

Validation of Nepali Version of Depression, Anxiety and Stress Scales (N-DASS21) among Higher Secondary School Students

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ABSTRACT

Introduction

Depression and anxiety are recognized as serious public health problems and are globally leading causes of disability in terms of total years lost due to disability. Depressive disorders often start at a young age; they reduce people's functioning and are frequently recurring. The aim of this study was to examine the reliability and validity of Nepali version of Depression, Anxiety and Stress Scales (N-DASS21).

Methods

The study was conducted during February – May 2017 among higher secondary school students from nine public schools in Kathmandu. The sample size achieved for this study was 1007, with a response rate of 94.8%. The Nepali version of the questionnaire was used for data collection. Data were analyzed for validity using confirmatory factor analysis.

Results

The internal consistency of the three subscales for the constructs was assessed using Cronbach's alpha with values obtained between 0.76 and 0.81 indicating a reliable scale. The receiver operating characteristic curves showed the area under the curve for depression and anxiety scales as 0.80 and 0.91, respectively. This indicates that the scales are accurate.

Conclusion

The Nepali version of DASS21 (N-DASS21) is psychometrically sound with good reliability and validity. It can be utilized as an instrument for measuring depression and anxiety in Nepali population.

Keywords

Anxiety, DASS-21, depression, N-DASS21, validation

Submitted

Aug 10, 2022

Accepted

Oct 27, 2022

INTRODUCTION

Stress is an experience of negative emotions developed due to physiological, biochemical, cognitive and behavioral changes.¹ Stress has both psychological and biological implications. The psychological sphere involves the subjective assessment of the ability to cope with the stressor whereas biological sphere refers to the multiple body systems that are activated and controlled by both psychologically and physically demanding situations.² If the heightened stress is prolonged, it could enhance anxiety and lead to mood disorder or depression.^{3,4}

Anxiety is an emotion characterized by feelings of tension, worried thoughts and physical changes like increased blood pressure. The prevalence of anxiety disorders based on 87 studies across 44 countries ranges between 0.9% and 28.3%.⁵

An estimated 5% of adults suffer from depression globally.⁶ Depressive disorders often start at a young age; they reduce people's functioning and are frequently recurring. Depression is among the leading causes of disability worldwide in terms of total years lost due to disability, changing from the fourth rank in 1990 to the third in 2017.⁷

The Depression, Anxiety and Stress Scales (DASS) is a set of three self-report scales developed by Lovibond and Lovibond in 1995 to measure the negative emotional states of depression, anxiety and stress.^{8,9} DASS is useful in identifying depression, anxiety and stress among the people above 14 years old.⁸ The original DASS has 42 items whereas the DASS-21 has 21 items with 7 items per sub-scale. DASS-21 is the shorter form of the DASS-42 and has been used widely to screen for symptoms at different levels of depression, anxiety and stress.

This study assessed the correlation between DASS-21 and Beck's depression and anxiety inventories as well as examined the reliability and validity of Nepalese version of DASS-21 (N-DASS21).

METHODS

A cross-sectional survey was conducted during February – May 2017 among public school students in Kathmandu district, Nepal. The study participants were male and female students aged 16 years or above studying in grades XI and XII at the time of data collection.

The optimum sample size for confirmatory factor analysis or exploratory factor analysis is 500.¹⁰ To address the effect of clustering, by taking design effect 2.0, the required sample size was calculated 1,000. At the time of data collection, there were 49 public higher secondary schools in Kathmandu district.¹¹ We randomly selected 10 schools as clusters. However, we could collect data from 9

out of the 10 selected schools because in one of the selected schools there was a vacation during our first visit and in the next visit the students were engaged in their final exams. The following were the nine schools included in the study: Ganesh Higher Secondary School, Budhanilkantha; Shitala Higher Secondary School, Bohoratar; Shivapuri Higher Secondary School, Maharajgunj; Guheshwori Higher Secondary School, Chabahil; Bishwo Niketan Higher Secondary School, Tripureshwor; Nil Barahi Higher Secondary School, Tankeshwor; Padhmodaya Higher Secondary School, Ramshahapath, Chamunda Higher Secondary School, Jorpati; and Janakalyan Higher Secondary School, Bouddha.

The inclusion of students aged 16 years or above for data collection through self-administered questionnaire was discussed in a presentation at the Institutional Review Committee (IRC) of the Institute of Medicine (IOM) which provided us the ethics approval to conduct this study. We recruited and trained three enumerators and two supervisors for the data collection. Prior to data collection, we took written permission from the principals of all concerned schools, explaining the nature and objectives of our study. Next, we sought respective class teacher's consent prior to data collection. The principals and class teachers of all schools provided us the consent to proceed with the data collection after thorough assessment of the proposal and the questionnaire. Finally, prior to taking informed consent from the students, the enumerators explained to the students the nature of the study, its rationale and the extent of participant involvement, including the explanation that the confidentiality would be maintained.

Enumerators distributed a total of 1062 questionnaires in the respective schools. Among them, 21 students did not want to participate, and 34 questionnaires were filled incomplete. The total respondents were 1007 resulting in a response rate of 94.8%. The students filled their questionnaire in their classrooms. The study investigators monitored and supervised the data collection and performed checks for quality and completeness of the filled forms.

We used self-administered questionnaire in four sections: socio-demographic characteristics of the study participants, DASS-21 related questions (N-DASS21), Beck Depression Inventory (BDI) and Beck Anxiety Inventory (BAI) related questions.

For this study DASS was translated in Nepali language from English version with reference to WHO guidelines. The process of translation was forward translation, expert panel translation, back translation and pre-test of tool.¹²

DASS-21 has 21 statements including the three sub-scales: (DASS 21-D), Anxiety (DASS 21-A), and Stress (DASS 21-S) each having seven

Table 1. Cut-off scores for depression, anxiety and stress in DASS-21

Category	Depression	Anxiety	Stress
Normal	0-4	0-3	0-7
Mild	5-6	4-5	8-9
Moderate	7-10	6-7	10-12
Severe	11-13	8-9	13-16
Extremely severe	14+	10+	17+

items. The depression scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, and lack of interest or involvement, anhedonia, and inertia. The Anxiety scale assesses autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect. The Stress scale is sensitive to levels of chronic non-specific arousal. It assesses difficulty in relaxing, nervous arousal, and being easily upset/agitated, irritable/over-reactive and impatient.⁹ Each item was measured in four point Likert scale to reflect severity that are scored from 0 to 3; 0 as never; 1 as sometimes; 2 as often and 3 as almost always. The total score of each domain was 21 and were categorized into five as shown in Table 1.⁸

The data were first cross-checked and entered in a database created in the SPSS program after the data collection. Basic demographic characteristics of the study population were first analyzed and presented as frequencies and percentages. The distribution and normality of the DASS-21 items were assessed by calculating the mean, standard deviation, skewness and kurtosis. Correlations between BDI and depression scale of DASS-21 as well as BAI and anxiety scale of DASS 21 were calculated.

We followed the guidelines outlined by Goetz et al. for the validation process and psychometric definitions, e.g., content, construct, and criterion validity.¹³ Data were analyzed for construct validity using exploratory factor analysis of principal components with Varimax rotation. Main component matrix was forced to three factors – depression, anxiety and stress. The factor loading for each item of three subscales were calculated. The internal consistency of the three subscales for the constructs was assessed using Cronbach's α . We further calculated individual item-total correlations for each subscale as correlation matrix. The area under the receiver operating characteristic (ROC) curve was calculated as the criterion validity, denoted as area under the curve (AUC) providing a measure of the ability to discriminate those without the health conditions. The ROC curves were plotted for depression and anxiety subscales against Beck depression and Beck anxiety inventories, respectively.

RESULTS

Most of the students (92%) were of the age between 16 to 19 years (Table 2). More than half of the students (54.1%) were male, about two fifth (42.5%) were disadvantaged Janajati. Majority (85%) of student's parents were married, while 2% were divorced. Majority of the students were living in a nuclear family.

The three sub-scales of N-DASS21, stress, anxiety and depression have Cronbach's alpha 0.76, 0.77 and 0.81 respectively.

The correlation coefficient between anxiety scale of N-DASS21 and BAI was 0.76 whereas the correlation

Table 2. Socio-demographic characteristics of the studied population

Characteristics	Number (%)
Age	
16 to 19 years	926 (92.0)
20 years and above	81 (8.0)
Sex	
Male	545 (54.1)
Female	462 (45.9)
Ethnicity	
Brahmin and Chhetri	351 (34.9)
Relatively advantaged Janajati *	123 (12.2)
Disadvantaged Janajati **	426 (42.3)
Dalit	81 (8.0)
Others	26 (2.6)
Marital status of parents	
Married	859 (85.3)
Separated	70 (7.0)
Divorced	18 (1.8)
Widower	60 (6.0)
Type of family	
Nuclear family	643 (63.9)
Joint family	364 (36.1)

* Relatively advantaged Janajati: Newar, Thakali, Gurung

** Disadvantaged Janajati: Magar, Tamang, Rai, Limbu, Sherpa, Bhote, Gharti, Bhujel, Kumal, Sunuwar, Jirel, Lepcha, Chepang, Raute, Kusunda

Table 3. Correlation between the DASS scales, the BDI, and the BAI

Scale	DASS Depression	DASS Anxiety	DASS Stress	BDI
DASS anxiety	0.74	-		
DASS Stress	0.76	0.78	-	
BDI	0.58	0.57	0.57	-
BAI	0.62	0.76	0.70	0.62

Table 4. Distribution of N-DASS21 items

Item number	Short name of the item	Mean±SD	Skewness	Kurtosis
1	Difficult to wind down	0.89±0.72	0.70	0.80
2	Aware of dryness of mouth	0.79±0.79	0.76	0.03
3	Could not seem to experience any Positive feelings	0.72±0.82	0.95	0.18
4	Experience breathing difficulty	0.54±0.72	1.30	1.43
5	found it difficult to work up the initiative to do things	0.79±0.80	0.78	0.03
6	Tended to overreact to the situations	0.74±0.83	0.95	0.28
7	Experience trembling	0.47±0.71	1.47	1.67
8	Using a lot of nervous energy	0.76±0.82	0.87	0.10
9	Worried about situation in which I might panic	0.81±0.88	0.88	-0.001
10	Had nothing to look forward to	0.71±0.88	1.14	0.52
11	Found myself getting agitated	0.61±0.82	1.28	0.98
12	Found it difficult to relax	0.62±0.77	1.25	1.25
13	Felt downhearted and blue	0.81±0.87	0.91	0.12
14	Intolerant of anything that kept me from getting on	0.81±0.86	0.93	0.21
15	Felt I was close to panic	0.95±0.90	0.73	-0.19
16	Unable to become enthusiastic about anything	0.77±0.86	1.00	0.33
17	Was not worth much as a person	0.90±0.91	0.83	-0.92
18	Felt that I was rather touchy	1.01±0.94	0.67	-0.42
19	Was aware of the action of my heart in the absence of physical exhaustion	0.63±0.80	1.21	0.90
20	Felt scared without any good reason	0.66±0.85	1.14	0.48
21	Felt that life was meaningless	0.83±1.00	0.99	-0.18

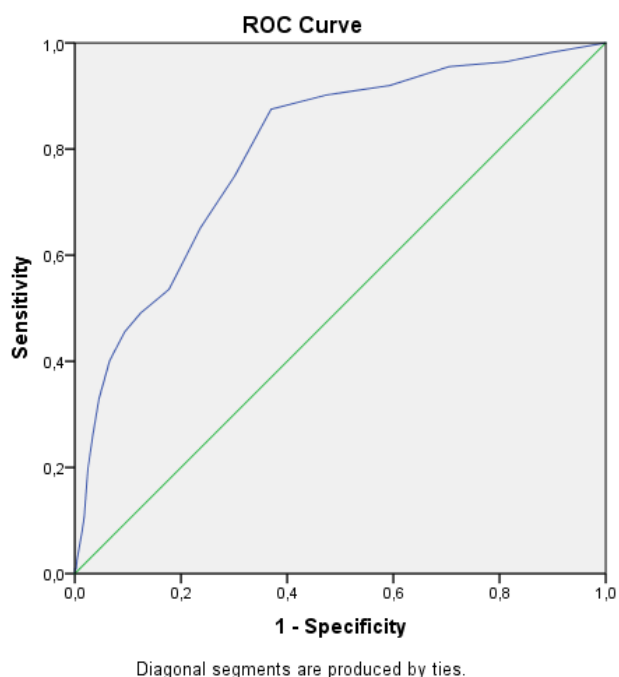


Figure 1. ROC curve for Depression scale based on N-DASS21 against BDI

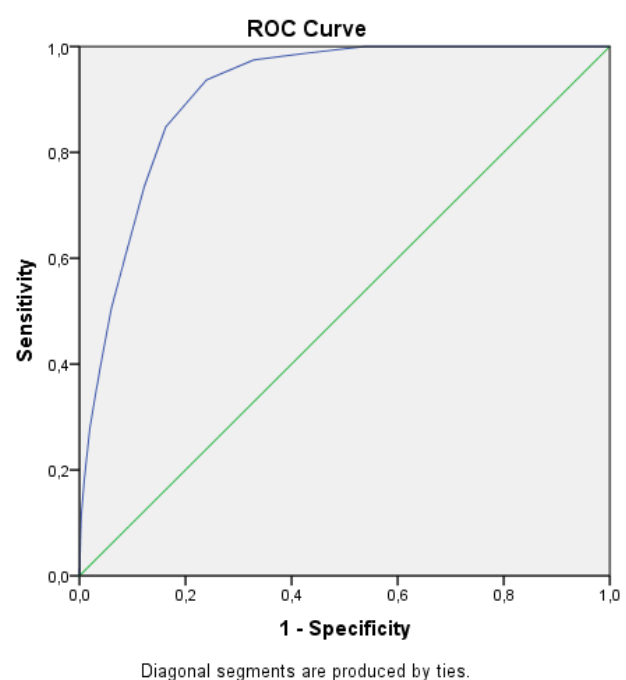


Figure 2. ROC for anxiety scale based on N-DASS21 against BAI

Table 5. Factor loadings based on confirmatory factor analysis and correlation matrix for each item in N-DASS21

Items	Factor loading			Correlation matrix		
	Depression	Anxiety	Stress	Depression	Anxiety	Stress
D3	0.54			0.62**	0.42**	0.43**
D5	0.57			0.58**	0.48**	0.49**
D10	0.62			0.70**	0.48**	0.50**
D13	0.70			0.69**	0.59**	0.63**
D16	0.62			0.68**	0.52**	0.50**
D17	0.62			0.73**	0.47**	0.51**
D21	0.69			0.76**	0.56**	0.57**
A2		0.48		0.37**	0.58**	0.42**
A4		0.57		0.42**	0.65**	0.49**
A7		0.54		0.41**	0.61**	0.46**
A9		0.60		0.51**	0.65**	0.51**
A15		0.70		0.59**	0.70**	0.62**
A19		0.61		0.49**	0.68**	0.51**
A20		0.65		0.54**	0.69**	0.55**
S1			0.56	0.44**	0.47**	0.63**
S6			0.54	0.45**	0.45**	0.61**
S8			0.59	0.46**	0.56**	0.62**
S11			0.68	0.61**	0.57**	0.67**
S12			0.63	0.50**	0.55**	0.67**
S14			0.60	0.48**	0.52**	0.66**
S18			0.54	0.48**	0.42**	0.63**
% of explained variance	19.77	14.34	13.00			

** correlation is significant at the 0.01 level. * correlation significant at 0.05 level

between depression scale of N-DASS21 and BDI was 0.58. The correlations of various sub-scales of DASS, BDI and BAI ranged from 0.57 to 0.78, showing that there is positive correlation between various sub-scales of DASS as well as between the BDI and BAI (Table 3).

The distribution of each item showed positive skewness (Table 4). We received positive Kurtosis statistic indicating deviation of data from the normal distribution. Thus to address this, we used bootstrapping to run CFA to adjust for deviation from the normality of the data.

Three dimensions proposed by original authors⁹ were also replicated in our data. Factor loading and correlation matrix from Varimax orthogonal analysis for three factor model is presented in Table 5. Factors related to depression showed strong loading for depression with factor loading scores varying from 0.54 to 0.70, while anxiety shows more variation with the range 0.48 to 0.70 and stress shows less

variation in the factor loading with the loading score from 0.54 to 0.68. We also calculated that the inter-item correlation coefficients of the N-DASS21 items ranged from 0.37 to 0.76 at $p < 0.01$. These correlation coefficient indicate that there were no redundant or unrelated items in the scales.

AUC was calculated by plotting ROC curves for depression and anxiety subscales against Beck depression and anxiety inventory, respectively (Figures 1 and 2). The value of AUC for depression scale was 0.80 (95% CI 0.76-0.84) and for the anxiety scale 0.91 (95% CI 0.89-0.94). This indicates that depression and anxiety scales are accurate.

DISCUSSION

The mental health issues received an increased global attention as an important public health agenda with the publication of the World Health Organization (WHO) in 1990 introducing mental health as a component of primary health care.¹⁴

Nepal's National Health Policy 2019 has recognized the increasing trend of mental illness as one of the major problems in Nepal.¹⁵ The policy has also emphasized that the government needs to increase investment for the health care of people with mental disability. Nepal Government's policy is to ensure health services as fundamental rights and the strategy is to provide mental health services from the community level up to the specialized hospitals.¹⁵ Nepal's first ever mental health policy formulated in 1996 aimed to ensure availability and accessibility of minimum mental health services to all Nepalese, prepare human resources for mental health, protect the rights of the mentally ill and improve awareness about mental health.¹⁶

In the United Kingdom general adult population showed an adequate construct validity and reliability of DASS-21, a shorter version of the full length DASS was useful with clients having limited concentration.¹⁷ The capacity to distinguish between the three related states of depression, anxiety and stress should be useful to researchers concerned with the nature, etiology and mechanisms of emotional disturbance. The essential function of the DASS-21 is to assess the severity of the core symptoms of depression, anxiety and stress. It must be recognized that clinically depressed, anxious or stressed persons may well manifest additional symptoms that tend to be common to two or all three of the conditions, such as sleep, appetite, and sexual disturbances. These disturbances will be elicited by clinical examination, or by the use of general symptom checklists as required.¹⁸

Our study examined the correlation of depression and anxiety scales of the N-DASS21 with the BDI and BAI, respectively. This study also examined the reliability and validity of the Nepali version of DASS-21, that is, N-DASS21. A validated questionnaire in a field of research is essential for getting usable research results in that particular field. DASS-21 is a self-report instrument which requires no special skills to administer.¹⁹ DASS-21 has been validated already in several languages.²⁰ However, validation of Nepali version among Nepali populations has not been done earlier. Additionally, the validation of a translated tool is important because cultural variation may influence the individual's experience and emotional expression.²¹

A previous study done among Nepali population engaged in social service agencies and community organizations residing in Hong Kong found a negative correlation between DASS-21 and the Life Satisfaction Scale that assessed individual's assessment of satisfaction with life. The author concludes that their Nepali version of DASS-21 demonstrated psychometric properties in relation to internal consistency and validity that support prior studies conducted in populations speaking

different languages.²²

The psychometric study of Bahasa Malaysia (BM) version of DASS 21 (BM DASS-21) among the diabetic patients showed that it had a good psychometric value for internal consistency and confirmatory factor analysis.¹⁹ Our study also found acceptable reliability of the N-DASS21 with Cronbach's alpha ranging between 0.76 and 0.81 for Stress, Anxiety and Depression sub-Scales. The validation of BM DASS-21 showed Cronbach's alpha values of 0.75, 0.74 and 0.79 respectively for depression, anxiety and stress subscales.¹⁹

A study conducted in Turkey with the purpose to examine psychometric properties of DASS-21 demonstrated that DASS-21 had acceptable and fairly high validity and reliability scores and it may be used as an efficient instrument in order to assess emotional states of university students.²³ Hence, it can be said that DASS-21 is a reliable and valid measure of the constructs it was intended to assess.

Our study revealed that the stress, anxiety and depression measured through N-DASS21, BDI and BAI have a positive correlation within themselves with the range of the correlation coefficient minimum 0.57 to maximum 0.78. Studies have found a link between chronic stress and anxiety disorders and depressive disorders.²⁴ Chronic stress can result in serious consequences like insomnia, weakened immune system, high blood pressure, anxiety and depression.²⁵

The Beck Depression Inventory (BDI) is among the most used self-rating scales for measuring depression worldwide.²⁶ BDI has sound psychometric properties in a primary care setting among the people aged 10 to 19 years. It is a practicable and reliable measure for identifying probable cases of depression among adolescents.²⁷ A meta-analysis on internal consistency of BDI estimated a mean coefficient alpha of 0.86 for psychiatric patients and 0.81 for non-psychiatric participants. The mean correlations of the BDI samples was 0.72 with clinical ratings whereas with non-psychiatric participants, the mean correlations of the BDI with clinical ratings and the Hamilton Rating Scale for Depression were 0.60 and 0.74, respectively. The BDI differentiates subtypes of depression as well as depression from anxiety.²⁸ The Nepali version of BDI showed good sensitivity and specificity when compared with gold standard of Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV) and also showed acceptable inter-item reliability.²⁹

The Beck Anxiety Inventory (BAI) is a 21-item inventory which identifies anxiety symptoms and measures intensity. It is a tool to assess the anxiety and its severity. It has a four-point scale ranging from 0 ("not at all") to 3 ("severe – I could barely

stand it"). Highest possible score after summing up of 21 items is 63, higher scores represents greater levels of anxiety. It has high internal consistency (Cronbach's $\alpha = 0.92$) and test-retest reliability over 1 week, $r = 0.75$. The BAI distinguished anxieties (panic disorder, generalized anxiety disorder, etc.) from non-anxious diagnostic groups.²⁸ The Nepali version of Beck Anxiety Inventory showed good sensitivity and specificity compared with DSM-IV standard. It also showed acceptable inter-item reliability and expected factor structures.³⁰

Plotting the ROC curve of anxiety sub-scale of N-DASS21 against BAI, the value of the AUC was 0.91 whereas ROC curve of depression sub-scale of N-DASS21 against BDI showed the AUC 0.80. This confirms the accuracy of our depression and anxiety subscales of N-DASS21.

In the current study we could not validate the Nepali version of the stress subscale of DASS-21 because of the lack of validated Nepali stress scale. Nevertheless this study establishes the validity and reliability of the Nepali version of the depression and anxiety sub-scales in Nepali population.

CONCLUSION

The depression and anxiety subscales of the Nepali version of DASS21 (N-DASS21) is psychometrically sound with good reliability and validity. It can be utilized as an instrument for screening depression and anxiety in Nepali population.

ACKNOWLEDGEMENT

The authors would like to thank the students that took part in this study. We are grateful to the Chiefs of Maharajgunj Medical Campus, Maharajgunj Nursing Campus and Manmohan Memorial Institute of Health Sciences and the Head of the Department of Psychiatry and Mental Health, Maharajgunj Medical Campus for their administrative facilitation in the grant application and conduct of this study. We also thank the enumerators for conducting the data collection for this study.

FINANCIAL SUPPORT

This study received a funding support from the University Grants Commission of Nepal under the Faculty Research Grants Scheme.

CONFLICT OF INTEREST

The authors declare that they have no competing interests.

REFERENCES

1. Baum A: Stress, intrusive imagery, and chronic distress. *Health Psychol.* 1990; 9(6): 653-75.
2. Salleh MR: Life event, stress and illness. *Malays J Med Sci.* 2008; 15(4): 9-18.
3. Anisman H, Matheson K: Stress, depression, and anhedonia: Caveats concerning animal models. *Neuroscience and Biobehavioral Reviews.* 2005; 29(4-5): 525-46.
4. McEwen BS: Understanding the potency of stressful early life experiences on brain and body function. *Metabolism.* 2008; 57(2).
5. Baxter AJ, Scott KM, Vos T et al: Global prevalence of anxiety disorders: a systematic review and meta-regression. *Psychol Med.* 2013; 43(5):897-910.
6. World Health Organization: Depression. Geneva: WHO. Available from: <https://www.who.int/news-room/fact-sheets/detail/depression>.
7. GBD 2017 Disease and Injury Incidence and Prevalence Collaborators: Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet.* 2018; 392(10159):1789-1858
8. Lovibond SH, Lovibond PF: Manual for the Depression Anxiety Stress Scales. (2nd. Ed.). Sydney: Psychology Foundation; 1995.
9. Overview of the DASS and its uses. Available from: <http://www2.psy.unsw.edu.au/dass/over.htm>.
10. Anthoine E, Moret L, Regnault A et al: Sample size used to validate a scale: a review of publications on newly-developed patient reported outcomes measures. *Health Qual Life Outcomes.* 2014; 12:176.
11. District Education Office, Kathmandu. Shaikshik Manjari. Kathmandu: DEO; 2013.
12. World Health Organization: Process of translation and adaptation of instruments. 2014. Available from: https://www.who.int/substance_abuse/research_tools/translation/en/.
13. Goetz C, Coste J, Lemetayer F et al: Item reduction based on rigorous methodological guidelines is necessary to maintain validity when shortening composite measurement scales. *Journal of Clinical Epidemiology.* 2013; 66:710-18.
14. World Health Organization. The Introduction of a mental health component into primary health care. Geneva: WHO; 1990.
15. Ministry of Health and Population. National Health Policy 2076. Kathmandu: MoHP; 2019.
16. World Health Organization and Ministry of Health and Population. WHO-AIMS Report on Mental Health System in Nepal. Kathmandu: WHO and MoHP; 2006.
17. Henry JD, Crawford JR: The short-form version of the Depression Anxiety Stress Scales (DASS-21): construct validity and normative data in a large non-clinical sample. *Br J Clin Psychol.* 2005; 44(2): 227-39.
18. Lovibond PF: Long-term stability of depression, anxiety, and stress syndromes. *J Abnorm Psychol.* 1998; 107(3):520-6.
19. Ramli M, Salmiah MA, Nurul AM: Validation and psychometric properties of Bahasa Malaysia version of the depression anxiety and stress scale (DASS) among diabetic patients. *Malaysian Journal of Psychiatry.* 2009; 18(2).
20. Tran TD, Tran T, Fisher J: Validation of the depression anxiety stress scales (DASS) 21 as a screening instrument for depression and anxiety in a rural community-based cohort of northern Vietnamese women. *BMC Psychiatry.* 2013; 13(24).
21. Oei TPS, Sawang S, Goh YW et al: Using the Depression Anxiety Stress Scale 21 (DASS-21) across cultures. *Int J Psychol.* 2013; 48(6).
22. Tonsing KN: Psychometric properties and validation of Nepali version of the Depression, Anxiety and Stress Scales (DASS-21). *Asian J of Psychiatr.* 2014;8.
23. Akin A, Cetin B: The depression, anxiety and stress scale (DASS): The study of validity and reliability 2007. Available from: <http://>

- www.academia.edu/1323267/The_Depression_Anxiety_and_Stress_Scale_DASS_The_study_of_VValidity_and_Reliability.
24. Khan S, Khan RA: Chronic stress leads to anxiety and depression. *Annals of Psychiatry and Mental Health*. 2017; 5(1):1091.
 25. Anderson NB: Levels of analysis in health science: A framework for integrating socio behavioral and biomedical research. *Annals of the New York Academy of Science*. 1998; 840:563-76.
 26. Richter P, Werner J, Heerlein A et al: On the validity of the Beck Depression Inventory. A review. *Psychopathology*. 1998; 31(3):160-8.
 27. Basker M, Moses PD, Russell S et al. The psychometric properties of Beck Depression Inventory for adolescent depression in a primary-care paediatric setting in India. *Child Adolesc Psychiatry Ment Health*. 2007; 1(8).
 28. Beck AT, Epstein N, Brown G et al: An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology*. 1988; 56(6):893-7.
 29. Kohrt BA, Kunz RD, Koirala NR et al: Validation of the Nepali version of Beck Depression Inventory. *Nepalese Journal of Psychiatry*. 2002; 2(4):123-30.
 30. Kohrt BA, Koirala NR, Sharma VD et al. Validation of the Nepali version of Beck Anxiety Inventory. *Journal of the Institute of Medicine*. 2003.