and by enhancing consumer awareness and education, Nepal can effectively harness the potential of nutraceuticals to improve public health and well-being.

Key Words: Concepts, controversies, debate, nutraceuticals, Nepal

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Check for updates

[1] Little Buddha College of Health Science, Purbanchal University, Kathmandu, Nepal
[2] Tribhuvan University, Institute of Medicine, Central Department of Public Health, Kathmandu, Nepal

Correspondence to:
Rojina Basnet
Tribhuvan University, Institute of Medicine, Central Department of Public Health
Kathmandu, Nepal.
Email: rojinabasnet4@gmail.com, rojina.basnet@cdph.tu.edu.np

BACKGROUND

Nutraceutical is a word formed by the combination of "nutrition" and "pharmaceuticals". They are the products extracted from sources like herbs, dietary supplements, specific diets, and processed foods. They provide health benefits in addition to basic nutrition and can even prevent or treat diseases. (1) The concept of nutraceuticals originated from Hippocrates' famous quote: "Let your food be your medicine and your medicine be your food (2)." They can be classified into different categories based on their nature and mode of action such as anti-cancer, antioxidant, anti-inflammatory and anti-lipid etc. (3). They have also been found to show positive affect on cardiovascular disease, can boost immune system and have a preventive role in infectious diseases (4).

In this article, Neutraceutical means, dietary supplements, fortified foods, and functional foods. Nutraceuticals, dietary supplements, and traditional herbal remedies are all related but separate ideas in the field of health and wellbeing, each with a specific function. Traditional herbal remedies, which have their roots in Ayurvedic medicine, are widely used in Nepalese culture to treat illnesses and promote overall health using plant-based materials (5). Dietary supplements are more modern and standardized which address specific nutrient deficiencies (6). Similarly, nutraceuticals, combining nutrition and pharmaceuticals, offer scientifically-backed health benefits beyond basic nutrition, bridging traditional and modern approaches (7).

Recently, use of nutraceutical has gained significant attention within the health and wellness domain and has been used globally (8). However, many health claims associated with these nutraceuticals may lack scientific support regarding their safety, efficacy, and impact on health conditions (9). Many studies conducted to explore the potential health benefits of nutraceuticals for specific pathological conditions found discrepancies in showing the exact mechanisms of action for reducing the pathological condition and improving the diseased condition (10). This has raised discussions among medical and scientific experts regarding the beneficial action of nutraceuticals (11). Different studies have shown that individuals with a balanced diet typically do not require nutraceuticals, and also there is a risk of adverse effects from over-supplementation (9,10). In developing countries, children may suffer from vitamin or mineral deficiencies due to inadequate nutrition, leading to the need for essential micronutrient supplementation like Vitamin A, iron, iodine, and zinc (14). Although vitamin and mineral supplements may offer benefits for specific deficiencies, recent studies have found no reduction in heart disease, stroke, or premature death with the use of multivitamins, Vitamin D, calcium, and Vitamin C supplements (12,15,16).

Many nutraceuticals are marketed with questionable claims like improving brain function, supporting heart health, preventing aging, and reducing inflammation (4). Both consumers and health professionals encounter conflicting study results, potential side effects from overuse, and harmful interactions, highlighting the need for solid evidence (12). Critical issues such as how the body absorbs and processes these compounds, their safe dosages, and interactions with other drugs or supplements are not well-researched (17). The unknown safe levels and potential toxicity of ingredients used in nutraceuticals are also major concerns (18).

The rapid growth of the use of nutraceuticals is because of factors like increase in health consciousness among consumers, over-the-counter availability of the products, and growing demand for natural and organic products (19). A significant health risk has occurred due to the rapid use of these nutraceuticals (9). Adulteration, contamination, and mislabeling of nutraceutical products have been reported across various countries like Brazil and Germany, highlighting the need for enforcement of strict rules and regulations (20).

The global prevalence of prescribing nutraceutical products is well-established and also are being used without prescription. Similarly, these prescriptions by medical professionals have become a controversy (21). In many countries, nutraceuticals are being supplied illegally, which has increased the health risk. So realizing the fact, countries like Nepal, have banned such prescriptions (22). Those who are in favor of nutraceuticals, advocate for their potential to fill nutritional gaps, support immune function, and enhance overall health outcomes and those who are opponents are questioning the scientific evidence supporting these claims and raise concerns about the lack of proven data to support the usefulness, safety and efficacy of those products (23). Additionally, the industries involved in producing nutraceutical products are being criticized for practicing misleading marketing tactics, and the commodification of health, regulation challenges, and inconsistent quality standards leading to questions about the ethicality of promoting nutraceuticals as a solution for various health concerns (24).

In the context of Nepal to maximize the benefits derived from nutraceutical products, it is crucial to establish a robust regulatory framework that prioritizes the protection of consumer health and the integrity of these products. Recent ban of nutraceutical products by the Department of Drug Administration (DDA) due to concerns over safety, efficacy, or regulatory compliance, have sparked debates regarding the quality and reliability of such supplements. These actions reflect broader discussions within the country regarding the need for stricter regulations, enhanced surveillance, and greater consumer awareness regarding nutraceuticals.

Controversies surrounding the use of nutraceuticals and synthetic additives in nutraceutical formulations have generated debates over their safety and long-term health implications (25). So this review has been conducted to provide an overview of the use of nutraceuticals and the debate surrounding their uses (26). As this industry continues to expand in the context of Nepal, there is a pressing need to understand its uses and debate surrounding its uses for public health and well-being. Additionally, while there is a growing body of literature on nutraceuticals globally, there is a need of comprehensive studies and reviews specific to the Nepalese context.

METHODS

Research team

The research team comprised two faculty members with expertise in Masters in Public Health Nutrition and Masters in Health Promotion and Education, who brought a deep understanding of public health and nutritional aspects. Additionally, a pharmacy student contributed valuable insight into pharmaceutical perspectives related to nutraceuticals, enhancing the interdisciplinary nature of the article.

Procedures

The study adhered to the scoping review guidelines established by Arksey and O'Malley. We applied these guidelines to sift through the data within the databases and subsequently structured our report following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis extension for scoping reviews (PRISMA – ScR). Following the Arksey and O'Malley Framework, we adhered to six stages for conducting a scoping review: (1) defining the research question; (2) finding relevant literature; (3) choosing studies; (4) extracting and mapping the data; (5) summarizing, synthesizing, and creating a report; and (6) consulting with experts. This scoping review aimed to address the following research question: What are the key concepts and debates surrounding nutraceuticals in Nepal?

Eligibility criteria: The study included all the articles like cross-sectional and longitudinal studies, qualitative studies, perspectives, reviews, systematic reviews, commentaries, case studies, conference proceedings, opinion pieces, and letters to the editor.

Exclusion criteria: The study excluded articles published in other than English language, non-peer reviewed, and unpublished articles.

Information sources and search strategy

Between December 25, 2023, and January 25, 2024, we conducted a search in PubMed and Google Scholar for relevant literature. RB crafted the search strategy in line with the study's primary objective, which CKP reviewed. RB, RP, and CKP jointly identified relevant databases and keywords essential for the study. They selected suitable free-text keywords such as "nutraceuticals," "concepts," "debates," and "Nepal." The search strategy ((((nutraceuticals) AND (concepts)) AND (debates))) was initially crafted in PubMed and then applied across all databases.

Selection of relevant studies

The search outcomes were transferred to the Zotero reference manager for de-duplication and assessment. RB, RP and CKP separately reviewed titles and abstracts based on the eligibility criteria. Articles lacking sufficient details in the title and abstract underwent full-text screening for potential inclusion. RB and CKP then deliberated on the screening outcomes, addressing any disparities through discussion. Additionally, they scanned the reference lists of chosen articles to identify further relevant studies for inclusion.

Data extraction/charting

All the authors were involved in extracting the data from the included studies in word tables. Information was placed into tables for data extraction. The reviewers extracted information about the concept of nutraceuticals, its debate, and regulatory mechanism. Reviewers also recorded their comments separately in a notes column that was incorporated into the main content while preparing the manuscript.

Summarizing, synthesizing, and creating a report

The main author (RB) organized and combined information from studies and drafted the manuscript. The other authors checked and improved the summary. Important points required for the manuscript were included after consultation with experts.

RESULTS

Initially, 37 papers were found in PubMed, and 7850 more were identified from other sources like Google scholar and Google totaling 19413 papers. After a thorough review, 19248 papers were excluded for being duplicates leaving 165 papers for full-text analysis. Further screening removed 49 papers in the first round and 37 more in the second round and 62 at third round. So after filtering the papers based on inclusion criteria, all together 17 articles are included in this paper which is shown as in figure below

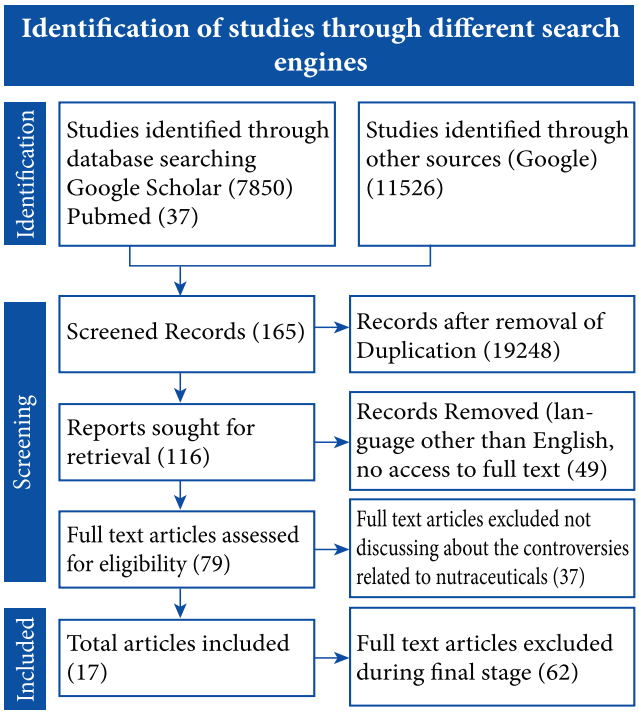

Figure 1 PRISMA Flow Diagram

Regulatory framework

In Nepal, the oversight and regulation of dietary supplements are governed by the Dietary Supplement Guideline (2016), mandated by the Food Act of 1967, administered under the Department of Food Technology and Quality Control within the Ministry of Agriculture and Livestock Development (27). This guideline serves to safeguard consumer health and ensure customer satisfaction by controlling and guaranteeing the composition and purity of products, while also establishing quality standards for nutritional supplementary food. Also Drug Act 1978 and various regulation under it provides the legal framework for registration, licensing, importation, manufacturing, labeling, advertising, and quality control of nutraceuticals (28). Nutraceutical products must undergo registration with the DDA, involving the submission of detailed documentation on product composition, safety data, manufacturing processes, and labeling information, leading to the issuance of a registration certificate upon successful compliance (29). Labeling requirements ensure comprehensive information on product name, ingredients, dosage instructions, storage conditions, batch number, manufacturing, and expiry dates, promoting consumer safety and transparency (30). Advertising guidelines mandate ethical standards, prohibiting misleading or unsubstantiated claims about product efficacy or health benefits (31). Quality control measures enforce adherence to Good Manufacturing Practices (GMP) and quality testing of raw materials and finished products, with periodic inspections and audits conducted by regulatory authorities to ensure compliance (32). Surveillance and monitoring activities, conducted by agencies like the DDA, oversee the market, identify non-compliant products, and take enforcement actions, including routine inspections of manufacturing facilities, sampling, testing, and investigation of consumer complaints, ensuring the safety, purity, and efficacy of nutraceuticals in Nepal (33).

Despite the existence of regulatory provisions, challenges persist in the implementation and enforcement of the regulatory framework for nutraceuticals in Nepal. These challenges include limited resources and capacity within regulatory agencies, inadequate surveillance and monitoring of the nutraceutical market, proliferation of unregistered and counterfeit products, and ambiguity in regulatory requirements (34). Due to a lack of resources, regulatory agencies are unable to enforce compliance or carry out efficient inspections, which permits the sale of inferior goods (35). Manufacturers struggle with high compliance costs and quality control challenges, especially small and medium-sized businesses (36). Inadequate labeling and marketing frequently deceive consumers, and trustworthy safety and efficacy data are unavailable to healthcare providers (37).

Nutraceutical consumption patterns

Nutraceutical consumption practices in Nepal has been influenced by a diverse mix of traditional practices and socio-economic background, cultural beliefs, and healthcare access (38). Accurate data on nutraceutical consumption in Nepal is limited, however, it has been found that people are showing a growing interest in dietary supplements, herbal remedies, and functional foods as part of everyday health maintenance (22). A study conducted in the far-western part of Nepal found that a significant portion of the Nepalese population relies on traditional herbal medicines for managing various health conditions, with common ingredients including ginger, garlic, turmeric, and neem (5). Similarly, a hospital-based study found over 80% of patients were discovered to be self-administering nutraceuticals (9). The most commonly recommended types of nutraceuticals included vitamins (40.7%), minerals (23.7%), enzymes (21.1%), proteins (8.8%), probiotics (4.2%), and herbal supplements (2.0%) (9). Additionally, a survey revealed a notable increase in the consumption of dietary supplements, particularly among urban residents and affluent demographics, driven by perceived health benefits and lifestyle choices (39). Also, in Nepal, cultural preferences and beliefs shape consumption patterns, with Ayurvedic and traditional remedies remaining popular alongside modern nutraceuticals (40).

Production and marketing

Studies have highlighted the significant role of local herbal resources and traditional knowledge systems in the manufacturing of nutraceutical products (41). In terms of marketing, a report by the United Nations highlighted a growing trend of direct-to-consumer marketing channels, including online platforms and health food stores, to promote nutraceutical products (42). According to the International Partnership for the Satoyama Initiative, Nepal is home to over 1,600 species of medicinal plants, which form the raw materials for nutraceutical production (43). Key players in the industry have capitalized on these resources, producing a variety of products such as herbal supplements, fortified foods, and natural remedies (44). The domestic market for nutraceuticals has expanded by approximately 12% annually, fueled by rising consumer awareness and the integration of traditional Ayurvedic practices with modern nutritional science (45). Additionally, Nepal's nutraceutical exports have also increased, particularly to markets in India, China, and Europe, with export revenues reaching approximately $30 million in the last fiscal year (46).

Debates

Food supplements containing essential micronutrients can be utilized to enhance the health of individuals with specific needs (47). However, many health claims

associated with these supplements may lack scientific support regarding their safety, efficacy, and impact on health conditions (48). Studies often lack rigor in exploring the mechanisms of action and potential health benefits of nutraceuticals for specific pathological conditions (9). Controversies regarding nutraceutical persist around the integration of traditional knowledge and indigenous practices into commercial nutraceutical formulations, with debates over cultural appropriation, intellectual property rights, and equitable benefit-sharing (49). Divergent opinions among healthcare professionals, policymakers, and industry stakeholders regarding the therapeutic value and appropriate use of nutraceuticals contribute to ongoing debates and controversies within the nutraceutical sector (26). While individuals with a balanced diet typically do not require supplements, there is a risk of adverse effects from over-supplementation. Some studies indicate that vitamin and mineral supplements can benefit specific groups, such as children and the elderly, by improving bone density or reducing birth defects (50–52). Certain dietary supplements and nutraceuticals have demonstrated therapeutic and preventive benefits (3). Some are associated with reduced immunopathology, antiviral and anti-inflammatory effects, and even the prevention of acute respiratory distress syndrome (ARDS) (53–55). On the other side, recent large-scale studies have found no significant reduction in heart disease, stroke, or premature death associated with the use of multivitamins, Vitamin D, calcium, and Vitamin C supplements (56–58). Also, legislation concerning the prescription of nutraceuticals by qualified medical professionals remains contentious, with some countries banning their prescription altogether (22). Safety and efficacy concerns surrounding nutraceuticals have sparked debate among medical and scientific professionals (59).

Future direction

The regulatory framework in Nepal must align with ongoing research efforts to ensure adherence to standards of quality, safety, and efficacy, given the widespread use of nutraceuticals. Comprehensive studies on the medicinal properties of native plants and traditional treatments are essential to validate the effectiveness and safety of nutraceuticals through rigorous research, clinical trials, and testing. Collaborative efforts among researchers, academia, and industry are crucial for developing evidence-based nutraceutical formulations tailored to the unique health needs of the Nepalese population. Consequently, stringent regulations for product registration, manufacturing processes, labeling, and advertising must be implemented. Additionally, surveillance and monitoring mechanisms should be strengthened to promptly address any instances of noncompliance. Additionally, nurturing consumer awareness and education regarding nutraceuticals is indispensable in empowering individuals to make informed decisions for their health and well-being. Disseminating accurate information on nutraceutical benefits, risks, and appropriate usage can cultivate confidence and encourage responsible consumption practices among the people, thereby contributing to the cultivation of a healthier society.

Limitations

The review faced limitations due to language barriers and restricted access to full texts, which may have led to the omission of relevant studies. Additionally, the focused search strategy may have excluded some valuable resources. Despite these constraints, the selected studies offer a comprehensive overview within the accessible scope.

CONCLUSION

The term "nutraceuticals," encompassing products derived from sources such as herbs, dietary supplements, specific diets, and processed foods offering health benefits beyond basic nutrition, holds significant promise in Nepal's healthcare setting. As the industry is emerging globally, Nepal too witnesses a rapid evolution in nutraceutical consumption and production, driven by heightened health consciousness, demand for natural remedies, and preventive healthcare trends. However, alongside their potential, nutraceuticals in Nepal also lead numerous debates and controversies regarding their safety, efficacy, regulation, and ethical considerations. The growing popularity of nutraceuticals has also led to challenges, including the risk of adulteration, misleading marketing practices, and variability in product quality. Despite the challenges, the future direction for nutraceuticals in Nepal appears promising, with opportunities to align regulatory frameworks with ongoing research, foster industry growth through innovation and investment, and promote consumer awareness and education. By addressing these aspects, Nepal can harness the potential of nutraceuticals to advance public health and well-being despite the complexities inherent in this burgeoning industry.

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Conflict of interest

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Review Article

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Public Health Ethics: Perspectives in Nepal

Ramesh P Aacharya

ABSTRACT

Public health ethics in Nepal involves navigating the balance between individual rights and the collective good, especially in settings with limited resources. Nepal's distinct socio-economic conditions, cultural diversity, and unequal access to healthcare create significant ethical challenges. This review article delves into these ethical considerations, focusing on cultural sensitivity, equitable access, and the need to balance public health priorities with individual autonomy. Ethical dilemmas frequently arise when allocating scarce resources, particularly in preventive measures like vaccination campaigns, where the needs of the many may outweigh the rights of the few.

Cultural beliefs and practices play a vital role in public health ethics in Nepal. Ethical dilemmas often surface when public health interventions, such as vaccination programs, conflict with deeply rooted cultural beliefs, sometimes fueled by rumors. Addressing these issues ethically requires a culturally sensitive approach that respects local traditions while advancing public health goals.

The COVID-19 pandemic has amplified the ethical challenges within Nepal's public health system. Measures like lockdowns, mandatory use of face mask, vaccination drives, and quarantine protocols raised important questions about individual freedoms versus the collective good. The ethical management of scarce resources, such as ICU beds and oxygen supplies, emerged as a critical issue, demanding transparent and equitable decision-making processes.

Overall, public health ethics in Nepal is shaped by the imperative to balance individual rights with community welfare within a context of resource limitations and cultural diversity. Tackling these ethical challenges is essential for advancing public health and ensuring the well-being of the population.

Keywords: Public health, autonomy, collective good, justice, equity.

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Correspondence to:

Ramesh P Aacharya

P. O. Box 8844, Kathmandu, Nepal.

Email: raacharya@yahoo.com

BACKGROUND

Public health ethics is a field of study and practice that examines ethical issues arising in public health policies and practices. It involves applying ethical principles and values to decision-making in public health at various levels, from local communities to global populations. It guides policymakers, healthcare professionals, researchers, and communities in navigating complex ethical challenges to promote health and well-being effectively and equitably. It draws on principles from bioethics, political philosophy, and human rights to inform decision-making that impacts populations at large.

Public health ethics, while critical, has often been a neglected or underemphasized area within healthcare compared to clinical ethics or medical research ethics. This neglect can have significant implications for the effectiveness and fairness of public health interventions.

Public health ethics has firmly established as an area of lively academic activity with a growing list of engaged participants across the globe. [1] The COVID pandemic has further emphasized that public health is part of everyone's lives.

Public health ethics applies the healthcare principles through professional ethics to foster care and build strong relationships. [2] Public health ethics including the concept of mutuality which is specified by the notions of interdependent concern and care. [3] The mutuality emphasizes shared responsibility, concern, and care between individuals and the community, recognizing that everyone's well-being is interconnected.

Principle based domains – clinical care versus public health

Principle-based domains in ethics refer to frameworks or categories that guide ethical decision-making based on core principles that are consistent and justifiable. These principles help to structure and navigate complex ethical dilemmas by providing a foundational approach to evaluating and resolving moral issues. In public health and healthcare ethics, these domains typically include:

1. **Respect for Autonomy:** This principle recognizes and honors individuals' right to make their own decisions and to be self-governing. In clinical care, this involves ensuring informed consent, respecting patient choices, respecting cultural and religious beliefs and providing the necessary information for decision-making. In public health, it requires balancing individual rights with the collective well-being of the community with community health measures. It addresses conflicts between individual autonomy and public health measures, such as quarantine, use of masks or vaccination mandates, where public health benefits may sometimes outweigh individual preferences. [4]

   Public health deals with extensive data and therefore, it is important to protect individuals' private information and ensure that it is not disclosed without consent. Furthermore, anonymity must be maintained as far as possible. In public health, it involves balancing the need for data collection with privacy concerns and ensuring that sensitive information is handled appropriately.

2. **Beneficence:** The obligation to promote the well-being and best interests of individuals and communities. This principle involves taking actions that benefit others, such as providing effective treatments and interventions in clinical care settings but in public health, implementing effective and appropriate policies results in improved outcomes in population health. Public health interventions often involve trade-offs between individual freedoms and collective benefit. Ethicists consider how to achieve the greatest good for the greatest number while respecting individual rights.

   Ethical decision-making in public health requires accountability to stakeholders and transparency in communication. This helps maintain public trust and legitimacy in health interventions.

3. **Non-Maleficence:** The duty to avoid causing harm or injury. Healthcare professionals must avoid causing harm to patients through negligent care or ineffective treatments. In public health, it involves minimizing risks and harm associated with health interventions and policies. Public health ethics promote proactive measures to prevent harm and protect populations from health risks. This includes ethical considerations in vaccination policies, disease surveillance, and environmental health regulations.

4. **Justice:** Justice is the principle of fairness and equity in distributing benefits and burdens. In clinical settings, this involves ensuring fair access to medical care and resources. Ethical frameworks in public health emphasize the fair distribution of resources and interventions across populations. This includes addressing health disparities and ensuring equitable access to healthcare services.

Given the interconnected nature of health across borders, global health ethics addresses ethical dilemmas in international collaborations, resource allocation, and responding to global health crises.

PUBLIC HEALTH ETHICS IN NEPAL

Public health ethics in Nepal emphasize the need to improve health and well-being while respecting people's rights, promoting fairness, and being accountable in public health decisions. Similar to other countries, it deals with various ethical issues and challenges unique to Nepal's healthcare system and context.

1. **Cultural sensitivity:** Cultural sensitivity in public health ethics goes beyond simply respecting diversity; it involves actively integrating cultural understanding into public health practices to enhance health outcomes and promote equity.[5] It is a crucial component of public health ethics, particularly in diverse and culturally rich countries like Nepal. Understanding and integrating cultural perspectives into public health practices can enhance effectiveness, respect, and equity in health interventions. Health, illness, and treatment beliefs are often deeply embedded in cultural and religious traditions, shaping how individuals perceive and react to health interventions.

Health interventions should be tailored to fit cultural practices and values, ensuring they are both respectful and relevant. For instance, vaccination campaigns may need to take local health customs into account. Furthermore, informed consent should be obtained in a way that aligns with cultural norms and communication styles, respecting the local context.

In Nepal, public health initiatives are both ethically sound and effective, gaining acceptance from the communities they serve. Public health ethics emphasizes the need to respect cultural norms, beliefs, and practices when implementing health interventions. This involves ensuring that healthcare services are culturally sensitive and tailored to local contexts, enhancing their acceptability and effectiveness.

2. **Equity and Access to Healthcare:** Nepal faces considerable challenges in ensuring equitable access to healthcare, particularly in rural and remote areas. Public health ethics in Nepal emphasize the importance of developing policies and interventions that tackle disparities stemming from geographic, economic, or social factors, ensuring that all populations, including marginalized communities and ethnic minorities, have access to essential health services. Resource allocation should be conducted in a way that respects cultural values and fairly prioritizes the needs of diverse communities, particularly vulnerable populations. [6] Special situations like disasters and pandemics need special consideration on equity and access.
3. **Community Engagement:** Involving local leaders and community members in decision-making processes to ensure that public health strategies are culturally sensitive and more effectively address community needs. Furthermore, establishing mechanisms for communities to provide feedback and voice their concerns about health interventions promotes participation and collaboration. For example - collaborating with traditional healers or local religious leaders to promote vaccine acceptance.
4. **Ethical practices on public health research:** It is essential to conduct research involving local populations with cultural sensitivity, ensuring that consent is obtained appropriately and local practices are respected. In a public health emergency, when multiple ethics reviews of clinical and vaccine trials are conducted, transparent communication between the Ethical Review Board (ERB) or Institutional Review Committees involved in the process is crucial. [7] In addition, it should be ensured that the benefits of research are shared with the communities involved, and that research findings are disseminated and utilized to address local health needs.
5. **Public Health Messaging:** Crafting of health messages should be linguistically appropriate and culturally relevant. This might involve using local languages and respecting cultural norms in public health campaigns. Stigma associated with certain health conditions should be addressed and overcome through culturally sensitive education and communication strategies. For example - Integrating traditional practices with modern healthcare in maternal and child health programs like birthing center, ensuring that cultural beliefs about childbirth and child-rearing are respected while providing essential medical care.
6. **Infectious Disease Control:** Nepal faces challenges from infectious diseases like tuberculosis, malaria, dengue fever, cholera, and emerging threats such as COVID-19. Public health ethics should guide decisions on disease surveillance, prevention strategies, vaccination programs, and treatment protocols, ensuring a balance between public health objectives and individual rights and privacy.
7. **Healthcare Governance and Policy:** Public health ethics plays a crucial role in shaping healthcare governance and policy formulation in resource constrained countries like Nepal. Ethical principles such as transparency, accountability, and fairness guide decisions on healthcare financing, resource allocation, and regulatory frameworks to ensure that health systems are responsive and equitable.

DISASTER ETHICS IN NEPAL

Nepal's distinct geographical and socio-economic context presents particular challenges and ethical considerations in disaster response. The country is highly vulnerable to natural hazards such as earthquakes, floods, landslides, and glacial lake outburst floods, which necessitate careful ethical deliberation across various domains, from emergency response to long-term recovery.

Ethical Response to Vulnerable Groups: Addressing the needs of vulnerable populations—such as children, the elderly, individuals with disabilities, and those with pre-existing health conditions—is a critical aspect of ethical disaster response. It is also essential to protect these groups from exploitation or abuse during the chaos of disaster situations.

Distributive Justice: Ethical decision-making in disaster scenarios involves triaging and prioritizing care, particularly when allocating scarce medical resources. This requires balancing the urgent needs of immediate disaster relief with planning for long-term recovery and maintaining flexibility in resource allocation.

The response to the 2015 Nepal earthquake underscored ethical challenges related to resource distribution, as some regions received more aid than others. Ensuring equitable distribution of assistance was a major concern. While efforts were made to respect local customs in rebuilding, aligning international aid with local needs and practices posed difficulties. [8]

In flood-prone areas, integrating local knowledge about flood patterns and traditional coping mechanisms into disaster preparedness plans is crucial for enhancing resilience. It is important to ensure that evacuation plans and relief efforts are conducted with careful consideration of vulnerable populations, upholding ethical standards of fairness and respect.

PUBLIC HEALTH ETHICS DURING COVID-19

Public health ethics during the COVID-19 pandemic presented complex and often challenging issues. Balancing individual rights with community welfare, ensuring equitable access to resources, and maintaining transparency were central concerns. [8] Some of the key ethical considerations that emerged during COVID-19 are discussed here.

1. **Balancing Individual Rights and Public Safety:** Implementing restrictions on movement and social interactions measures like quarantines and lockdowns raised questions about the extent to which individual freedoms could be restricted for the sake of public health. This was an important component of public health ethics. After the availability of vaccines, debates arose over whether governments could or should mandate vaccines, balancing public safety with personal autonomy. In the absence of a vaccine or adequate treatments, societies fall back upon some of the oldest and simplest forms of infectious disease control like quarantine, isolation, physical distancing, the creation of barriers at borders. [9]
2. **Resource Allocation:** With limited healthcare resources particularly ICU beds, ventilators, and other critical resources, ethical decisions were needed about how to allocate these resources fairly and effectively. Similarly, deciding who gets priority for vaccination -healthcare workers, high-risk populations, or the public - required ethical considerations about equity and justice.
3. **Equity and Access:** The pandemic highlighted and often exacerbated existing inequalities in healthcare access. Addressing these disparities was crucial in ensuring fair treatment and outcomes for all populations. The economic consequences from lockdowns and other restrictive measures disproportionately affected marginalized communities, raising ethical concerns about how to support those most affected. Patients and their contacts, people on quarantine and even hospital staff dealing with testing or working in hospitals, isolation wards or quarantine centers were stigmatized as 'possibly infected' and even denied food and accommodation [10]. In the context of COVID-19, the stigmatization and shaming of Japanese healthcare providers persisted as human rights issues that impact the safety and well-being of everyone. [11]
4. **Transparency and Communication:** Effective public health responses required clear, honest communication about the risks and uncertainties associated with COVID-19. Misinformation and lack of transparency could undermine public trust and compliance with health guidelines. The use of contact tracing and other surveillance tools raised concerns about privacy and the potential misuse of personal data.
5. **Global Solidarity:** The pandemic underscored the need for global solidarity and cooperation, with ethical considerations about sharing resources including vaccines, and information across borders. Ensuring that low-income countries had access to vaccines and treatments was a significant ethical issue, emphasizing the need for equitable global health strategies.
6. **Ethical Research Practices:** The rapid development of vaccines and treatments required balancing speed with rigorous scientific evaluation to ensure safety and efficacy. While obtaining informed consent, ensuring that participants in vaccine clinical trials were fully informed and understood the risks was a critical ethical consideration.

Navigating these ethical challenges required careful consideration of values such as justice, equity, and the common good, and often involved making difficult trade-offs in the face of exceptional circumstances.

THE WAY FORWARD

Contemporary issues in public health ethics are diverse and complex, reflecting evolving societal values, advancements in technology, and ongoing challenges in health equity.

1. **Integration into Education:** Incorporating public health ethics into healthcare and public health education and training programs to ensure that professionals are well-prepared to handle ethical challenges. Health equity and social determinants of health such as socioeconomic status, education, and access to healthcare reducing health disparities need to be emphasized.
2. **Development of Guidelines:** Creating and disseminating standardized ethical guidelines and frameworks specifically for public health practice to

provide clarity and consistency. Examples include equitable health policy guidelines, data privacy guidelines etc. The rise of digital health tools and electronic health records causes ethical concerns about the privacy and security of personal health data.

3. **Promoting Research:** There is a scope to promote research focused on ethical issues in public health to develop evidence-based approaches and solutions. Priority areas of research include the health impacts of climate change, the effects of extreme weather events, air pollution, and changing disease patterns.

4. **Public Engagement:** Enhancing public awareness and engagement with public health issues and the ethical considerations involved to foster informed discussions and support. To ensure public engagement, strategies should be developed for transparent and effective communication to tackle public concerns. For example - addressing misinformation and disinformation like rumors about vaccines and other health measures is critical for maintaining public trust and promoting vaccine uptake. Similarly, integrating the policies on environmental sustainability into public health facilitates mitigation of potential adverse effects on health.

5. **Policy Emphasis:** Ensuring that ethical considerations are integrated into public health policy development and implementation to promote fair and equitable health interventions. For example - ethical issues related to advances in genetic editing, fertility treatments, and reproductive technologies, including concerns about equity, consent, and potential societal impacts. This incorporates the ethics of collecting, storing, and using biological samples for research, including issues of consent and data privacy. Another example can be evaluating the ethical implications of resource allocation policy on different populations and ensuring that it does not affect vulnerable groups disproportionately.

These issues reflect the dynamic nature of public health ethics as new challenges and technologies emerge, requiring ongoing dialogue and adaptation to ensure that public health practices uphold ethical principles and promote health equity.

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Community-Based Approach to Clinical Trials: Insights and Challenges from COVID-19 Vaccine Trials in Nepal

Khem B Karki[1] Dina Pradhan[2] Stela Shakya[2] Ajit Acharya[2]

SUMMARY

Vaccine trials in Nepal are not a new phenomenon. However, following the COVID-19 pandemic, there were several vaccine trials for COVID-19 vaccines in Nepal. Unlike previous trials, COVID-19 vaccine studies required swift and large-scale enrollment from communities. These trials aimed to recruit healthy individuals to evaluate the safety and efficacy of the vaccines in preventing the targeted disease.

In clinical trials other than vaccines, researchers can enroll patients with specific medical conditions with their consent from the hospital. In contrast, vaccine trials require researchers to recruit healthy volunteers primarily found in community settings. Recruiting healthy individuals from these communities is challenging because it involves navigating various layers of community stakeholders who must be supportive and grant permission for participation. Therefore, community-wide engagements crucial for the success of vaccine trials.

Communities need to be fully informed and positively engaged, despite potential negative influences from media and misconceptions about the trials. Despite these challenges, effective community interventions and engagement resulted in the successful enrollment of up to 4,600 participants across three trial centers within just two months.

Conducting the clinical trial in Nepal with a community-based approach has been enriching and effective. This strategy facilitated smooth implementation and deepened connections with the local population. Engaging with community leaders, stakeholders, and members helped overcome challenges such as participant recruitment and adverse event management. The active involvement of community members in various trial stages fostered trust, cooperation, and empowerment. This experience underscored the importance of community engagement, cultural sensitivity, and collaboration in achieving successful and sustainable clinical research, inspiring us for future endeavors.

Key Words: Vaccine trial, clinical trial, community-based approach, COVID-19, Nepal.

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Check for updates

[1] Department of Community Medicine and Public Health, IOM TU, Kathmandu, Nepal
[2] Society for Local Integrated Development Nepal (SOLID Nepal), Lalitpur, Nepal

Correspondence to:
Khem B Karki
Department of Community Medicine and Public Health,
Institute of Medicine (IOM),
Tribhuvan University (TU)
Kathmandu, Nepal
khemkarki9n@gmail.com

INTRODUCTION

A clinical trial is any research study that prospectively assigns human participants or groups of humans to one or more health-related interventions to evaluate the effects on health outcomes. Interventions include but are not restricted to drugs, cells and other biological products, surgical procedures, radiological procedures, devices, behavioral treatments, process-of-care changes, preventive care, etc. (1,2) The definition indicates that a Vaccine Trial is a specific type of clinical trial. Vaccine trials aim to determine the safety, effectiveness, and potential side effects of a new vaccine. These trials follow rigorous protocols to ensure that the vaccine provides

adequate protection against a particular disease and is safe for public use. Therefore, it can be said that all vaccine trials are clinical trials.

In general, health-related interventions/trials encompass a wide range of measures such as drugs, vaccines, surgical procedures, devices, behavioral treatments, educational programs, dietary interventions, quality improvement interventions, and process-of-care changes. These interventions aim to bring about modifications in health-related outcomes. Typically, the implementation of most of these interventions/trials occurs within a hospital-based setting. Hospitals, acting as central hubs for healthcare, have multidisciplinary teams of medical experts, including physicians, nurses, paramedics, lab technicians, and more. (3) This setting also provides the necessary infrastructure for of executing clinical trials. Moreover, hospitals attract patients from diverse backgrounds and demographics, serving as a valuable asset in clinical trials. This diversity allows researchers the opportunity to examine the impact of interventions across a broad spectrum of populations. (4)

In the areas of clinical trials, the trials related to drugs, procedures, or any equipment are typically focused on evaluating the safety and efficacy of the products in patients with specific medical conditions. These trials are conducted in hospital settings, where individuals with the targeted health conditions seek medical care. Patients visit the hospital, where researchers enroll them in the study after obtaining their consent. (5) In contrast, vaccine trials are often carried out in a healthy population, frequently within university and community settings. In a university setting, the researcher typically posts a trial notice on university website or notice board, and interested students voluntarily enroll themselves in the trial after expressing their interest. Similarly, in community settings, the researchers use IEC brochures and other media to inform and enroll the participants in the trial. (6)toxicity, safety, and pharmacokinetics of the drug decide whether it goes for the clinical trial. Clinical trial of a drug is executed in four different phases (phase I, II, III, and IV

COVID-19 VACCINE TRIALS IN NEPAL

Several vaccine trials have been conducted in Nepal, primarily by the Institute of Medicine TU, Kathmandu University and its collaborators, as well as by the Society for Local Integrated Development Nepal (SOLID Nepal) and its partners. SOLID Nepal, a national NGO focused on health, carried out two vaccine trials, enrolling 1,200 and 4,600 healthy volunteers, respectively within a very limited span of time.

The selection criteria required participants to be unvaccinated and free from prior COVID-19 infection, making it challenging to find a large enough pool of eligible participants in urban areas, where many had already received COVID-19 vaccinations. As a result, the trials had to be conducted in rural and community settings, where a more diverse participant pool could meet the specific enrollment criteria outlined in the protocol. Therefore, SOLID Nepal opted to conduct the vaccine trials in rural areas, partnering with local organizations that had longstanding relationships with the community. New trial sites were also established near these communities, leading to the expansion of vaccine trial sites to the Chitwan, Jhapa, and Sunsari districts of Nepal. This expansion marked a significant milestone in the field of clinical trials in the country.

Experience in community and the challenges

Since vaccine trials were a new initiative in Nepal, local organizations and bodies lacked sufficient knowledge in this area, making it challenging to find suitable partners and community mobilizers. Even explaining the concept to local authorities was a challenging task. Acknowledging the sensitivity of conducting trials in regions with limited education and information, SOLID Nepal established partnerships with three local organizations in the selected districts. The main goal of this collaboration was to engage local community actors in raising awareness and informing potential participants about the clinical trial process. Social mobilizers were recruited and trained on the vaccine trial, the overall project, and their specific roles and responsibilities. Additionally, the established sites were prepared for vaccination, and the necessary human resources were trained accordingly.

Participants recruitment

Upon project initiation, the study faced the massive challenge of finding participants meeting the criteria set by the study protocol. Many participants were disqualified during screening at the vaccination sites due to non-compliance with the inclusion criteria specified in the protocol. Additionally, even though the participants met the criteria, the hesitancy to participate in the clinical trial was prevalent in the community. A high number of participants refused vaccination even after signing the informed consent, which we respected the decision made by the participants.

However, an alternative approach was adopted to address the challenge of screening failure at the vaccination site, involving the preliminary screening conducted within the community by organizing a health camp. This approach aimed to identify and bring the participants who fulfilled the inclusion criteria to the designated vaccination sites. This approach was successfully implemented and proved efficient in managing the participants. Also, the implementation of this approach not only facilitated the identification of eligible participants but also played a crucial role

in addressing health issues within the community and helped uncover health problems among individuals who were previously unaware, enabling early management of these issues. Identified individuals were promptly referred to hospitals or health centers for further medical attention. Through effective mobilization via health camps and strong coordination between the trial sites and partner organizations, the recombinant two-component COVID-19 vaccine (Recov) trial successfully enrolled 4,607 participants, including 314 specifically in the immunogenicity group. Similarly, another trial for the recombinant COVID-19 vaccine (Sf9 cell) successfully enrolled 1,269 participants.

Follow-up, monitoring and reporting

Following the enrollment, the trained social mobilizers maintained regular contact with participants daily, conducting thorough follow-ups to monitor any solicited or unsolicited events. In case of any events, the social mobilizers promptly communicated with physicians at the sites, ensuring necessary and immediate management while prioritizing the participants' health. After administering three consecutive doses of vaccines spaced 21 days apart, the follow-up process was extended for up to six months for vaccinated participants. Any instances of Severe Adverse Events (SAEs) were promptly addressed and reported to the sponsor, the Ethical Review Board of Nepal Health Research Council (NHRC), and the Department of Drug Administration (DDA). Moreover, detailed information regarding each SAE was presented to the Data Safety and Monitoring Board (DSMB) to determine its relation to the study vaccine. The decisions of the DSMB were then submitted to the sponsor, NHRC, and DDA respectively, ensuring a comprehensive and transparent approach to safety monitoring in the study.

Management of severe adverse events (SAEs)

Serious Adverse Events (SAEs) are critical occurrences that encompass severe side effects, hospitalization, persistent disability or incapacity, congenital anomaly/birth defects, life-threatening situations, or even death. Given the size of this trial, management of the SAE cases was also a challenging task. For the immediate response and management of any kind of SAE, Our three site hospitals had standby medical staff to address such emergencies and a robust referral system was in place as per the requirement. All participants and their social mobilizers were strictly instructed to seek the nearest medical support and notify site investigators in the event of SAEs immediately. All SAE cases were thoroughly examined and tested to identify their relation with the study vaccine and the reports were thoroughly discussed in the DSMB meetings. The social mobilizers and communities collaborated extensively to report and address any adverse events experienced by the participants. The trail projects received strong support in the management of these issues.

Media management

Another challenge we faced was media reporting. Some reputable outlets claimed that marginalized communities were being targeted in the clinical trials, despite these articles being groundless. This caused significant rumors within the communities, leading to fear among participants and eroding trust in our study team from local representatives. To address the situation and rebuild trust, we held meetings with local representatives, community members, and participants. Similarly, media advocacy was conducted to clarify the process of clinical trials. The trial projects organized workshops and meetings with journalists to clarify the issues surrounding clinical trials. Over time, the media recognized that clinical trials ultimately benefit people and began advocating for them. From this experience, we learned the importance of proactive communication with the media to prevent misinformation and minimize misunderstandings.

Endpoint collection

The collection of endpoint cases was another important yet challenging issue in this trial as there was a provision for self-antigen test in the protocol. However, a substantial number of participants faced difficulties in conducting these tests on their own. To address this, social mobilizers underwent training and were actively involved in administering the antigen tests. The process of collecting endpoint cases involved regular communication initiated by social mobilizers who closely monitored participants for any indications of COVID-19 infection. Additionally, participants were instructed to promptly reach out to social mobilizers if they experienced any symptoms associated with COVID-19. Ultimately, a total of 210 potential endpoint cases were identified across three different sites. This extraordinary achievement was made possible solely through our strong community engagement.

Hindrances from the law enforcement agency

Despite the significant success of community participation in the trial, the social mobilizers faced various hurdles from law enforcement agencies at the community level. To facilitate endpoint collection, our team set up mobile health camps at the community level. These camps included home visits where antigen tests were conducted, medical check-ups were performed, and medications were dispensed. If an antigen test was positive, the swabs were collected for polymerase chain reaction (PCR) for further analysis. However, during one operation, two of our social mobilizers were detained by local armed forces. Despite our attempts to explain the situation, we struggled to convince the authorities, leading to the detention of our mobilizers and the seizure of our vehicle.

LESSONS LEARNT

Conducting the clinical trial in Nepal using a community-based approach has been an enriching and multifaceted experience. The utilization of a community-centric strategy has not only facilitated the smooth implementation of the trial but has also fostered a deeper connection with the local population. Engaging with the community has proven instrumental in overcoming various challenges, from participant recruitment to management of adverse events. The collaborative efforts with local leaders, stakeholders, healthcare practitioners, and community members have enhanced the trial's credibility and acceptance. This approach has allowed us to build trust within the community, leading to a higher level of participant cooperation and enthusiasm.

The active involvement of community members in various stages of the trial, including the dissemination of information, participant monitoring and follow-up and feedback collection, has not only contributed to the trial's success but has also empowered the local community This empowerment is reflected in the sense of ownership and pride expressed by community members who see themselves as integral contributors to advancing medical knowledge.

In conclusion, the experience of conducting the clinical trial in Nepal using a community approach has been holistic and rewarding. It has highlighted the importance of community engagement, cultural sensitivity, and collaborative partnerships in ensuring the success and sustainability of clinical research endeavors in diverse settings.Top of Form

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Black-Letter Methodology in Public Health Research

Arjun Aryal[1]

SUMMARY

In comparison to other public health disciplines, such as epidemiology and social sciences, the significance of law in promoting population-level health advances is relatively underutilized and less well-studied. Black-letter methodology, also known as doctrinal research, traditionally used in legal studies, focuses on the systematic analysis of legal texts and statutes. Black-letter methodology indicates the fundamental components of legal study that are not subject to dispute or uncertainty. It is generally recognized by the majority of justices in a specific jurisdiction. The fundamental sources of law, such as legislation, are the focus of the black-letter analysis. In public health, the objective of black-letter methodology is to acquire an understanding of the ways in which the legal determinants, including various laws, procedures, systems, and provisions, affect the health of the people involved. This methodology can be adapted to public health research to examine the impact of laws and regulations on health outcomes. This viewpoint explores the application of the black-letter methodology in public health, highlighting its potential to provide robust insights into the legal determinants of health.

Keywords: Black letter methodology, doctrinal research, public health, legal determinants of health, health, Nepal

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Check for updates

[1] Central Department of Public Health, Tribhuvan University, Institute of Medicine, Kathmandu, Nepal

Correspondence to:
Arjun Aryal
Central Department of Public Health, Tribhuvan University, Institute of Medicine, Kathmandu, Nepal
Email: drarjunaryal@gmail.com

INTRODUCTION

Public health is one of the significant disciplines taught in in different universities in the world. In Nepal, the master's degrees related to public health include a Master in Public Health (MPH), Master in Public Health Nutrition (MPHN), and Master in Health Promotion and Education (MHPE), among others, and constitute research methodology and thesis or dissertation as mandatory courses. (1) The epidemiological and social research methodologies are frequently discussed in these public health-related research courses and the thesis or dissertation whereas legal research methodologies are rarely used in public health. In addition to and empirical studies, the black-letter methodology, which is also known as doctrinal studies is frequently used in legal research. (2, 3) Empirical research methodologies are also incorporated in public health research, but the black-letter research methodology, the powerful and useful research methodology for public health, is usually not practiced in public health research. It is rarely discussed in public health research courses, and hardly appears in the public health thesis or dissertation in our context.

The concept of the black-letter research methodology is explained as the rules that are generally well-known and free from doubt or dispute, as the term black-letter law is associated with the letter-of-the-law, which denotes a court's literal interpretation of the law. The black-letter methodology is a legal study system that simplifies case law from common law societies into reusable rules, which can be applied to

any set of facts to form consistent outcomes. (3) Black-letter methodology is a research methodology that is frequently implemented in the field of legal studies. It involves the meticulous investigation and analysis of legal sources in order to interpret and understand legal principles, rules, doctrines, and their practical applications. (4) Black-letter methodology, with its emphasis on the detailed analysis of legal texts, offers a structured approach to understanding these legal determinants.

While the black-letter methodology is commonly used in legal disciplines like contract, tort, and property law, its scope should be expanded to study the legal determinants of public health outcomes. Public health research often intersects with legal frameworks, as laws and regulations significantly influence health outcomes. As the black-letter methodology involves the systematic examination of statutes, case law, and legal principles to assess their impact, it is, therefore, paramount to explore the scope and application of black-letter methodology in public health research.

BRIEF HISTORY OF BLACK-LETTER LAW

The concept of black-letter law was developed as a result of the practice of composing legal precedent and law texts in Gothic black-letter type. This was a custom that endured the transition to Roman and italic text for all other printed works. Because it had become synonymous with the law of England, the robust, black Gothic font was maintained in English law. (5) The legal profession did not adopt Roman letters until the mid-19th century. This was not merely a fashion trend; rather, it was an effort to enhance the accessibility of the law for the general populace.

KEY CHARACTERISTICS OF BLACK-LETTER METHODOLOGY

The black-letter methodology can be characterized in the following points: (i) The black-letter methodology in legal research heavily focuses on the law itself as a set of principles accessed through court judgments and statutes, with little reference to external factors; (ii) It involves deriving principles and values from decided cases and organizing them into a coherent framework; (iii) Traditional legal scholarship has followed this approach, emphasizing order, rationality, and theoretical cohesion; (iv) The black-letter methodology is contrasted with non-traditional, interdisciplinary research projects; (v) It relies on using primary and secondary legal sources like court judgments and statutes to explain the law; (vi) Legal research skills taught in this approach include identifying legal context, analyzing legal issues, applying legal provisions to facts, and presenting research findings clearly. (6,7)

APPROACH OF BLACK-LETTER METHODOLOGY

Blackletter law specifically denotes areas of the law that are primarily composed of technical principles, as opposed to areas of the law that are defined by a more conceptual premise. Contracts, torts, and land law are all examples of blackletter law. The black-letter methodology involves several key steps. (4, 5, 6)

Data collection

In contrast to empirical legal research, data acquisition in black-letter methodology is comparable to literature review. It utilizes both primary and secondary data sources. The identification of keywords and the development of review parameters, as well as the sources and methods of information acquisition, are crucial. The library functions as the laboratory for this type of investigation.

Scientific justification

Regrettably, numerous academicians who implement black-letter methodology in their research frequently fail to articulate a transparent and unambiguous rationale for their findings. It is essential to rectify these deficiencies in order to improve the efficacy of legal research. Scholars who are involved in black-letter research methodology should prioritize the development of a structured and rigorous approach for their research in order to address this issue. The process must be rendered more transparent and reproducible by providing a comprehensive articulation of the underlying principles and criteria that guide their analysis. This method not only enhances the credibility of their research but also facilitates the general progress of legal scholarship.

Data analysis

The black-letter research may implement an assortment of analytical methodologies, including the systematic review and interpretation of judicial decisions or case law to deduce insights and conclusions about legal principles, rules, and their application, which is known as case law analysis. The effective contextualization and analysis of identified case laws are ensured by the predefined parameters and keywords.

The social, political, and cultural dynamics that highlight the legislative processes or policy implementation can be revealed by researchers through discourse analysis. It is particularly relevant in the context of political power dynamics involved in the creation and execution of law, as it is instrumental in discerning not only the overt content but also the covert notions, underlying assumptions, ideologies, and meanings.

In the field of legal research, content analysis is a methodological and unbiased approach to the

examination of written, verbal, or visual material in order to derive conclusions and gain insight into legal issues, trends, or patterns within a particular context. It is a valuable research technique that is extensively employed by legal scholars, researchers, and practitioners to investigate a variety of legal materials, including legal documents, court cases, legislation, and regulations.

Also, in public health research, the black-letter methodology can be utilized for analyzing and understanding the legal determinants of public health practices. It includes : (i) Identification of relevant legal texts: This covers statutes, regulations, case law, and legal commentaries relevant to the public health issue under study; (ii) Systematic analysis: Detailed examination of the legal texts to identify key provisions, principles, and interpretations; (iii) Contextual interpretation: Understanding the legal texts within the broader socio-political and economic context; (iv) Impact assessment: Evaluating the implications of the legal texts on public health outcomes. (6, 7)

STRENGTHS AND LIMITATIONS OF THE BLACK-LETTER METHODOLOGY

The black-letter methodology is characterized by the detailed examination of legal texts, such as statutes, regulations, case law, legal treatises, and commentaries, in order to derive insights and draw conclusions. It provides invaluable insights into legal doctrines, legal systems, and legal reasoning, thereby making a substantial contribution to the advancement of legal theory and practice, the development of legal principles, and legal scholarship. (4, 6)

Strengths

The black-letter methodology has several advantages, especially in providing clarity and predictability within the legal matters and provisions of a system: (i) Clarity and certainty: The black-letter methodology emphasizes the importance of clear and well-defined laws. This ensures that individuals and entities can understand the legal implications of their actions, leading to greater compliance and fewer legal disputes. (ii) Predictability: By focusing on established legal principles and statutes, this methodology allows for more predictable outcomes in legal cases. This predictability is crucial for individuals and businesses to plan their activities within the legal framework. (iii) Efficiency: A black-letter methodology streamlines the legal process by reducing the need for extensive interpretation and debate over the meaning of laws. This can lead to quicker resolutions of legal issues and lower legal costs. (iv) Consistency: This methodology promotes consistency in legal decisions, as judges and lawyers rely on the same set of established rules and principles. Consistency is important for maintaining fairness and equality before the law. (v) Legal Stability: By adhering to established laws and precedents, the black-letter methodology contributes to the stability of the legal system. This stability is essential for maintaining public trust and confidence in the legal system. (vi) Limitation of judicial discretion: The black-letter methodology limits the scope of judicial discretion, ensuring that judges do not deviate significantly from established laws. This can prevent arbitrary or biased decisions and uphold the rule of law. (vii) Alignment with codified laws: In areas where laws are codified, such as the criminal code in Nepal, the black-letter methodology ensures that individuals are only punished for actions that are clearly defined as crimes. This prevents retroactive punishment and upholds the principle of legality.

Limitations

The black letter methodology, which focuses on the literal interpretation of legal texts, can lead to a narrow understanding of the law and overlooks broader context and underlying principles. It can restrict the context to equip students with practical application skills, limiting their understanding of legal principles. The black-letter methodology is a limited approach to legal analysis due to its inability to adapt to changing legal systems. It may force the learners to memorize large amounts of facts and exceptions related to laws, which lacks depth in teaching students how to apply their knowledge.

APPLICATIONS OF THE BLACK-LETTER METHODOLOGY IN PUBLIC HEALTH

The black-letter methodology, traditionally used in legal research, has also been found to be applicable to public health research. It is the most appropriate research methodology for comparative studies, historical research, and jurisprudential research. (4, 7) This methodology focuses on the analysis of existing laws, regulations, and case law to understand their implications and effectiveness. To support this viewpoint, some of examples of applications of black-letter methodology in public health research are presented in this section.

Addressing anti-black racism in public health: A study analyzed legal frameworks and policies addressing anti-black racism within public health systems in North America. The study followed a structured approach to identify relevant laws and assess their impact on public health outcomes. (8)

Doctrinal legal method in health law: This method has been applied to explore the assumptions, commitments, and shortcomings of health laws. Researchers have used it to critically analyze the legal texts and their practical implications in public health. (9)

Guidance on reporting race and ethnicity: The methodology has been employed to review and provide updated guidance on the reporting of race and ethnicity in medical and science journals. This includes analyzing existing guidelines and their application in public health research. (10)

We can apply the black-letter methodology in public health research in various ways: (i) The black-letter methodology, which emphasizes analyzing legal rules and authorities, can be applied in public health research to examine and interpret health laws and regulations; (ii) Researchers can use this approach to understand the legal context surrounding public health issues, identify relevant legal provisions, and analyze how these laws impact public health practices and policies; (iii) By applying the skills of legal research such as identifying legal issues, analyzing legal provisions, and presenting research findings, researchers can contribute to the understanding of the legal framework governing public health initiatives and interventions; and (iv) The black-letter methodology can help in evaluating the effectiveness of public health laws, suggesting improvements for legal frameworks, and providing recommendations for enhancing public health outcomes through legal means.

To illustrate the application of the black-letter methodology in public health, we can consider the analysis of tobacco control laws. By systematically examining the legal texts related to tobacco regulation, researchers can assess the effectiveness of these laws in reducing smoking rates and improving public health. This approach can also identify gaps in the legal framework and suggest areas for reform.

IMPLICATIONS OF BLACK-LETTER METHODOLOGY IN PUBLIC HEALTH RESEARCH

The black-letter methodology provides a rigorous framework for analyzing the legal determinants of health. It allows researchers to systematically assess the impact of laws and regulations on public health outcomes. Public health research in Nepal, as in many other developing and developed countries, is predominantly focused on epidemiological and social research methodologies. These methodologies are integral to understanding and addressing the multifaceted health challenges faced by populations. However, there is a notable gap in the inclusion of legal research methodologies, particularly black-letter methodology, in public health research curricula and practice. It is therefore essential to incorporate black-letter methodology or doctrinal research in public health research for several reasons:

(i) Studying the legal determinants of public health

Understanding the legal determinants of public health is crucial for comprehensively addressing health disparities and promoting health equity. Legal determinants encompass the laws, regulations, and policies that influence health outcomes and access to healthcare services. By applying the black-letter methodology, public health researchers can systematically examine these legal determinants to identify how they impact various populations, particularly marginalized and vulnerable groups. This analysis can reveal legal barriers to health, such as discriminatory laws or inadequate legal protections, and provide evidence for advocating necessary legal reforms. Moreover, studying legal determinants helps in understanding the broader social determinants of health, as legal frameworks often shape social conditions like housing, employment, and education. Integrating this perspective into public health research ensures that interventions are not only scientifically sound but also legally and socially just, ultimately leading to more effective and equitable public health strategies.

(ii) Bridging the gap between law and public health

The black-letter methodology involves the systematic analysis of legal texts, statutes, and case law. Public health is inherently interdisciplinary, and legal frameworks play a crucial role in shaping health policies, regulations, and interventions. By incorporating the black-letter methodology, public health researchers can critically analyze existing laws and policies, identify legal gaps, and propose evidence-based legal reforms to enhance public health outcomes.

(iii) Enhancing policy development and implementation

Effective public health policies require a robust legal foundation. The black-letter research can provide a detailed understanding of the legal context within which public health operates. This understanding is essential for developing policies that are not only scientifically sound but also legally enforceable and sustainable. By integrating the black-letter methodology into public health research, scholars can contribute to the creation of comprehensive policies that address both health and legal considerations.

(iv) Addressing emerging public health challenges

The dynamic nature of public health challenges, such as pandemics, environmental health issues, and non-communicable diseases, necessitates a flexible and responsive legal framework. The black-letter research can help identify legal precedents and frameworks that have been effective in other contexts, facilitating the adaptation of these frameworks to address new

and emerging health threats. This proactive approach can enhance the preparedness and resilience of public health systems.

(v) Promoting interdisciplinary collaboration

Incorporating black-letter methodology into public health research fosters interdisciplinary collaboration between public health professionals and legal experts. This collaboration can lead to a more holistic understanding of health issues and the development of innovative solutions that are informed by both public health science and legal principles. Such interdisciplinary efforts are crucial for addressing complex health challenges that require multifaceted approaches.

(vi) Strengthening public health education

The incorporation of the black-letter methodology in public health curricula can enrich the educational experience of public health students. It equips them with the skills to critically analyze legal documents, understand the legal implications of public health interventions, and advocate for legal reforms that promote health equity and justice. This kind of integrated education prepares future public health professionals to navigate the legal dimensions of their work effectively.

CONCLUSION

The black-letter methodology offers valuable insights into the legal determinants of health. By systematically analyzing legal texts, public health researchers can better understand the impact of laws and regulations on health outcomes. This methodology can inform evidence-based policy development and contribute to more effective public health interventions. The integration of black-letter methodology into public health research is not merely an academic exercise but a practical necessity. It bridges the gap between law and public health, enhances policy development, addresses emerging challenges, promotes interdisciplinary collaboration, and strengthens public health education. As a faculty member in public health, advocating for the incorporation of black-letter methodology in research and curricula is a step towards more comprehensive and effective public health research and practices.

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The Nepal Journal of Public Health (NJPH) is a peer-reviewed, open-access journal dedicated to advancing knowledge and fostering innovation in the field of public health. NJPH serves as a platform for researchers, and practitioners, to share their scientific findings, experiences, and perspectives on a wide range of public health issues so as to enhance understanding, inform policy, and improve public health practices. NJPH is committed to highlighting the role of public health in addressing health disparities, enhancing health education, and promoting sustainable health practices. The journal publishes scholarly papers/articles covering both theoretical and applied research in the area of public health and especially encourages submissions that explore innovative health interventions, implementation and policy research, and collaborative health initiatives.

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1. Original Research Articles

Original research articles present new and significant findings in the field of public health. These articles should include a clear hypothesis/research question, methodology, results, and discussion, offering substantial evidence to support the conclusions drawn. Original research articles should be comprehensive, providing detailed information on the study design, participants selection/recruitment, data collection, statistical analysis, and interpretation of findings. Authors are encouraged to discuss the implications of their results for public health practice and policy.

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Review articles provide comprehensive summaries of specific topics in public health, synthesizing existing literature and offering critical analysis. These articles should highlight key trends, gaps in knowledge, and future research directions. Review articles can be systematic reviews, meta-analyses, or narrative reviews.

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Short communications are concise reports of preliminary research findings or novel techniques that are of immediate interest to the public health community. These articles should be brief yet informative, with a clear rationale, concise methods, key results, and a brief discussion of the findings.

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Case reports and case series describe unique or rare cases that provide insight into public health issues. These reports should include detailed patient information, diagnosis, treatment, and outcomes, highlighting the implications for public health practice. Case reports should offer a thorough discussion of the case, including relevant literature and the broader context of the public health issue. They should also provide lessons learned and recommendations for practitioners and policymakers.

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Editorials and commentaries offer perspectives on current public health issues, controversies, and trends. These articles are usually solicited by the editorial board but may also be submitted for consideration. Editorials should provide a concise overview of the topic, offering insights and opinions that stimulate discussion and debate. Commentaries should offer a critical analysis of recent developments in public health, highlighting their significance and potential impact.

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Use standard A4 size format with 1.5 line spacing, Arial font size 12, and 1-inch (2.54 cm) margins on all sides. Place page numbers on the top right, starting from the title page.

Title Page

The title page should include:

- Title of the manuscript
- Full names of all authors (First name, Middle name, Last name) and their affiliations
- Name of corresponding author with complete affiliation/address, phone number, and email address

Title

The title should be concise and informative, not exceeding 25 words. Avoid non-standard abbreviations. Use title case, except for articles, conjunctions, and prepositions (in 14 pt Arial font Bold). The running title should not exceed 7 words.

Abstract

The abstract should be clear and concise, not exceeding 300 words. Avoid abbreviations and references. For original manuscripts, structure the abstract with sub-headings:

- Background (Introduction, rationale, justification, ≤ 50 words)
- Objective
- Methods
- Results
- Conclusion

For review articles, viewpoints, case reports, and case series, structuring is optional.

Keywords

Provide up to four keywords for indexing purposes.

Main Text

Begin the main text on a separate page from the title page. Organize the manuscript into the following sections:

- Background
- Methods
- Results
- Discussion
- Conclusions
- Acknowledgement
- Conflict of Interest
- References

Background

Provide context and introduction to the study, including the problem's nature and significance. Clearly state the study's purpose, objectives, or hypothesis, and include relevant theoretical or conceptual frameworks if applicable. Limit: up to 300 words.

Methods

Briefly describe the study design, methods, participant selection, sites, sample size, sampling strategies, techniques, tools, data management, and analysis.

Ethical Approval

Original articles must include ethical approval details; secondary data analysis may not require this.

Results

Present results in a logical sequence using text, tables, and illustrations. Begin with the most important findings. Number and title each table, figure, and photograph. Manuscripts can include up to 6 tables and up to 3 figures/photographs (varies for case series).

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Interpret and contextualize findings, comparing them with similar studies. Discuss theoretical frameworks related to the study's findings, and provide insights, implications, and limitations.

Conclusion

Summarize main findings concisely, aligning with objectives. Provide recommendations for policy, programs, and further studies.

Acknowledgment

Include acknowledgments for contributions that do not justify authorship (e.g., technical support, funding).

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Declare any conflicts of interest, such as involvement in sponsored research or financial support from sponsors. This information is not sent to reviewers.

References

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- Theoretical paper: up to 5000 words

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Correspondence Address:

NJPH Secretariat
Central Department of Public Health, IOM, TU
Maharajgunj, Kathmandu, Nepal
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Email: editors.njph@gmail.com