

Factor structure and reliability of the 12-item Sinhala version of General Health Questionnaire

Chrishantha Abeysena^{1*}, Pushpa Jayawardana¹, Upali Peiris²

¹ Professor / Department of Public Health, Faculty of Medicine, University of Kelaniya, Ragama, Sri Lanka

² Senior Lecturer / Department of Psychiatry, Faculty of Medicine, University of Kelaniya, Sri Lanka

* **Corresponding Author:** Chrishantha Abeysena

Tel: 2953411 (Department) | Mobile: 0777 591715 | Email: chrishantha-abeyseena@mfac.kln.ac.lk, chrishanthaabeyseena@yahoo.com

Abstract

Introduction: The General Health Questionnaire (GHQ) is widely used to detect common psychiatric disorders. Even though the GHQ 12 has been validated for many countries, psychometric properties in relation to the Sinhala speaking Sri Lankan population lack conclusive evidence.

Objective: To determine the factor structure and the reliability of the Sinhala version of GHQ 12.

Methods: This was a descriptive study including 385 patients with in the age range of 18 to 75 years, attending the Out Patient Department of Colombo North Teaching Hospital, Ragama, Sri Lanka, between June 2009 to September 2010. Sinhala version of GHQ-12 was completed by the participants. Each item of the GHQ was rated on a four-point scale (0-1-2-3). Factor analyses were performed by applying Generalized Least Squares method using oblimin rotation. The internal consistency was assessed by calculating Cronbach's α coefficient.

Results: Median age of the study population was 32.5 years (IQR= 21years) and the median GHQ score was 9 (IQR=7). The GHQ 12 yielded two factor solutions. Factor I (Depression and Anxiety) accounted for 88% of the total explained variance and Factor II (Social dysfunction) 12%. Forty five percent (45%) of the total variance could be explained by the two extracted factors. There was a clear distinction between the items that loaded on the two factors. The correlation coefficient between the factors I and II was 0.65. The Cronbach's alpha of GHQ 12 was 0.88, which indicated satisfactory internal consistency.

Conclusions: GHQ 12 displays adequate reliability and validity for use in the Sinhala speaking primary care attendees of Colombo North Teaching Hospital for assessing psychiatric disorders.

Key words: Factor analysis, General Health Questionnaire, Reliability, Psychometric properties

Introduction

The General Health Questionnaire (GHQ) is a self-administered questionnaire widely used to detect potential non-psychotic psychiatric disorders. The original questionnaire consists of 60 items but subsequently 30, 28 and 12 item versions have been derived from it. These are used globally.

In Sri Lanka, GHQ-30 has been used widely for both research and clinical purposes. However, GHQ-12 has been in existence for some time and owing to the fewer number of items (12 instead of 30) included which is accepted to do the same task of detecting non psychotic psychiatric illness, utilizing it instead of the GHQ-30 has many advantages. It will be more attractive to the respondents owing to its brevity and thus less time consuming to complete, which will minimize respondent fatigue and thus the likelihood of obtaining more accurate and reliable responses. All these are key requirements in research as well as in clinical practice. It will also make analysis of the questionnaire less complicated which will be an additional attraction in the assessment of the psychological status of respondents, especially in a busy clinic setting. However, before such use it is important to translate the questionnaire to the local language following which an assessment of the psychometric properties in terms of validity and reliability are needed.

Validity of an instrument may be assessed in terms of judgmental, construct and criterion validity. Construct validity is the extent to which a particular measure relates to other measures consistent with theoretically derived hypothesis concerning the concepts or constructs that are being measured.¹ One method of assessing this is by examining the factor structure that constitute the main instrument.

The GHQ-12 has been validated in different languages and cultures.^{2,3} Previous studies across countries reported that the GHQ-12 has two to three factor solutions.^{4,5,6,7} The components of the two factor structure were Psychological distress and Social dysfunction.^{6,7} Cheung reported a three factor structure namely Anxiety and depression, Social dysfunction and Loss of confidence.⁸

There is no published literature in relation to validation of GHQ-12 in Sri Lanka. Thus the objective of this study was to determine the factor structure, and the reliability of the Sinhala version of the GHQ-12.

Methods

A descriptive cross sectional study was conducted at the Out Patient Department (OPD) of the Colombo North Teaching Hospital (CNTH), Ragama, between June 2009 to September 2010. The study participants included both male and female patients aged 18 to 75 years who were able to read and understand the Sinhala language.

Factor analysis of GHQ-12 was an extension to a study designed to assess the validity and reliability of GHQ-30.⁹ Hence the methods designed were for the larger component of the study which was the GHQ-30. As the minimal sample size for factor analysis depends on the number of items in the questionnaire, what is recommended is at least 5 participants per question item. Therefore the minimum required for the GHQ-30 was 150 participants, but a sample size of 385 were included with an average of 32 participants per item of the GHQ-12, which is preferable due to the increase in the precision of results.

All patients who were registered for OPD visits in the CNTH (who consented to be in the study) during the study period and were eligible for inclusion were recruited until the required sample size was reached using convenience sampling. Around 10 to 15 patients/day were recruited.

The main study instruments used were a questionnaire on general information to determine relevant socio demographic data and the Sinhala version of GHQ-30, which is a self-administered questionnaire. It was completed during the same OPD visit. Each item of the GHQ was rated on a four-point scale Likert scoring system (0-1-2-3).

Data entry was carried out using EPI INFO 6. Double entry was carried out to check for the reliability of data entry. The statistical analysis was performed using the statistical package SPSS windows Version 16 and the question items that constitute the GHQ-12 were disembodied from the GHQ-30, which was the instrument administered. Factorability of the GHQ-12 was assessed by using the Bartlett's test of sphericity (<0.001) and Kaiser-Meyer-Olkin (0.95) measure of sampling adequacy. It was found to be satisfactory. We applied principal axis factoring method with Oblimin rotation. The internal consistency of the GHQ-12 was assessed by calculating Cronbach's α coefficients.

Informed consent was obtained from all the research participants and confidentiality of data were assured by concealing the identity by using a coding system. Ethical clearance was granted from the Ethics Review Committee, Faculty of Medicine, University of Kelaniya, Ragama.

Results

Total number of OPD patients who were invited to the study during the period between May 2009 and January 2011 was 432. Of them 22 patients were not willing to participate

which gives a non-participant rate of 5.0%. Therefore the total number of patients recruited to the study was 410. Of them 25 (6.1%) had missing data for one or more items of the GHQ-12, which left a study sample of 385.

Median age of the study population was 32.5 years (IQR=21years). The highest proportion (28.5%; n=117) of them were in the age group of 21 to 30 years. Fifty nine percent (n=242) of the study population was Buddhists and 26.6% (n=110) Catholics / Christians. Two hundred and twenty two (57 %) had studied up to General Certificate Examination (Ordinary Level).

Factor structure of GHQ-12

Using the Likert scale, the median GHQ score was 9 (IQR=7) for the total sample. It was 10 (IQR=9) for males and 9 (IQR=6) for females. For the age group of <32 years, it was 8 (IQR=7) and ≥32 years, it was 10 (IQR=9). It was also 10 (IQR=7.5) for the low educational category and 8 (IQR=6.5) for the high educational category.

Factor analysis produced a two factor solution. Forty five percent (45%) of the total variance could be explained by the two extracted factors. Factor I (Depression and Anxiety) accounted for 88% and Factor II (Social dysfunction) for 12% of the total variance (Table 1). The Factors I and II were inter-correlated giving a correlation coefficient of 0.65.

Internal consistency of GHQ-12

The Cronbach's alpha for the total sample was 0.88 indicating satisfactory internal consistency of the scale. The value (0.88) was the same for all the subgroups in terms of sex, age and educational level. The corrected item-total correlation coefficients were above 0.40 for the total sample as well as for the sub samples (Table 2). The Cronbach's alphas were 0.86 for Depression and anxiety (Factor I) and 0.74 for Social dysfunction (Factor II).

Discussion

We extracted two factors for GHQ-12 namely 'Depression and Anxiety' and 'Social dysfunction' which accounted for 45% of the total variance. The GHQ-12 is also considered as reliable based on the high internal consistency values derived.

Our results are consistent with Iranian⁷, Indian¹⁰ and Brazilian¹¹ studies that reported a two factor structure named as 'Social dysfunction' and 'Psychological distress'. However, there were differences with regard to the factor loadings of individual factors in these studies. Doi and Minowa⁶ produced two factor solutions for women and three factor solutions for men from a Japanese population. These were named Psychological distress, Social dysfunction and Happiness. The two factor solution for women in this study jointly accounted for 49% of the total variance, a value which was similar to our study. The five items included in the factor on 'Psychological distress' and the four items included in the factor on 'Social dysfunction' by Doi and Minowa⁶ were same as that

included in factors on 'Depression and anxiety' and 'Social dysfunction' of our study. The only inconsistency was that the item 1 (Been able to concentrate on whatever you are doing?) in their study⁴ was common to both factors. Werneke et al¹² examined the factor structure of GHQ-12 using a larger sample from 15 different countries. They also identified two factors namely 'Anxiety/depression' and "Social dysfunction". However they found that substantial factor variance was there between centers in addition to multiple cross loading of these factors. Also an important finding of their study was the factor variation observed over time in the same setting in Manchester, UK.

There are several studies that report a three factor structure^{4,6,13,14,15} for the GHQ-12. Ferrell¹³ had extracted two different factors namely Anxiety and Depression in addition to 'Social dysfunction' which accounted for 64% of the total variance. Sánchez-López⁴ named these as 'Successful coping', 'Self-esteem' and 'Stress' which accounted for 54% of the total variance. A recent study⁵ conducted in Malaysia extracted 'Psychological distress', 'Social and emotional dysfunction' and 'Cognitive disorder' which jointly accounted for 52% of the total variance. According to Kuruvilla¹⁴, the Tamil version of the GHQ-12 tested in India consisted of factors 'Depression/anxiety', 'Social performance' and 'Self-esteem', which explained 65% of the total variance. This has relevance to Sri Lanka as we need to have a validated Tamil translation as well, without which it will not be possible to apply the GHQ to Tamil speaking communities. Daradkeh¹⁵ named the extracted factors as 'General dysphoria', 'Lack of enjoyment' and 'social dysfunction'.

Two studies, one from France¹⁰ and the other from UK⁸ had tested the goodness of fit of the factor structures that had been already described using confirmatory factor analysis. The study¹⁰ from France concluded that it showed a good fit for a two-factor as well as for a three-factor model. The other study⁸ from Britain found that the three-factor model had a good fit.

One of the most recent studies¹⁶ had described a one factor structure using exploratory factor analysis which contributed to 60.5% of the total variance with a Cronbach's alpha of 0.94. All this point to the futility of extensive comparisons of the factor structures extracted, as it is well known to vary with the culture and within the same culture too in relation to different demographic and social factors as well as the semantics and the statistical analysis used¹⁶.

In our study we found that the factors I and II were inter-correlated. The findings are consistent with the results reported by two studies performing one exploratory and the other confirmatory factor analysis.^{8,17}

We agree with Goldberg et al that GHQ can be used efficiently in developing countries as well and that sex, age and educational level are not factors that affect the reliability and validity of the GHQ.

We recruited the study participants from the OPD patients without applying any probability sampling method. The use of a convenience sample was the most feasible

considering the circumstances the patients are subjected to at an extremely busy OPD setting. This is viewed as a limitation of our study as it restricts the generalizability of the findings. A community based study would have been the ideal, but it was not possible because the second component of the study involved the participation of clinicians. However, the effect of it may have been mitigated by low non response rate which is strength of the study.

In conclusion, GHQ-12 displays adequate reliability and validity for use in the Sinhala speaking primary care attendees of the Colombo North Teaching Hospital, Sri Lanka for assessing psychiatric disorders. Future studies should confirm the factor structure of GHQ-12 for the general population by including both Sinhala and Tamil speaking communities.

Acknowledgements

This study was funded by the University of Kelaniya. We are grateful to the Research and Publication Committee to the University of Kelaniya and to the research assistants.

Conflicts of interest: None declared

References

1. Abramson JH, Abramson ZH. Survey methods in community medicine. London, Churchill Livingstone.
 2. Huppert FA, Walters DE, Day NE, Elliott BJ. The factor structure of the General Health Questionnaire (GHQ-30). A reliability study on 6317 community residents. *The British Journal of Psychiatry* 1989;155: 178-185.
 3. Jakob KS, Bhugra D, Mann H. The validation of the 12-item General Health Questionnaire among ethnic Indian women living in the United Kingdom. *Psychol Med.* 1997;27:1215-1217.
 4. Sánchez-López MP, Dresch V. The 12-Item General Health Questionnaire (GHQ-12): Reliability, external validity and factor structure in the Spanish population. *Psicothema* 2008; 20(4):839-843.
 5. Zulkefly NS, Baharudin R. Using the 12-item General Health Questionnaire (GHQ-12) to Assess the Psychological Health of Malaysian College Students. *Global Journal of Health Science.* April 2010; 2:73-80.
 6. Doi Y, Minowa M. Factor structure of the 12-item General Health Questionnaire in the Japanese general adults population. *Psychiatry and Clinical Neuroscience* 2003;57,379-383.
-

7. Montazeri A, Harirchi AM, Shariati M, Garmaroudi G, Ebadi M, Fateh A. The 12-item General Health Questionnaire (GHQ-12): translation and validation study of the Iranian version. *Health and Quality of Life Outcomes* November 2003, 1:66.
8. Cheung Y B. A confirmatory factor analysis of the 12-item General Health Questionnaire among older people. *International Journal of geriatric Psychiatry*, 2002;17: 739-744.
9. Abeysena C, Peiris U, Jayawardana P, Rodrigo A. Validation of the Sinhala version of 30-item General Health Questionnaires. *International Journal of Collaborative Research on Internal Medicine & Public Health*. 2012; 4(7): 1373-1381.
10. Rajabi G, Sheykhabani SH. Factor Structure of the 12-Item General Health Questionnaire. *Journal of Education & Psychology*. 2009;3:81-94.
11. Gouveia VV, Barbosa GA, Andrade EO, Carneiro MB. Factorial validity and reliability of the General Health Questionnaire (GHQ-12) in the Brazilian physician population. *Cad. Saúde Pública, Rio de Janeiro*. 2010;26:1439-1445.
12. Werneke U, Goldberg DP, Yalcin I and Ustun BT: The stability of the factor structure of the General Health Questionnaire. *Psychol Med* 2000, 30:823-829.
13. Farrell RN, Gerald A. The mental health of hospital nurses in Tasmania as measured by the 12-item General Health Questionnaire. *Journal of Advance Nursing*. 1998;28:707-712.
14. Kuruvilla A, Pothen M, Philip K, Braganza D, Joseph A, Jacob KS. The validation of the Tamil version of the 12 item General Health Questionnaire. *Indian Journal of Psychiatry*. 1999;41: 217-221.
15. Daradkeh TK, Ghubash R, El-Rufaie OE. Reliability, validity, and factor structure of the Arabic version of the 12-item General Health Questionnaire. *Psychological Reports*. 2001;89: 85-94
16. Lesage F, Martens-Resende S, Deschamps F, Berjot S. Validation of the General Health Questionnaire (GHQ-12) adapted to a work-related context. *Open Journal of Preventive Medicine* 2011;1: 44-48.
17. Salama-Younes M, Montazeri A, Ismaïl A, Roncin C. Factor structure and internal consistency of the 12-item General Health Questionnaire (GHQ-12) and the Subjective Vitality Scale (VS), and the relationship between them: a study from France. *Health and Quality of Life Outcomes* 2009;7:22 doi:10.1186/1477-7525-7-22.

Table 1: Factor loadings of the Sinhala version of GHQ 12

Item	Depression	Social dysfunction
09. Been feeling unhappy and depressed?	0.889	
05. Felt constantly under strain?	0.768	
10. Been loosing confidence in you?	0.636	
02. Lost much sleep over worry?	0.584	
12. Been feeling reasonably happy, all things considered?	0.543	
11. Been thinking of you as a worthless person?	0.511	
06. Felt you could not overcome your difficulties?	0.456	
01. Been able to concentrate on whatever you are doing?	0.334	
04. Felt capable of making decisions about things?		0.719
07. Been able to enjoy your day to day activities?		0.642
08. Been able to face up to your problems?		0.613
03. Felt that you are playing a useful part in things?		0.543

Extraction Method: Principal Axis Factoring.

Rotation Method: Oblimin with Kaiser Normalization.

Table 2: Item-total correlation coefficients of GHQ 12 for the whole sample and the subgroups

Item	Total sample	Male	Female	Age <32	Age ≥32	Low Education	High Education
1	0.49	0.53	0.48	0.39	0.59	0.43	0.58
2	0.45	0.54	0.46	0.46	0.46	0.43	0.47
3	0.44	0.51	0.40	0.49	0.38	0.45	0.42
4	0.49	0.57	0.44	0.52	0.46	0.45	0.56
5	0.63	0.74	0.59	0.58	0.68	0.65	0.61
6	0.58	0.56	0.59	0.53	0.61	0.57	0.58
7	0.58	0.57	0.60	0.57	0.61	0.56	0.61
8	0.56	0.62	0.52	0.56	0.56	0.56	0.57
9	0.72	0.72	0.74	0.68	0.76	0.70	0.74
10	0.69	0.74	0.67	0.68	0.70	0.68	0.70
11	0.65	0.61	0.69	0.68	0.63	0.66	0.65
12	0.66	0.74	0.63	0.66	0.66	0.64	0.67