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https://doi.org/10.5109/6792814

出版情報：Evergreen. 10 (2), pp.676-687, 2023-06. 九州大学グリーンテクノロジー研究教育センター
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# Malay Version of the ATS-DLD-78A Questionnaire for Detecting Respiratory Symptoms in Welders: Translation and Cross-Cultural Validation.

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(Received December 22, 2022; Revised March 25, 2023; accepted April 24, 2023).

**Abstract**: The role of the questionnaire in epidemiological and public health studies has received increased attention across a number of disciplines. In a respiratory study, the progress of research in cross-cultural settings is reflected in the systematic application of clinical and research data collection that is quantifiable and reliable. However, one of the main obstacles is language. To date, there has been no reported evidence pertaining to the translation of the respiratory symptoms questionnaire into Malay, the national and most widely used language in Malaysia. Therefore, this paper presents a translation method for ATS-DLD-78A, the respiratory symptoms questionnaire, into the Malay language using a forward-backwards translation approach. This pilot study was conducted to validate a questionnaire on respiratory symptoms in a Malaysian welder population. A total of 28 welders were enrolled in this pilot study. The internal reliability and validity of the questionnaire were assessed. The Cronbach's alpha was 0.812, which is high and considered good. All other correlations using Pearson are significant, indicating that the concepts measured by the items and the translated questionnaire were valid and clearly understood by the participants. This will greatly contribute to the field of a respiratory epidemiological study in Malaysia.

Keywords: translation; ATS-DLD-78A; respiratory symptoms; Malay language; welders

## 1. Introduction

Welding fumes, which have different effects on health, are known to cause a lot of health problems at work. Unfortunately, for those who work as welders, the respiratory system is prone to problems following exposure to welding fumes that have been categorized by the International Association for Research on Cancer (IARC) as a Group 1 carcinogen with the lungs as the target organ[1)]. Research done in the past has shown that welders exposed to welding fumes are more likely to have respiratory complaints and a reduction in lung function[2-4)]. According to the Malaysia Department of Occupational Safety and Health's (DOSH) annual report, the number of cases of occupational lung disease (OLD) in Malaysia went from 95 in 2017 to 134 in 2020. Therefore, occupational exposure to welding fumes is proven to be harmful to workers[5)]. This is because the composition of welding fumes contains not only harmful gases but also toxic heavy metals. Since fumes can adversely affect a welder's health, it is important to consider the workers who are exposed to them. When a disease strikes a certain group of people, either because of their jobs or because of something else, it is important to do an epidemiological study to find out what caused the disease and how it might affect the population as a whole.

The findings from this epidemiological study are important to mitigate the disease from becoming an outbreak in the specific period and to stop it from happening in the future. The output from the occupational epidemiological studies was useful, especially for an organisation's decision-making to go for a greener strategy, which later on could benefit the quality of life of the workers by lowering workplace pollutants[6)]. Besides, this strategy could also have an impact and benefit the environment and society[7)]. Despite the many

epidemiological studies that have been conducted among welders, the results from the few epidemiological studies on this subject are few in Malaysia. In addition, according to the Malaysian Investment Development Authority (MIDA) the number of automotive manufacturers in Malaysia is large, as 28 production and assembly plants for passenger vehicles, commercial vehicles, motorcycles, and scooters, as well as automotive parts and components, have been established[8].

The prevalence of respiratory disorders in the industrial workforce was overwhelming. This is demonstrated by the Social Security Organization's (SOCSO) report, which noted an alarmingly high number of cases involving respiratory symptoms, including 544 cases of occupational respiratory disease in 2021, with a preponderance of cases involving males (67%) as the majority[9]. Since inhalation is the most prevalent route of exposure, it is well-known that occupational exposure can negatively impact the environment and humans. If it passes through respiratory barriers, it may potentially cause lung damage[10].

In order to obtain information on any respiratory complaint by the subject group, a questionnaire is one of the common tools to be used. A health questionnaire is fast becoming a key instrument in conducting an epidemiological study and has often been developed in one country or language, and later will be used in another cultural setting with a variety of languages. However, the performance of the questionnaire is limited by the understanding of the language when adapted to cross-cultural situations due to the fact that research questionnaires are not always correctly translated before being employed in different temporal, cultural, or linguistic contexts. As a result, it's possible that the outcomes based on these instruments don't precisely represent what they're meant to measure. To compare responses among populations of various language and/or culture, researchers must ensure that questionnaires written in different languages measure the same construct using the same metric[11]. The only way to guarantee that a translated measure is equivalent to the original survey is through the translation process, which is time-consuming and expensive[12].

The process of studying the measurements that have been created in one culture or specific population and their application, suitability, and significance to another culture and situation is known as cross-cultural validity[13]. The majority of health status measures have been developed, validated, and published in English, which is their native language. As the number of multinational and multicultural studies has increased, so has the need to modify these measurements for use in other languages[12]. In preserving the importance of the original script, it may be difficult to change the instrument in a way that is culturally appropriate and accessible[14]. Therefore, in order to maintain the identity of the original instrument, the adaptation process for instruments that have been developed in other versions according to a specific culture, country, or language must be done and must follow a specific and accurate methodology, and this process is known as cross-cultural adaptability[12].

This process may differ depending on the circumstances. Since the majority of health-related measures were established in the population that speaks English, the modification of language in the population that does not speak English would be a challenge, which would require consideration of language and cultural factors[15]. The language and style of the questionnaire may have an effect on how people answer the question, even in areas where English is frequently spoken alongside the native language and bilingualism is common. Respondents' actions when answering the questionnaire often occur in a subconscious state in order to fit cultural elements related to the target language. The discrepancy between respondents who can master at least two languages and use the same language questionnaire as the other respondents is smaller than if they answered in separate languages[16]. The respiratory questionnaires are normally constructed universally and can be applied to a diverse population. Yet, to ensure the research is conducted effectively, the cultural adaption of the questionnaire is needed by using the local language to avoid erroneous data collection as well as to convey the information correctly. Therefore, the ideal solution is to use, try, and test the instrument after appropriate adaptation based on the selected cultural settings.

A questionnaire used was based on the Adult's Questionnaire approved by the American Thoracic Society and is used in occupational health studies among workers relating to respiratory problems (ATS-DLD-78A). The questionnaires include the following information: the adult's present and previous history of respiratory symptoms and diseases; work history; parental history of diseases; socio-demographic characteristics; smoking habits; and pack years. It is believed that a measure of respiratory symptoms that works in the original country of the questionnaire (the USA) may not necessarily apply 100 percent to clinical settings in Malaysia. To suit the study on the preliminary evaluation of respiratory symptoms and diseases among welders, this questionnaire has been slightly modified in the areas of socio-demographic factors, smoking habits, and occupational history.

Several studies have shown that ATS-DLD-78 can be utilised in multicultural settings in the translated questionnaire, with validation studies of the translated Sindhi, Portuguese, Urdu, French, Chinese, Norwegian, Thai, Hausa, Japanese, and Zulu versions showing considerable consistency across cultures[17-27]. As a result, the American Thoracic Society Division of Lung Disease questionnaire (ATS-DLD-78A) is an established method for evaluating and detecting respiratory system warning indicators in the investigated population globally. It is important to note that the cultural context of the second

language (Malay) that was used to translate the original questionnaire differs from the original language. Thus, in order to achieve conceptual equivalence in a questionnaire translation process, the forward-backwards translation techniques should be implemented so that the instruments are practically performed in the same way and it is necessary to translate in the studied population or culture[28]. The forward-backward technique begins with a version of the question set in the language in which it was initially written, for example, English, and this version is handed to expert translators who translate the module into the target language (Malay in this research) and then pre-test it in a Malay-speaking community prior to the research activity.

This paper explores the development and evaluation procedure of a questionnaire that relates to the recent work on metal fume exposure among automotive welders in Malaysia. According to a previous study, the Malay translation was easy to understand and preferred among Malay native speakers[29]. All team members are trained to ensure that the participant or respondent clearly understands the questions, especially the existence of respiratory-related symptoms like coughing and gasping (shortness of breath), as the research questionnaire is conducted in an interview-based manner[30-31]. This means that if there is any unclearity about the question given, the respondent has the right to have a detailed explanation from the researcher before answering the questions.

As a result, the goal of this research is to present knowledge that focuses on the procedures used to conduct each step of translating the ATS-DLD-78A questionnaire into Malay, which is a Malaysian national language, and modifying the context to suit Malaysian culture, thereby advancing knowledge of the research on respiratory symptoms and illness.

## 2. Methods

### 2.1 Study Design and Setting

In October 2016, 28 male welders were recruited for a pilot study at one of the Malaysian automotive companies at Pekan Automotive Hub. The list of respondents was obtained from the Head of Operations, who is in charge of the welders in the company. The sample size determination was according to Krejcie and Morgan (1970)[32], and the sampling method is according to probability sampling that involves random selection (a simple random sample) using an online Random Number Generator provided in Open Source Epidemiologic Statistics for Public Health[33]. With the exception of any practical trainees, all of the welders chosen for this study had at least one year of experience with metal inert gas (MIG) welding. Subjects with at least one year of work experience and over the age of 20 were eligible. The selection of welders (for inclusion and exclusion) to participate in this study is up to the decision of the expert staff who are part of this research team.

Only welders who met the requirements were enrolled in this study. The welders who are taking part are all Malay, with the majority speaking a variety of Malaysian dialects. By considering the welder's work for a standard eight hours per day (average time of exposure to the contaminants) for five consecutive days per week (Monday-Friday), the work comes to 40 hours per week. This interview-analysis additionally evaluated sociodemographic data, smoking behaviour, and previous work experience in a chemically hazardous setting. There were two categories of smoking habits: never-smokers and ever-smokers, where ever-smokers is a category for current and former smokers. An individual who smoked for at least a year and hasn't smoked in the past year is considered a former smoker. The ATS-DLD-78A questionnaire was employed to document if there were any existing symptoms that were related to respiratory problems among welders. The questionnaire is divided into two sections: socio-demographic and respiratory symptoms, which are then divided into a few sub-sections, as shown in Fig. 1.

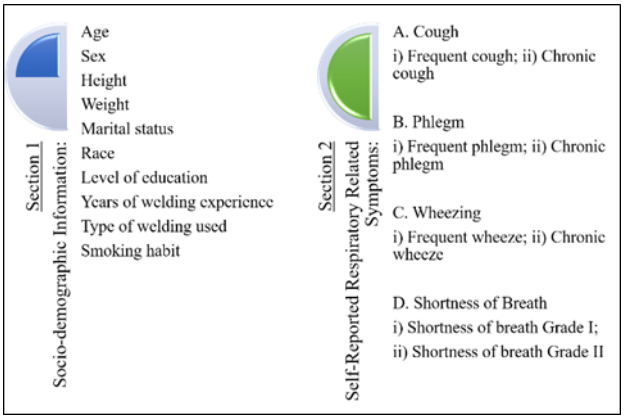


**Fig. 1:** Two sections of ATS-DLD-78A.

To ensure the accuracy of the questions, the ATS-DLD-78A was translated in two directions (forward and backward) from the original version (English) into the target version (Malay) and re-translated back into the original language.

### 2.2 Translation Process

The cross-cultural equivalence validity in translation systems often list five criteria: content, semantic, technical, criterion, and conceptual[34]. The translation process between the original and translated versions in Malay is divided into three levels: a) the linguistic or semantic; b) the technical; and c) the conceptual, as recommended in another study[35]. The translation level and its purposes are shown in Fig. 2.

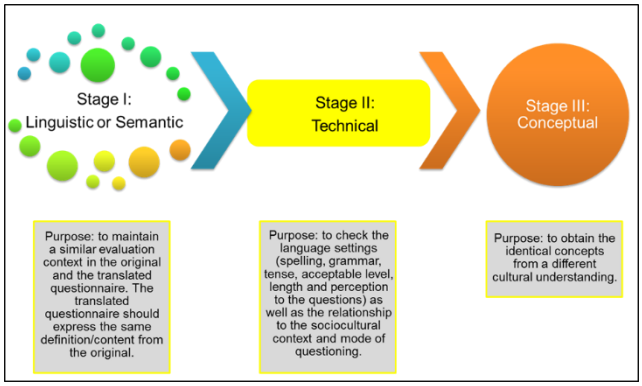


**Fig. 2:** Level of translation and its purpose.

In the modern period of globalisation, every society is dependent on other societies, and the world is becoming increasingly interconnected[36]. The only barrier that normally existed was the language. Thus, instead of making a new set of questionnaires, a previously validated instrument is often used and changed to fit another target culture and language. This is more common in clinical settings than in other situations. However, the overall context of the original questionnaire can not be changed in any fundamental way. As most of the validated and established questionnaires are originally in the English language, this may create a problem of ethnocentricity, also known as cultural hegemony, in the cross-cultural study[37].

This translation process is done by Malay language expert translators that work separately for forwarding translation in order to produce a consensus questionnaire before the ATS-DLD-78A questionnaire is back-translated by a professional bilingual English and Malay translator team who are blinded to the original questionnaire. Following comparison and evaluation by the translators, these bilingual versions are checked to ensure the translation process is expressing the same meaning and is acceptable and applicable according to cultural settings. These translator teams are selected based on their skills, knowledge, and experience in the translation process and proofreading. A selection of more than one translator is better in many ways, especially in regional variance and idiosyncratic interpretation, with consideration of the translator's point of view[38]. The translators were chosen based on criteria that met a prerequisite of having at least five years of translating experience and a bachelor's degree[39]. The work is overseen by the coordinator, who is responsible for supervising and explaining any issues that arise to the translator[40]. The brief translation process flow for this project is illustrated in Fig. 3.

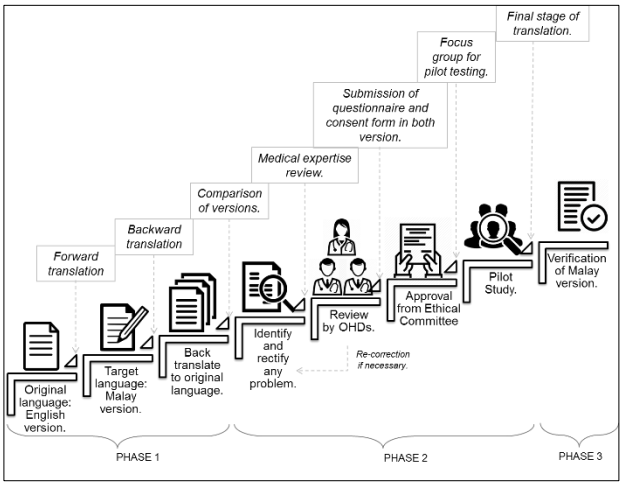


**Fig. 3:** Illustration of ATS-DLD-78A translation and evaluation phases.

The ATS-DLD-78A questionnaire that is used for current research has been modified to suit Malaysian culture and the targeted work population (welder). This is because there is a cultural difference in interpretation in translating the term from the original version to the local version. For example, the term "check" in the original version may be interpreted in a different manner among respondents. In this situation, the term "check" may refer to the act of examining in order to determine its accuracy, quality, and/or condition, whereas the term "tick" has been interpreted as a mark used to indicate items in a list or questionnaire's text have been chosen. Upon completion of the translation process, the Malay version of ATS-DLD-78A was given to the selected Malaysian occupational health doctors (OHDs) who are specialised in the medical subject for review. These OHDs suggest that the research should be conducted by using an interview-based questionnaire approach to assist respondents, especially those with low education. Based on a review by OHDs, the critical terms used in this translated questionnaire would be clearly understood by the Malaysian respondent.

Overall, the research team that participates in this project should be well-versed not only in the relevance of cultural questions before collecting data but also in considering the technical and semantic equivalence perspectives. A pilot test of the translated version questionnaire was conducted among automotive welders to provide extra rigour and validity to the Malay version questionnaire, and the study found that this translated questionnaire was useful as a tool in diagnosing respiratory problems among adult workers[41].

### 2.3 Questionnaire

In a respiratory epidemiological study, the questionnaire is one of the most common procedural and subjective instruments for determining the symptoms[42]. This approach is widely available and has been used in many investigational studies. A variety of questionnaires

are used to assess respiratory symptoms. Each has its advantages and drawbacks. Studies done so far have shown that the ATS-DLD-78A is reliable and can be used over and over again by self-assessment or interviewer-administered methods that are designed to screen for and find respiratory symptoms in any country[43-44]. In the previous study, the classification of the respiratory symptoms into frequent or chronic or Grade I or Grade II for cough, phlegm, wheezing, and shortness of breath was referred to Abbasi et al.[45]. The additional info on smoking status is categorised into three: never smoked; current smoker; and former smoker[46]. A "former smoker" is someone who has smoked at least 100 cigarettes in their lifetime and hasn't smoked in more than a year. A "current smoker" is someone who is still smoking or a "recent quitter" who quit less than a year before the survey was done[47].

The ATS-DLD-78A is a research instrument that can be utilised in a two-stage detection procedure: screening test and clinical diagnostic. A screening test is to detect any probable cases, while clinical diagnosis is commonly used during the clinical interview. The questionnaire consists of ten parts that touch in depth on 1) cough; 2) phlegm; 3) episodes of cough and phlegm; 4) wheezing; 5) breathlessness; 6) chest colds and illnesses; 7) past illnesses; 8) occupational history; 9) smoking; and 10) family history. Most of the items have a yes/no option. The subtleties and nuances of language and culture need to be considered during the translation process to avoid misinterpretation of the symptoms[35].

Before translation, a few criteria in the questionnaire are modified according to the research needs which are focused on welders. The socio-demographic questions sought information on the current company that the respondent works for; age; designation; highest education level; height (in kilogrammes), weight (in centimetres), nature of the previous job (if worked either in the chemical or welding environment), and race. As Malaysia is a multicultural country, the list of options is typified by three major ethnic groups, namely Malays, Chinese, and Indians[48]. For another respondent that is not on the list, they need to state their ethnicity in the "Other" options. The respondents must also answer questions about the types of welding used in their current and previous jobs. The number of years welding in the current and previous jobs is recorded to measure the duration of exposure among welders to metal fumes. An additional question about smoking habits is included so that the addiction to smoking is not only focused on the manufactured cigarette, cigar, and pipe but also other types of smoking such as vaping, electronic cigarettes, hand-rolled cigarettes, and water pipes (also known as shisha).

In the initial phase (Phase 1), a translation is conducted by bilingual certified translators whose native language is the Malay language by applying forward translation from English to the Malay language. Then, the Malay version of the document is back-translated by other translators who have an excellent command of both languages. The word search was done by referring to the Malay Literary Reference Centre (PRPM) website provided by the Institute of Language and Literature (DBP). On completion of translation, the first revision process (Phase 2) is conducted by comparing both versions to identify any differences in the translated questionnaire. A draft of the translated questionnaire is reviewed and refined in a team meeting. Any discrepancies should be seriously discussed and rectified. Once rectified, the questionnaire is then submitted to medical expertise for a review.

The second revision of the translation was done by registered occupational health doctors (OHDs) under the Malaysia Department of Occupational Safety and Health (DOSH) who work in the same community. The translation should be revised based on the information provided by the OHDs. The Malay language is the native tongue of these OHDs, who are of the Malay ethnicity. Therefore, their views and ideas are reasonable. For example, in the section that asked about the wheezing symptoms, the panel agreed to translate the word "wheezing or whistling" as "*berdehit*" rather than "*semput atau bersiul*" due to the potential for confusion among respondents. It is suggested that, in the phase of the study involving illiterate people, the trained interviewers need to assist in the comprehension and cultural relevance of the question asked. Before the study starts, both versions of the questionnaire and consent form are sent to the International Islamic University Malaysia (IIUM) Research Ethics Committee for approval.

When inviting the participants to participate in a pilot study about automotive welding fume exposure and health impacts associated with respiratory systems, the purpose of the research was clearly explained. This focus group had to read (or it had been read for illiterate respondents) the foregoing information, have the opportunity to ask questions about this research and have it answered to their satisfaction before they decided whether to join this study or not. The whole exercise should be carried out in a structured manner.

The data collected from the pilot testing is analysed, discussed and verified for the Malay version, and this is the final stage of translation (Phase 3). This testing is necessary to validate the new version of the questionnaire in the targeted language due to the fact that translation for cross-cultural research is quite difficult and requires a conversion from the researcher's language into another cultural language[49]. The structure for this questionnaire is then developed using Epi Info™ 7 (Version 7.2.0.1) from the Centers for Disease Control and Prevention (CDC), which includes field validation and skip logic to make data entry easier. The approach of the translation of a selected tool designed to suit the target culture tends to have more accuracy in methodology. The application of this encourages more understanding of the scientific and medical aspects of welding fume related exposure.

The purpose of this research was to translate the ATS-DLD-78A and this also highlighted the understanding of respondents in answering the symptom-related questions

in the Malay language, as well as to assess its reliability and validate it. The translated questions of respiratory related symptoms into the Malay version were shown in Table 1.

Table 1. List of questions that highlight the respiratory-related symptoms.

| Items | Symptoms |
|---|---|
| Q1 | Cough |
| Q2 | Frequent Cough |
| Q3 | Chronic Cough |
| Q4 | Phlegm |
| Q5 | Frequent Phlegm |
| Q6 | Chronic Phlegm |
| Q7 | Wheeze |
| Q8 | Frequent Wheeze |
| Q9 | Chronic Wheeze |
| Q10 | Shortness of Breath Grade I |
| Q11 | Shortness of Breath Grade II |

### 2.4 Data Analysis

This study only discusses the translation process, internal consistency reliability (α), and validity by applying Pearson correlation analysis to respiratory-related symptom questions. The data was analysed using IBM SPSS Statistics 27.0 for Windows. The statistical test of Cronbach's alpha (α) was computed to measure the questionnaire's reliability based on data gathered in the study, with the high alpha score indicating that the questionnaire has a high degree of internal consistency. Chronbach's alpha acceptability levels reported range from 0.70 to 0.95[50]. The following rules of thumb are established in previous article[51]: Excellent ($\alpha \geq 0.90$), Good ($\alpha \geq 0.80$), Acceptable ($\alpha \geq 0.70$), Questionable ($\alpha \geq 0.60$), Poor ($\alpha \geq 0.50$), and Unacceptable ($\alpha < 0.50$). In addition, it should be emphasised that an alpha of 0.80 is likely an reasonable target[52].

The reliability of the scale was evaluated using Cronbach's alpha for the full scale, corrected item-total correlations, and if an item is deleted. The reliability of the questions that highlight the respiratory symptoms as claimed by the welders has been assessed. Utilising Pearson correlation, construct validity was tested. A p-value was deemed statistically significant if it was less than 0.05. The frequency and descriptive statistics of socio-demographics collected in this pilot study, the correlation between respiratory-related symptoms and lung function among respondents, as well as the findings of multivariate regression, were established in other articles[41].

### 2.5 Ethical Consideration

Written informed consent is distributed before the ATS-DLD-78A questionnaire is conducted. All participants are briefed on the content of the consent and the rights that they have to opt out at any time from the study and that collected data may possibly be published. The International Islamic University Malaysia (IIUM) Research Ethic Committee approved the study protocol, and all research participants provided written, informed consent in accordance with the Declaration of Helsinki (Reference ID: IREC 850).

## 3. Results and Discussion

This is believed to be one of the first studies to examine the reliability of the ATS respiratory questionnaire in a local language (Malay) among automobile welders in Malaysia. The Malay version of the ATS-DLD-78A is intended to aid in the assessment and evaluation of respiratory-related symptoms in order to gauge the knowledge levels of employees' respiratory conditions.

The consistency and repeatability of an instrument are referred to as reliability, and internal consistency was tested[53-54]. By adding more items to the questionnaire, reliability can be increased[55]. However, doing so may change the results for internal consistency. Basically, the number of items, the mean, and the standard deviation are the three pieces of data needed to calculate internal consistency. In this study, internal consistency methods are emphasised. Cronbach's alpha is commonly employed to measure internal consistency. All Cronbach's alpha values as shown in “Chronbach’s Alpha If Item Deleted” for the developed constructs in Table 2 were greater than 0.75. Nunnally & Bernstein (1994) defined a value equal to or greater than 0.70 ($\alpha \geq 0.70$) as indicating excellent internal consistency and acceptable reliability[55]. Cronbach's alpha levels of 0.5 to 0.7, as determined by Sowtali et al., are considered acceptable, while values of 0.7 and higher indicate apparent questionnaire item homogeneity[56]. As demonstrated, Cronbach's alpha for the eleven items in the instrument is 0.812. Consequently, no modifications are made to the instrument's contents.

These findings imply that the reliability of the questionnaire in the Malay version of this study is satisfactory. Several studies on various occupational groups have found a link between specific symptoms and decreased lung function[57-59]. One study found that cough and phlegm symptoms were more likely to be related to an obstructive pattern than wheeze or phlegm[60]. Notwithstanding, another respiratory study found that automotive welders have a restrictive lung pattern[61]. This is because one of the things that can cause abnormal lung patterns in workers (either obstructive or restrictive) is how they work and what they are exposed to at work. The appearance of any respiratory-related symptoms reported by the workers could indicate that there is something wrong with their respiratory systems. Since the purpose of the questionnaire is to find out about breathing problems, a further test or diagnosis is needed to confirm the lung condition. Even though most of the links between specific symptoms and changes in lung function found in these studies can be traced back to specific occupational exposures, symptoms found in questionnaires accurately

predicted changes in lung function that were confirmed by spirometry.

Overall, most of the domains of the Malay version of the respiratory questionnaire (ATS-DLD-78A) exhibited excellent internal consistency. This finding is almost parallel to that of previous studies, which indicated a Cronbach's alpha of more than 0.70 in almost all domains of the ATS-DLD-78A that have been translated into other languages[43,58].

Hair et al. (1995) assert that the appropriate explanation of the conceptual field to be covered determines an instrument's content validity[62]. It was investigated how one item related to the full set of items. A Pearson Correlation with the calculated variables for each group is shown in Table 3. The data from this study show that the severity of complaints of cough, phlegm, wheeze, and shortness of breath among respondents varies with the results of the association between the inter-items of frequent cough ($p = 0.029$, 95% CI: 0.047–0.681); chronic cough ($p < 0.001$, 95% CI: 0.746–0.941); frequent phlegm ($p = 0.020$, 95% CI: 0.078–0.697); chronic phlegm ($p = 0.005$, 95% CI: 0.173-0.744); wheeze ($p = 0.020$, 95% CI: 0.078-0.697), frequent wheeze ($p < 0.001$, 95% CI: 0.285-0.792), and short breath grade II ($p = 0.005$, 95% CI: 0.173-0.744) respectively. A strong positive correlation was also found between frequent cough and chronic phlegm ($p = 0.029$, 95% CI: 0.047-0.681), frequent wheeze (p 0.001, 95% CI: 0.433-0.848), and chronic cough with short breath grade II (p 0.001, 95% CI: 0.305-0.880). Having phlegm was found to be associated with chronic phlegm ($p < 0.001$, 95% CI: 0.779-0.950), wheeze ($p = 0.001$, 95% CI: 0.258-0.781) and frequent wheeze ($p = 0.004$, 95% CI: 0.197-0.755). The results also showed that chronic phlegm was associated with wheeze ($p < 0.001$, 95% CI: 0.389-0.832) and frequent wheeze ($p < 0.001$, 95% CI: 0.285-0.792). Frequent wheeze ($p = 0.004$, 95% CI: 0.197-0.755) and chronic wheeze ($p < 0.001$, 95% CI: 0.577-0.894) as well as the short breath grade II ($p = 0.020$, 95% CI: 0.078-0.697) were also found to have a statistically positive correlation with wheeze.

Correlations between the respiratory symptoms of cough, phlegm, wheeze, and shortness of breath suggest that the item is a valid summary indicator of symptom severity[63]. The links between cough, phlegm, wheezing, and shortness of breath indicate that the measure is sensitive to changes in the severity of the disease (frequent or chronic for cough, phlegm, and wheezing; Grade I or II for shortness of breath). The findings of this investigation indicate that the Malay translation of ATS-DLD-78A is trustworthy. As an instrument is used repeatedly in studies by different researchers under different conditions and contexts, information about its validity and reliability accumulates over time, and trust in the instrument grows[63].

There was poor correlation found for questions *"Adakah anda biasanya mengeluarkan kahak seperti ini pada kebanyakkan hari selama 3 bulan berturut-turut atau lebih dalam tempoh setahun?"* (Q5) and *"Adakah anda mempunyai masalah sesak nafas apabila bergegas berjalan di permukaan rata atau menaiki bukit?"* (Q10) in any of the other questions. The validity of the instrument's construct is demonstrated by the removal of these question groups. But since the Chronbach's alpha if item deleted is more than 0.75, therefore, there is no necessary to eliminate Q5 and Q10.

All of the other correlations are significant, which means that the items are measuring the concepts. There were no missing data, and every participant answered every question on the questionnaire. Content validity is an assessment of the appropriateness of the content and its presentation[64]. These results show that the appliance's content validity is acceptable. As a proven and globally adopted scale, its original structure will not be altered. The main objective is to have a better grasp of how this scale functions in the Malaysian language and culture. A similar approach from the previous study of translating and validating the questionnaire related to medical assessment into a Malay version has been observed as a valid and reliable tool for assessing educational needs and gathering information among group-based participants in Malaysia[56,65-69]. To date, none of the studies have been observed using the Malay version of the respiratory symptoms questionnaire in Malaysia.

Despite the fact that this was a pilot study with a limited sample size, it considerably adds to the scant evidence about the validation of the ATS respiratory questionnaire in automotive welders' community settings, particularly in Malaysia. According to a similar study done before, spirometry has the added benefit of detecting impaired lung function in people who don't have any symptoms[45]. This may not be possible with questionnaires alone, which have low sensitivity and positive predictive values but high specificity and negative predictive values for all frequent or less severe symptoms as well as chronic or more severe symptoms in the ATS questionnaire. Therefore, it is recommended to establish a parallel procedure in the study on respiratory symptoms by utilising a questionnaire and spirometry test that are aligned.

The findings of this study demonstrate that the ATS-DLD-78 questionnaire is still a valid tool for data collection, and that respondents, regardless of their level of education, were able to understand the items it included. It was discovered that every subset question for outcome variables such as cough, phlegm, wheeze, and dyspnea was trustworthy. The results of this study are the same as those of other studies done all over the world that used the ATS-DLD-78 respiratory symptoms and illnesses questionnaire as a pilot[43,70-71].

Table 2. The reliability coefficients for 11 items, the scale statistics, and item total statistics with internal consistency (Cronbach's alpha) if the item is eliminated.

| Statistics for scale | | | N of items<br>11 | Mean<br>1.46 | Variance<br>4.851 | SD<br>2.202 |
|---|---|---|---|---|---|---|
| | Mean | Minimum | Maximum | Range | Max/Min | Variance |
| Item Means | 0.133 | 0.036 | 0.214 | 0.179 | 6.000 | 0.005 |
| Item Variances | 0.115 | 0.036 | 0.175 | 0.139 | 4.889 | 0.003 |
| Inter-item Correlations | 0.242 | -0.145 | 0.893 | 1.038 | -6.164 | 0.089 |
| Item-total statistics<br>Questions: Indication | | | Scale Mean If Item Deleted | Scale Variance If Item Deleted | Corrected Item-Total Correlation | Chronbach's Alpha If Item Deleted |
| Q1: Cough | | | 1.29 | 3.693 | 0.671 | 0.775 |
| Q2: Frequent Cough | | | 1.43 | 4.550 | 0.328 | 0.810 |
| Q3: Chronic Cough | | | 1.32 | 4.004 | 0.505 | 0.794 |
| Q4: Phlegm | | | 1.25 | 3.528 | 0.731 | 0.767 |
| Q5: Frequent Phlegm | | | 1.43 | 4.847 | -0.038 | 0.828 |
| Q6: Chronic Phlegm | | | 1.29 | 3.545 | 0.785 | 0.761 |
| Q7: Wheeze | | | 1.25 | 3.528 | 0.731 | 0.767 |
| Q8: Frequent Wheeze | | | 1.39 | 4.173 | 0.568 | 0.792 |
| Q9: Chronic Wheeze | | | 1.32 | 4.226 | 0.339 | 0.811 |
| Q10: Short Breath Grade I | | | 1.39 | 4.840 | -0.050 | 0.836 |
| Q11: Short Breath Grade II | | | 1.29 | 3.989 | 0.455 | 0.800 |
| Reliability Coefficients for 11 Items | | | Chronbach's Alpha<br>0.812 | | | |

Table 3. The Pearson Correlation Coefficients for ATS-DLD-78A respiratory symptom factors in the questionnaire.

| | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | Q11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Q1 | - | | | | | | | | | | |
| Q2 | **0.413*** | - | | | | | | | | | |
| Q3 | **0.876**** | -0.079 | - | | | | | | | | |
| Q4 | **0.438*** | 0.369 | 0.284 | - | | | | | | | |
| Q5 | -0.090 | -0.037 | -0.079 | 0.369 | - | | | | | | |
| Q6 | **0.513**** | **0.413*** | 0.343 | **0.893**** | -0.090 | - | | | | | |
| Q7 | **0.438*** | 0.369 | 0.284 | **0.576**** | -0.101 | **0.666**** | - | | | | |
| Q8 | **0.595**** | **0.694**** | 0.283 | **0.531**** | -0.053 | **0.595**** | **0.531**** | - | | | |
| Q9 | 0.076 | -0.079 | 0.125 | 0.284 | -0.079 | 0.343 | **0.782**** | -0.113 | - | | |
| Q10 | -0.129 | -0.053 | -0.113 | 0.193 | -0.053 | 0.233 | -0.145 | -0.077 | -0.113 | - | |
| Q11 | **0.513**** | -0.090 | **0.609**** | 0.211 | -0.090 | 0.270 | **0.438*** | 0.233 | 0.343 | -0.129 | - |

*statistically correlates p-value < 0.05; ***statistically correlates p-value < 0.01.

In general, evaluating an instrument's consistency or reliability is crucial. Internal consistency (Cronbach's alpha) was noticed to determine reliability. In this pilot investigation, the Cronbach's alpha reliability for the total of eleven items was 0.81, which denotes good instrument internal consistency. Pilot testing of the instrument in Malaysia with this small, homogeneous group (n = 28 welders) indicates that the instrument has appropriate psychometric qualities to sustain its usage; however, field testing with a larger sample of welders in other automobile plants is required. The limitation of this study is that the reliability study of the questionnaire was restricted to the Malay-speaking population, and the reliability evaluation was limited to internal consistency.

## 4. Conclusion

The results of this study indicate that the ATS-DLD-78A in the Malay version has good validity and reliability. The application of ATS-DLD-78A in the Malay language is able to assist cross-cultural research in Malaysia that is relevant to clinicians and public health sectors. The ATS-DLD-78A was successfully translated into Malay and then cross-culturally adapted. Although certain items exhibited poor correlation results, overall consistency was deemed satisfactory. Validation of the instrument in its Malay version and demonstration of its psychometric qualities are required to demonstrate the instrument's suitability for measuring respiratory-related symptoms in welders.

### Conflict of Interest

There are no conflicts of interest in this study.

### Acknowledgements

We would like to acknowledge the translators, review team, and participation of occupational health doctors (OHDs) and other medical doctors for their assistance in reviewing and validating the amendment of a respiratory questionnaire for quality assurance.

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