# Validity and Reliability of the Indonesian Short Form-Leeds Dyspepsia Questionnaire (SF-LDQ)

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## ABSTRACT

***Background:*** *The severity of dyspepsia symptoms is often overlooked despite established definitions and diagnostic criteria. The Short Form-Leeds Dyspepsia Questionnaire (SF-LDQ) is a validated English-language tool designed to evaluate these symptoms. This research focuses on creating and validating an Indonesian version of the SF-LDQ.*

***Methods:*** *The SF-LDQ was translated into Indonesian following standard procedures, including forward-backward translation, cross-checking, and pilot testing. Unselected patients from Dabo Regional Hospital and Dabo Lama Community Health Center (Pusat Kesehatan Masyarakat, or Puskesmas) completed a questionnaire upon enrollment and again after three days via direct follow-up or blinded phone interviews. Reliability was measured through internal consistency (Cronbach's α) and test-retest analysis (Spearman's correlation). Meanwhile, validity was evaluated by comparing SF-LDQ scores with Rome IV Criteria-based diagnoses from blinded physicians and analyzing diagnostic performance with ROC curves.*

***Results:*** *A total of 204 participants were included. The Indonesian SF-LDQ exhibited excellent reliability, with Cronbach's α of 0.875 and Spearman's correlation of 0.984 ($p < 0.001$). Validity analysis demonstrated an AUC of 0.946 ($p < 0.001$, 95% CI = 0.913–0.978). A cut-off score of 6.5 yielded 87.0% sensitivity and 93.3% specificity.*

***Conclusion:*** *The Indonesian SF-LDQ is a dependable and valid tool for evaluating the frequency and severity of dyspeptic symptoms.*

***Keywords:*** *Dyspepsia, Indonesian SF-LDQ, Validation Study*

## ABSTRAK

***Latar belakang:*** *Penilaian keparahan gejala dispepsia sering diabaikan meskipun definisi dan kriteria diagnostik telah tersedia. Short Form-Leeds Dyspepsia Questionnaire (SF-LDQ) adalah alat yang tervalidasi dalam bahasa Inggris untuk menilai gejala dispepsia. Penelitian ini bertujuan mengembangkan dan memvalidasi versi bahasa Indonesia dari SF-LDQ.*

***Metode:*** *SF-LDQ diterjemahkan ke dalam bahasa Indonesia menggunakan protokol standar (terjemahan maju-mundur, pemeriksaan silang, dan uji coba). Pasien dari RSUD Dabo dan Puskesmas Dabo Lama mengisi kuesioner saat pendaftaran dan diulang tiga hari kemudian melalui tindak lanjut langsung atau wawancara telepon secara tersamar. Reliabilitas dinilai menggunakan konsistensi internal (Cronbach's α) dan reliabilitas uji-ulang (korelasi Spearman). Validitas dinilai dengan membandingkan skor SF-LDQ dengan diagnosis berdasarkan Kriteria Rome IV oleh dokter tersamar serta analisis kinerja diagnostik menggunakan kurva ROC.*

***Hasil:*** *Sebanyak 204 pasien dilibatkan. SF-LDQ versi Indonesia menunjukkan reliabilitas yang sangat baik, dengan Cronbach's α sebesar 0,875 dan korelasi Spearman sebesar 0,984 (p < 0,001). Analisis validitas menunjukkan AUC sebesar 0,946 (p < 0,001, CI 95% = 0,913–0,978). Skor batas 6,5 memberikan sensitivitas 87,0% dan spesifisitas 93,3%.*

***Kesimpulan:*** *SF-LDQ Indonesia merupakan instrumen yang valid dan reliabel untuk menilai frekuensi dan keparahan gejala dispepsia.*

***Kata kunci****: Dispepsia, SF-LDQ Bahasa Indonesia, Studi Validasi*

## INTRODUCTION

Dyspepsia is a frequent gastrointestinal condition marked by discomfort in the upper digestive tract, affecting around 20% of the global population.[1–4] In Asia, its prevalence varies between 12.2% and 24.3%.[5,6] This condition poses a significant economic burden; for instance, dyspepsia treatment in the USA costs up to 18 million USD annually.[6] Most cases are functional dyspepsia, which requires no further evaluation, accounting for 43–79.5% of dyspepsia cases in several Asian countries, including Indonesia.[1,4] Functional dyspepsia is diagnosed using the Rome IV criteria, which define it as "a medical condition that significantly impacts a patient's usual activities and is characterized by one or more of the following symptoms—postprandial fullness, early satiation, epigastric pain, or epigastric burning—unexplained after a routine clinical evaluation." These criteria must be met for at least the last three months, with symptom onset occurring at least six months prior to diagnosis.[2,3]

Dyspepsia significantly reduces patients' quality of life, a decline linked to the intensity and recurrence of symptoms.[6–9] To measure and monitor these parameters, several symptom assessment tools have been developed.[10] The Leeds Dyspepsia Questionnaire (LDQ), recognized for its validity and reliability, has also been translated and validated in several other languages with promising results.[10–13] However, the original LDQ's long reference timeframe, length, and difficulty in self-completion prompted the development of the abbreviated version of the Leeds Dyspepsia Questionnaire (SF-LDQ).[14] This shorter tool uses four questions addressing the occurrence and intensity of symptoms within the last two months, alongside an additional question about the most disturbing symptom.[14,15]

The SF-LDQ has shown excellent validity and reliability in English-speaking populations.[14] Researchers in countries like Italy and Rwanda have also translated and validated the questionnaire, with promising results.[15,16] Its concise design, which includes visual aids and simplified questions, improves acceptability and usability for patients, making it an effective tool for diverse healthcare settings.[14] Given Indonesia's linguistic and cultural diversity, but widespread use of the Indonesian language, this research seeks to create and verify an Indonesian adaptation of the SF-LDQ for use in both primary and secondary healthcare. A reliable and practical assessment tool tailored to the Indonesian population would improve clinical management and support research on dyspepsia in this context.

## METHODS

### Study Design

An observational, cross-sectional study was carried out to evaluate the Indonesian SF-LDQ by testing its validity and reliability. The research aims to fill the gap in validated tools for assessing dyspepsia in Indonesia.

### Instrument Translation

The SF-LDQ was adapted into Indonesian through a meticulous forward and backward translation procedure. Two certified translators, both native Indonesian speakers, one of whom with a medical background, independently translated the original English questionnaire into Indonesian. Any discrepancies were resolved through discussions with the investigator team. It was then back-translated into English by another pair of certified translators

to maintain semantic consistency with the original version.

The draft was subsequently evaluated with 20 staff members from Dabo Regional Hospital and Dabo Lama Community Health Center. Participants were selected to reflect a range of ages (mean of 35.25 years, spanning 24–50 years), genders (9 males and 11 females), and educational backgrounds. Participants provided feedbacks on the questionnaire's acceptability and feasibility, and all were able to complete it without significant difficulties. The feedbacks were then utilized to finalize the draft.

### Patient Selection and Data Collection

Patients from Dabo Lama Community Health Center and Dabo Regional Hospital were recruited between March and May 2018. Adults over 18 years old were approached by trained research assistants before meeting physicians and invited to participate. Sampling was carried out through the consecutive sampling method. Patients were excluded if they were not fluent in Indonesian, were unable to read or write, had communication difficulties, or declined to participate. The enrolled participants were then given an informed consent to sign and were asked to fill the final questionnaire, with assistance available if needed. A blinded physician then assessed each participant for dyspepsia using the Rome IV criteria. Participants were asked to return after three days to complete the questionnaire a second time. For those unable to return, a blinded assistant conducted telephone interviews to collect verbal responses for the follow-up questionnaire. The study flowchart is presented in **Figure 1** below.

### Data Analysis

The validity and reliability of the Indonesian SF-LDQ were evaluated using Microsoft Excel 2007 and SPSS version 23. The reliability was assessed through internal consistency using Cronbach's α, and the test-retest reliability was performed using the Spearman correlation coefficient to compare initial and follow-up scores. The validity was evaluated by correlating SF-LDQ scores with clinical dyspepsia diagnoses following the Rome IV criteria. The ROC curve was employed to determine the area under the curve (AUC) and identify the optimal cutoff score for maximum sensitivity and specificity.

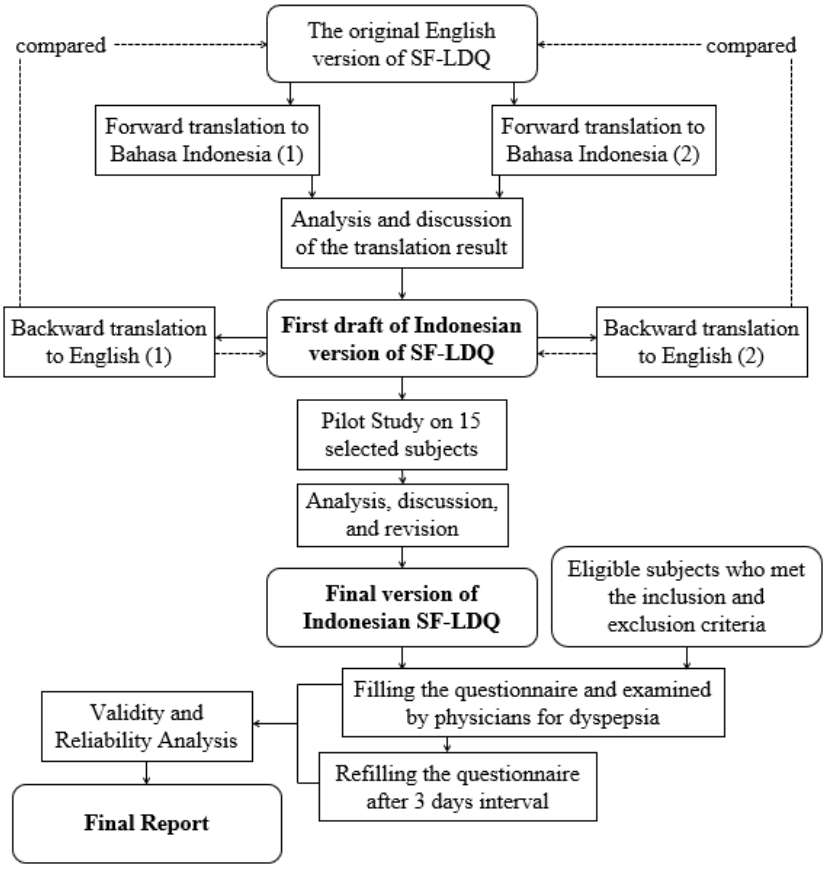


**Figure I. Study Flowchart**

### Ethical Consideration

All participants were provided with detailed information regarding the study's objectives and procedures. Patients were also informed that participation in the study was entirely voluntary and would not affect their medical care. Written informed consent was obtained from all participants. This study protocol was written according to the ethical principles as stated in the Declaration of Helsinki and had been reviewed and approved by the Hospital Board of Directors in December 2017 under approval letter number 438/TU-RSUD/2017/445.

## RESULTS

None of the pilot study participants encountered any difficulties in completing the questionnaire; therefore, no adjustments were made. The supplementary data includes the finalized Indonesian version of the SF-LDQ.

A total of 247 patients came to the participating healthcare facilities during the study period. However, 43 were excluded because they were not fluent in Indonesian or were unable to read or write. Sample size was calculated using the correlation formula for reliability and validity analysis (with an estimated r = 0.5), which yielded a minimal sample size of 38. In the end, 204 patients were included in the study (41.7% from a community health center and 58.3% from a regional hospital). Participants had a median age of 54 years, with 35.8% being male. Dyspepsia prevalence was 33.8%, based on clinical diagnosis. Only 198 participants completed the follow-up questionnaire for test-retest reliability, as 6 participants did not return. **Table 1** provides a detailed overview of participants' baseline characteristics. Endorsement frequencies for each individual item are shown in **Table 2**. Response rates for most questionnaire items exceeded 5%.

Reliability was evaluated using both internal consistency and test-retest methods. Cronbach's α of 0.875 demonstrated strong internal consistency, with item-total correlations between 0.36 and 0.72, all surpassing 0.3. Each question independently contributed to the overall score, reflecting various facets of the condition. Test-retest reliability, assessed via the Spearman correlation coefficient, was excellent at 0.984 ($p < 0.001$), based on data from 198 participants who completed the follow-up.

**Table 1. Baseline Characteristics of the Study Participants**

| Variables | Values |
|---|---|
| Age (median in years, min-max) | 54 (19-85) |
| Sex | |
| Male | 73 (35.8%) |
| Female | 131 (64.2%) |
| Sites of data collection | |
| Community Health Center | 85 (41.7%) |
| Referral Hospital | 119 (58.3%) |
| Diagnosis of dyspepsia | |
| Yes | 69 (33.8%) |
| No | 135 (66.2%) |

**Table 2. Endorsement Frequencies for Each Response Category of the Indonesian Short-Form Leeds Dyspepsia Questionnaire**

| Symptoms | Response category (%) | | | | | |
|---|---|---|---|---|---|---|
| | Not at all | Less than monthly | Between monthly and weekly | Between weekly and daily | At least daily | No response |
| Indigestion frequency | 50.5 | 6.4 | 16.2 | 17.6 | 9.3 | 0 |
| Heartburn frequency | 85.3 | 2.5 | 4.9 | 5.4 | 2.0 | 0 |
| Regurgitation frequency | 70.1 | 5.4 | 8.8 | 11.3 | 4.4 | 0 |
| Nausea frequency | 50.5 | 13.7 | 14.2 | 18.1 | 3.4 | 0 |
| Indigestion severity | 66.2 | 3.4 | 11.3 | 11.8 | 7.4 | 0 |
| Heartburn severity | 91.2 | 2.0 | 3.4 | 2.5 | 1.0 | 0 |
| Regurgitation severity | 83.3 | 3.4 | 4.4 | 7.4 | 1.5 | 0 |
| Nausea severity | 72.5 | 6.4 | 7.8 | 11.3 | 2.0 | 0 |

Validity was determined by comparing the total score with clinical dyspepsia diagnoses using an ROC curve, resulting in an AUC of 0.946 ($p < 0.001$, 95% CI: 0.913–0.978), demonstrating high diagnostic accuracy. A cutoff score of 6.5 provided 87.0% sensitivity and 93.3% specificity for diagnosing dyspepsia. Figure 2 displays the ROC curve for the total score in relation to dyspepsia diagnosis.

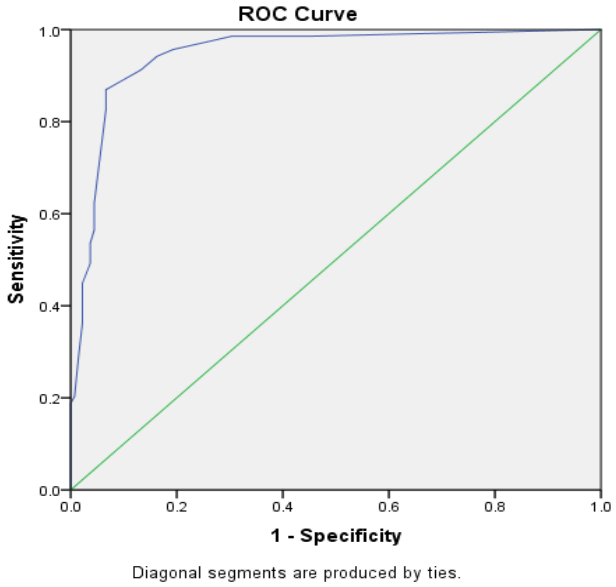


**Figure 2. ROC Curve for the Total Score of the Indonesian SF-LDQ against Diagnosis of Dyspepsia**

## DISCUSSION

A valid and reliable tool is very important in assessing symptoms of dyspepsia, whether in clinical practice or in research settings. Due to the subjective nature of dyspepsia symptoms, a parametric, quantifiable questionnaire is the best approach for obtaining such a tool.[17,18] This questionnaire can also be used to assess the efficacy of any new treatment for dyspepsia. The SF-LDQ has been shown in various studies to be valid and reliable in assessing the frequency and severity of dyspepsia symptoms.[15,16]

In current study, we successfully translated the SF-LDQ into Indonesian and validated it among an Indonesian population. To our knowledge, this is the first validation study for the SF-LDQ in the region, although the longer version of the Leeds Dyspepsia Questionnaire has previously been translated and validated in the Malaysian population by Mahadeva et al.[10] The present study also found a dyspepsia prevalence of 33.8% among the study population. This figure is comparable to that of the general population and to findings from other validation studies of the LDQ and SF-LDQ.[2,3,5,9,14]

The translation process in our study was conducted using rigorous protocols and pilot-tested in a diverse group prior to validation. The final questionnaire demonstrated good reliability (as shown by a Cronbach's α of 0.875 and a Spearman correlation coefficient of 0.984 for test-retest reliability) and validity (as indicated by an AUC of 0.946). These results are comparable to the original study in English by Fraser et al, which reported a Cronbach's α of 0.90, a Pearson correlation coefficient of 0.93 for test-retest reliability, and an area under the ROC curve of 0.82.[14] The minor differences in results can be attributed to variations in patient populations and cultural differences. Validation study of the SF-LDQ into both Italian and Kinyarwanda also showed comparably good validity and reliability parameters.[15,16]

Our study found that the optimal cutoff for the total score, balancing sensitivity and specificity, was 6.5, yielding 87.0% sensitivity and 93.3% specificity for diagnosing dyspepsia. This value is comparable to the value proposed by Fraser et al. in the original English SF-LDQ version, which was 7.0 (producing 77.3% sensitivity and 73.2% specificity).[14] The study by Gatta et al. on the Kinyarwanda SF-LDQ proposed a cutoff score of 16, with 97% sensitivity and 71% specificity.[15] However, a significantly different result was found by Nkurunziza et al. in their study of the Kinyarwanda version of the SF-LDQ, which proposed a cutoff score of 16 (yielding a sensitivity of 97% and specificity of 71%).[16] This discrepancy might be attributed to the absence of a definitive gold standard for dyspepsia diagnosis. All of these studies, including our own, used clinical diagnosis as the "gold standard" of dyspepsia diagnosis. However, each study might have used different clinical criteria, and each physician might have employed a different approach. In our study, standardized Rome IV criteria were applied as the gold standard to minimize potential biases.

One of the strengths of the present study is that the population reflects the general Indonesian population. The study was conducted in both a Community Health Center and a Regional Hospital, which are often the only types of healthcare facilities available in remote areas of Indonesia. As an archipelago comprising thousands of islands, many Indonesians rely on limited healthcare resources. Most dyspepsia patients initially seek medical attention at Community Health Centers, while others go directly to Regional Hospitals. Despite being classified as hospital, regional hospitals in remote areas were often deprived of resources and facilities. Simple, valid, and reliable tools such as the SF-LDQ

are indispensable in these settings. Therefore, by conducting the current study in this setting, we believe the results can be applied to other similar, isolated, resource-limited facilities across Indonesia.

One limitation of this study was the lack of a definitive gold standard for dyspepsia diagnosis, which was addressed by requiring physicians to follow the standardized Rome IV criteria. Additionally, the absence of a method for evaluating treatment response prevented the assessment of responsiveness. Future studies with a specific design are needed to assess the responsiveness of this questionnaire. Although the SF-LDQ was designed to be self-filled, some patients required assistance from staff to complete it, and follow-up responses were sometimes collected via telephone interviews instead of direct self-filling. These challenges reflect the realities of remote Indonesian communities, where low education levels and geographic barriers, such as significant distances and rough terrain, can hinder participation. Nevertheless, the successful use of telephone interviews demonstrated that such barriers can be effectively addressed with the appropriate use of technology.

## CONCLUSION

We have demonstrated that the Indonesian SF-LDQ has been shown to be a reliable and valid instrument for evaluating the occurrence and intensity of dyspeptic symptoms. This tool has potential applications in both clinical and research settings and has been proven to be suitable for the Indonesian population, particularly those in remote areas. Healthcare providers at Community Health Centers (*Pusat Kesehatan Masyarakat-Puskesmas*) can use this simple tool to assess patients with dyspepsia.

### Conflict of Interest

The authors declare that they have no competing interests.

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### Author Contribution

All authors contributed significantly to the work and approved the final manuscript.

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### Data Availability

All data have been provided within the manuscript.

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