ORIGINAL ARTICLE

Reliability and Construct Validity of Maqasid Shariah Knowledge Questionnaire.

Mohd Shaiful Ehsan Shalihin[1], Abdurezak Abdulahi Hashi[2], Aminudin Bin Che Ahmad[3], Ramli Musa[4], Nazri Mohd. Yusof[3], Azmir Ahmad[5], Mohamad Firdaus Mohamad Ismail[5].

[1]Department of Family Medicine, Kulliyyah of Medicine, International Islamic University of Malaysia, Jalan Sultan Ahmad Shah, 25200, Kuantan, Pahang.
[2] Department of Biotechnology, Kulliyyah of Science, International Islamic University Malaysia, Jalan Sultan Ahmad Shah, 25200, Kuantan, Pahang.
[3]Department of Orthopaedic, Kulliyyah of Medicine, International Islamic University Malaysia, Jalan Sultan Ahmad Shah, 25200, Kuantan, Pahang.
[4]Department of Psychiatry, Kulliyyah of Medicine, International Islamic University Malaysia, Jalan Sultan Ahmad Shah, 25200, Kuantan, Pahang.
[5]Kulliyyah of Nursing, International Islamic University Malaysia, Jalan Sultan Ahmad Shah, 25200, Kuantan, Pahang.

Corresponding Author
Mohd Shaiful Ehsan Shalihin
Department of Family Medicine, Kulliyyah of Medicine,
International Islamic University Malaysia,
Jalan Sultan Ahmad Shah, 25200, Kuantan, Pahang.
Email: shaifulehsan@iium.edu.my

Submitted: 22/08/2024. Revised edition: 26/09/2024. Accepted: 01/10/2024. Published online: 01/11/2024.

Abstract

Maqaṣid Shariah is a holistic view of life with the concept of maintaining good conditions and ensuring the welfare of all humankind while preventing any harmful act, evil, or injury. In the context of medical practice, it shares similar objectives, particularly in promoting well-being and upholding principles of harm reduction. However, no local questionnaire or assessment tool currently available to measure the level of understanding of our community regarding Maqasid Shariah principles. Therefore, a newly developed, reliable, and valid questionnaire is needed. This study aimed to develop and validate a newly created questionnaire to assess knowledge of Maqasid Shariah. The questionnaire consists of 20 items, including a mix of true and false-choice questions and one best answer question on Maqasid Shariah topics. The questionnaire was distributed to 254 members of the medical community. Reliability was determined using Cronbach's alpha for internal consistency, while construct validity was assessed using factor analysis. An acceptable degree of internal consistency was observed for the final 12 items (Cronbach's alpha = 0.700). Factor analysis showed two meaningful components, which represent the background domain and the knowledge domain. This study indicates that this questionnaire is a reliable and valid tool for assessing the knowledge of respondents about Maqasid Shariah.

Keywords: *Maqasid Shariah, questionnaire, validation.*

Introduction

Maqasid Shariah is one of the fundamental principles of human life. Its objectives are to bring benefit to mankind in both this world and the hereafter, while preventing corruption and evil [1]. *Maqasid* literally means "straight path" and "justice." Overall, *Maqasid Shariah* can be regarded as the meanings and wisdom considered by the lawgiver in all or most circumstances of Shariah. This consideration is not confined to specific types of Shariah rulings but governs all aspects of life. There are three types of rules under Shariah: rules relating to belief (Aqidah), rules relating to morality (Akhlak), and rules relating to acts of subjects or practical rules (Fiqh). The essential *Maqasids* are concerned with the protection and preservation of five fundamental values: religion (al-din), life (al-nafs), intellect (al-'aql), progeny (al-nasl), and wealth (al-mal) [2].

The primary objectives (*Maqasid*) typically include the preservation of faith (din), life (nafs), intellect ('aql), lineage (nasl), and property (mal) [1-3]. Based on the priority of saving lives, *Maqasid Shariah* places great importance on preserving life, encouraging the development of medical practices and interventions that save lives and improve health. It promotes the advancement of medical research and technology to prevent, diagnose, and treat diseases effectively. Regarding the preservation of intellect, *Maqasid Shariah* acknowledges the importance of mental health alongside physical health, advocating for comprehensive care that includes psychological well-being. In the preservation of faith, *Maqasid Shariah* promotes a holistic approach to medicine that considers spiritual well-being, ensuring that care aligns with patients' religious and spiritual beliefs. It also encourages responsible reproductive health practices and the protection of family lineage through ethical medical interventions in fertility, prenatal, and postnatal care, thus preserving lineage. Finally, in the preservation of property, *Maqasid Shariah* advocates for affordable healthcare services, ensuring that financial constraints do not hinder access to essential medical care [1-3].

Given that the preservation of the five essential *Maqasids* aligns with medical ethics and practices, this concept has long been incorporated into medical issues and guidelines, particularly among Muslim practitioners and patients. In medical practice, *Maqasid Shariah* shares similar objectives and aims in promoting well-being and upholding harm reduction principles [3,4]. The intersection of both can be seen as an integration of the theoretical framework governed by *Maqasid Shariah* and the practical aspects delivered by healthcare providers in medical settings. Early Muslim physicians, notably Ibn Sina and Al-Razi, demonstrated Islamic principles in medical and healthcare practices since the early history of medicine [3,4]. This integration has been emphasized in medical curricula at both undergraduate and clinical postgraduate levels. *Maqasid Shariah* offers a holistic view of life, focusing on maintaining good conditions and ensuring the welfare of all humankind, while preventing harm, evil, or injury. Nevertheless, there is currently no available questionnaire or assessment tool to verify the understanding of the community or physicians regarding *Maqasid Shariah* in the context of medical practice. Developing such a scale is crucial for analyzing feedback and assessing people's understanding of the concept, enabling improvements in future training or practice. Therefore, this study aims to develop and validate a questionnaire to assess knowledge of *Maqasid Shariah* in medical applications.

Materials and methods

Study instrument and content validation

The objectives of this study are to measure the reliability and construct validity of a newly developed questionnaire for the *Maqasid Shariah Knowledge Scale*. For this questionnaire, two domains were proposed and identified. The first domain consists of general questions about the respondent's background in Islamic education and exposure to *Maqasid Shariah*; the second domain

includes 14 items covering general topics related to *Maqasid Shariah*.

The items were developed through discussions and expert opinions from a panel of six members: three experts in *Maqasid Shariah*, two experts in questionnaire development and validation, and one expert in linguistics. These experts ensured the content and structural validity of the questionnaire. All panel members agreed that the items effectively covered key areas of *Maqasid Shariah* knowledge and were suitable for local contexts.

Sample Size.

The sample size is calculated based on the subject-to-variable ratio of 1:10 according to the Nunnally method [5]. As there are 20 items in this questionnaire, the required sample size is about 200 respondents.

Face Validation

Face validity of the newly developed questionnaire was assessed by conducting pre-testing among ten Malay-speaking, Muslim graduate students. The aim of this pretest is to ensure the readability and comprehensibility of the questions. The participants were required to answer the questions completely via a self-administered method initially and comment on each question if necessary. The comments were then discussed among the researchers.

Questionnaire Distribution, Reliability and Validity Testing

The final version of the questionnaire was then distributed to 254 students and staff of the medical faculty at a local university. These individuals met the inclusion criteria of the study, which are: 1) currently an active staff member or student of the medical faculty; 2) adult aged over 18 years; 3) Malaysian; 4) Muslim; and 5) able to converse in English. Verbal and written consent were obtained through their willingness to sign in for the online pre-test and submit the answers. The respondents were informed that their participation in the study was completely voluntary and that they could withdraw their consent to participate at any time without the need for an explanation.

Demographic data of the participants were summarized using descriptive statistics with means and standard deviations for continuous variables and counts and percentages for categorical data. For reliability testing, Cronbach's alpha was selected to measure the internal consistency among the items [6]. A score above 0.7 for Cronbach's alpha was considered highly consistent, while a value of 0.40 – 0.69 was considered moderately consistent [7]. The higher the value of Cronbach's alpha, the more reliable the questionnaire items [6-8]. Factor analysis was performed to measure the questionnaire's construct validity. The best items representing each component were identified. A Kaiser-Meyer-Olkin value of more than 0.7 and a significant Bartlett's test of sphericity (p value < 0.001) are needed to provide significant components in the factor analysis [9].

Ethical Approval

The study has been approved by the IIUM Research Ethics Committee (IREC 2022-113).

Results

Demographic data of the respondents

A total of 254 staff and students responded. All of them were Muslims, and 99% were Malaysian. 69.2% were female. The age of respondents ranged from 19 to 51 years (Table 1).

Reliability analysis

The Cronbach's alpha value of the 20 items was 0.647 which is acceptable. After discussion with experts and team members, items with low corrected item total correlation (below 0.19) namely items number 11,12, 14, 16, 17,18,19 and 20 were removed in view of poor discriminating value [10]. Table 2 shows the corrected item-total correction for each item before the deletion of those items mentioned.

Construct validity

Factor analysis of the remaining 12 items showed an acceptable value for the Kaiser-Meyer-Olkin measure of sampling adequacy (0.761) and a significant Bartlett's Test of Sphericity (< 0.001), which gave rise to three domains. However, by taking the eigenvalue of 2.0 on the scree plot (Figure 1), the graph levels off at component number 2. An eigenvalue of 2.0 was chosen based on Monte Carlo parallel analysis. Furthermore, by looking at the number of items without overlapping domains in factor analysis as shown in Table 3, the ideal number of retained domains is indeed two (Domain 1 and Domain 2). After discussion with the experts, Domain 3 was removed as the items in this domain were low in number and already present in Domain 1 and Domain 2. The first domain consists of six general questions pertaining to the exposure of respondents to Maqasid Shariah. The second domain consists of six items of general knowledge on Maqasid Shariah components. Reliability analysis of the remaining 12 items revealed a high Cronbach's alpha score of 0.700, with values of 0.747 for the first domain and 0.578 for the second domain.

Discussion

The purpose of this study is to determine the reliability and construct validity of the newly developed *Maqasid Shariah* knowledge scale. Reliability refers to the consistency of assessment data or scores over time [10], while validity pertains to the extent to which a concept is accurately measured in a quantitative study [11]. One of the major types of validity is construct validity, which refers to how well a research instrument measures the intended construct. In this research, we aim to evaluate whether the domains included in the newly developed questionnaire effectively assess knowledge of *Maqasid Shariah* among the medical faculty community.

Regarding the demographic characteristics of the respondents, the median age was 32 years, which falls within the middle age range for Malaysians [12]. All respondents were Muslim and Malay, key communities for applying the concept of *Maqasid Shariah* in their daily activities. This target population belongs to the medical community, which often relies on Islamic teachings when making decisions regarding medical procedures and issues. As frontline healthcare providers, doctors regularly face questions about precautions and prohibitions from an Islamic perspective [13]. It is important to include both staff and students in this study to gain a more comprehensive understanding of the questionnaire items and *Maqasid Shariah* topics. Both faculty and students should share a similar level of understanding and application of *Maqasid Shariah* principles.

Although it has been suggested that good knowledge does not always translate into practical skills among respondents, many studies emphasize the need to measure the knowledge of *Maqasid Shariah* among Muslim professionals [14, 15]. This general assessment is valuable for evaluating the effectiveness of university education programs, particularly for academicians, before it can be fully appreciated by students [16]. A sufficient level of knowledge is essential for ensuring a holistic approach to patient care that aligns with Islamic teachings [17]. Integrating *Maqasid Shariah* into medical practice can enhance cultural sensitivity in healthcare, thereby improving patient trust and compliance. Furthermore, *Maqasid Shariah* can influence the creation of public health policies that are equitable, just, and aimed at enhancing the overall well-being of society. Indirectly, it also emphasizes preventive measures to protect health and prevent illness, thereby reducing the burden on healthcare systems [1-4].

The *Maqasid Shariah* Knowledge Scale uses a simple true/false answer format, making it accessible to the general public, regardless of their formal educational background. The questionnaire is also practical and easy to

complete for respondents of any background, as it does not include sub-questions or multiple statements per item, which are relatively more complex and require critical thinking [18, 19]. Each item consists of a brief statement, making it suitable for any staff to answer, whether they are specialists, consultants, or support staff. Additionally, the entire questionnaire takes only five to ten minutes to complete. This study validated the *Maqasid Shariah* scale and identified three significant domains based on exploratory factor analysis. The three domains include background-related items, general knowledge-related items, and a combination of background and knowledge-related items for the third domain. Structurally, these three domains represent common concepts and questions regarding basic *Maqasid Shariah*. The items collectively cover essential topics that healthcare providers should understand, making the scale useful for assessing the understanding of both staff and students regarding *Maqasid Shariah* principles.

Despite several domains being retainable, ranging from one to three factors based on the combination of the scree plot, Kaiser's criterion, and parallel analysis (using Monte Carlo principal component analysis), we decided to retain two significant domains after rerunning the factor analysis by manually setting the number of factors. Initially, the rotation matrix method identified three domains; however, the factor loadings (in Table 3) reveal that some items strongly represent Domain 1 (Items 1-6), others strongly represent Domain 2 (Items 7-15), while some items are fairly loaded on both Domain 2 and Domain 3. To demonstrate that only two domains adequately represent the entire questionnaire, another factor loading was conducted, forcing the grouping into two domains (Table 4). The factor loadings for each item ranged from 0.4 to 0.8, confirming that the final set of items can be categorized into only two domains [20,21]. Notably, the two domains produced acceptable Cronbach's alpha values, with no need to reduce or omit any items. If a third domain were retained, it would consist of a mixture of items from the first and second domains. The forced number of factors set by the authors is a valid step in factor analysis, given their theoretical knowledge and pre-research overview of the appropriate number of factors to represent the items [22,23].

The final 12 items demonstrated acceptable internal consistency (Cronbach's alpha = 0.700). The first six items (first domain) represent respondents' personal backgrounds and past experiences related to the Maqasid Shariah principles. Meanwhile, the other six items (second domain) adequately represent the concept of the Maqasid Shariah, pertaining to faith, life, intellect, lineage, and property [1-3]. Assessing the underlying background of the patients is important to correlate it with their understanding of the Maqasid Shariah [3]. Six items per domain are indeed acceptable in comparison to other studies [24,25].

A key limitation is that the respondents are confined to the medical community, meaning this version is validated for individuals with a medical background, particularly doctors. However, since the questionnaire includes general items, it may also be applicable to other populations without modification. Additionally, the scenarios are limited to general contexts and do not cover specific medical disciplines, such as surgical, obstetric, or paediatric fields. The questionnaire currently consists of only one form of response, so future iterations could incorporate items that allow for one best-answer responses.

Conclusion

The Maqasid Shariah Knowledge Scale has demonstrated validity and reliability as a quick assessment of knowledge among our local academic and medical staff. This brief and respondent-friendly questionnaire can be easily completed through a self-administered method, making it suitable for the Malaysian population in clinical practice. It serves as a tool to enhance

understanding and practical knowledge of applying the concept in daily medical tasks.

Acknowledgement
We would like to thank the Islamisation of Human Knowledge Unit, Kulliyyah of Medicine, for their support in validating this questionnaire.

Conflict of Interest
None

Authors contribution
MSES – main idea, methodology, writings; AAH – content expert; ACA – content expert; RM – validation and analysis expert; NMY – content expert; AA - content expert; MFMI - content expert

Table 1. Demographic data of the respondents

Variables		**Frequency**	**Percentage**
Age		Median 32	(19-51)
Gender	Male	84	33.1
	Female	170	66.9
		254	
Department	Family Medicine	20	7.9
	Anaesthesiology	19	7.5
	Internal Medicine	11	4.3
	O&G	18	7.1
	Radiology	7	2.8
	Orthopedic	7	2.8
	Psychiatry	14	5.5
	Surgery	2	.8
	Others	4	1.6
	Undergrads	152	59.8
Profile	Staff	40	15.7
	Undergrads	152	59.8
	Postgrads	62	24.5

Table 2. Reliability analysis of 20 items before deletion of items 11,12, 14, 16, 17,18,19 and 20

	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
1. History of attending Islamic Primary School	0.258	0.632	
2. History of attending Secondary Primary School	0.339	0.620	
3. History of attended session or lecture on Maqasid Shariah	0.466	0.603	
4. Have you previously applied the principle of Maqasid Shariah in your daily life or career?	0.394	0.616	
5. Have you read anything previously regarding Maqasid Shariah?	0.462	0.607	
6. Do you have access to any reference or reading materials regarding Maqasid Shariah?	0.368	0.616	
7. Maqasid Shariah is founded on modern principles.	0.192	0.639	0.647
8. Maqasid Shariah is confined to Muslim settings.	0.195	0.640	
9. Maqasid shariah focuses on the issues facing mankind in the hereafter.	0.214	0.638	
10. The three main rules of Shariah are Ihsan, Aqidah and Akhlak.	0.414	0.610	
11. Sanctions relating to belief (Al-Ahkam al-I'tiqadiyah) are the rules related to the pillars of faith.*	0.051	0.649	
12. Rules relating to financial transactions are under sanctions relating to morals and ethics (Al-Ahkam al-Akhlak).*	0.117	0.651	
13. Essential Maqasid (Darruriyyah) includes religion, life, environment, wealth and progeny.	0.318	0.623	
14. Protection of religion includes defending Islamic faith in our daily affairs.*	0.168	0.644	
15. Protecting everyone's life is obligatory for every Muslim first, compared to other communities.	0.240	0.634	
16. Prohibition of liquor and substance abuse is included under the protection of Maqasid.*	-0.035	0.655	

17. Safeguarding chastity is one of the elements in the protection of progeny.*	-0.056	0.652
18. Madam Salmah, a 60-year-old woman with underlying diabetes mellitus type 2, is currently fasting during the holy month of Ramadhan. Within six hours of fasting, she develops coldness, dizziness, lethargy, and extreme thirst. She noted her capillary blood sugar was 2.8 mmol/L. Which of the following is the best option for her?*	0.034	0.651
19. Madam Rosnah, a 33-year-old teacher, comes with her son, who has been diagnosed with hand-foot-and-mouth disease. Her son needs to be isolated at home. She therefore requests that you provide medical leave for her in order to take care of her son at home. She is otherwise asymptomatic without any medical illness, upon your assessment. What is the best option?*	0.178	0.655
20. Mr. Razak is a quadriplegic patient, and he wants to perform Zohor prayer. He asks a female staff nurse to assist him in taking ablution. Which of the following interventions is appropriate?*	0.059	0.648

* Items deleted in view of low Corrected Item-Total Correlation value

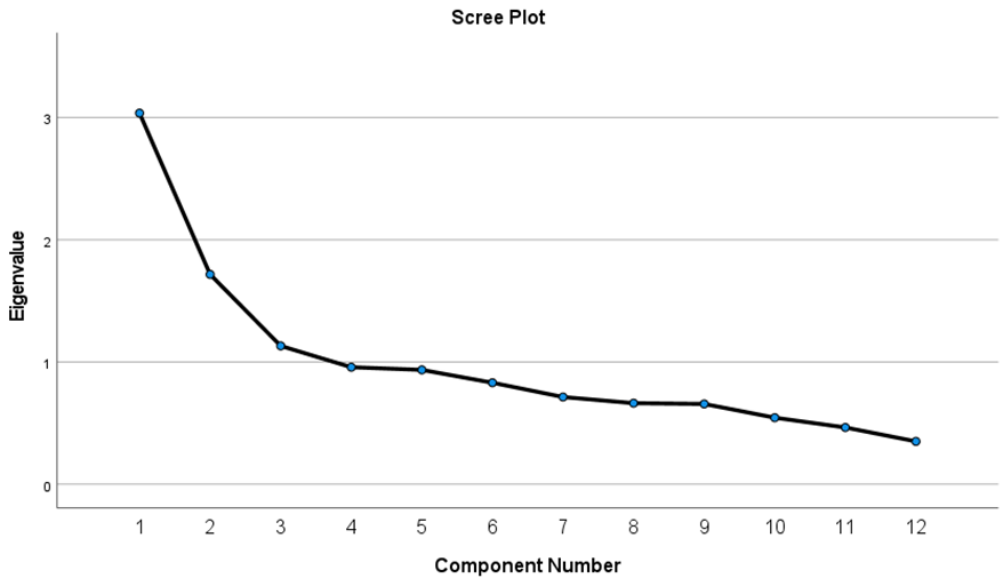

Figure 1. Current structure in managing diabetic foot.

Table 3. Factor analysis of 12 items.

	1	2	3
Item 1	0.228		0.613
Item 2	0.419		0.588
Item 3	0.776		
Item 4	0.777		
Item 5	0.793		
Item 6	0.697		
Item 7		0.360	0.386
Item 8		0.237	0.628
Item 9		0.638	
Item 10		0.765	
Item 13		0.587	0.294
Item 15		0.533	

Rotation Method: Quartimax with Kaiser Normalization.

Table 4. Rotated component matrix (factors loading forced into 2 groups)

	Domain	
	1	2
Item 1	.402	
Item 2	.581	
Item 3	.775	
Item 4	.760	
Item 5	.785	
Item 6	.651	
Item 7		.444
Item 8		.404
Item 9		.565
Item 10		.526
Item 13		.635
Item 15		.757

Extraction Method: Principal Component Analysis.; Rotation Method: Varimax with Kaiser Normalization.;

a. Rotation converged in 3 iterations.
b. Factors loadings forced into two group

References

[1] Tarmizi L. Irsyad Usual Al-Fiqh Series 33: Introduction to Maqasid Al-Syariah. Pejabat Mufti Wilayah Persekutuan. Published February 8, 2019. https://Muftiwp.Gov.My/En/Artikel/Irsyad-Usul-Fiqh/3099-Irsyad-Usul-Al-Fiqh-33-Introduction-To-Maqasid-Al-Syariah

[2] Mubarak d, othman n, abd-majid m, nadzri s. maqasid-shariah and well-Being: A Systematic Literature Review. Https://Ircief.Kuis.Edu.My/Wp-content/uploads/2022/07/10.-Maqasidshariah-And-Wellbeing-A-Systematic-Literature-Review.pdf

[3] Hashi AA. The Applications of Maqasid Al-Shari'ah in Medicine: An Overview. Revelation and Science. 2019;9(02):1-20. https://journals.iium.edu.my/revival/index.php/revival/article/view/253

[4] Amiruddin S, Aziz SA. Secularism in Medicine from Maqasid Al-Syariah. International Journal of Academic Research in Business and Social Sciences. 2018;7(12):615-623. https://hrmars.com/index.php/IJARBSS/article/view/3643/Secularism-in-Medicine-from-Maqasid-Al-Syariah.

[5] Nunnally, J. C. (1978). Psychometric Theory (2nd ed.). New York McGraw-Hill. - References - Scientific Research Publishing. www.scirp.org. https://www.scirp.org/reference/ReferencesPapers?ReferenceID=1867797

[6] Cronbach, L. J. (1951). Coefficient Alpha and the Internal Structure of Tests. Psychometrika, 16, 297-334. - References - Scientific Research Publishing. www.scirp.org. https://www.scirp.org/reference/referencespapers?referenceid=2293568.

[7] Tavakol M, Dennick R. Making Sense of Cronbach's Alpha. International Journal of Medical Education. 2011;2(2):53-55. doi:https://doi.org/10.5116/ijme.4dfb.8dfd.

[8] Boateng GO, Neilands TB, Frongillo EA, Melgar-Quiñonez HR, Young SL. Best Practices for Developing and Validating Scales for Health, Social, and Behavioral Research: A Primer. Frontiers in Public Health. 2018;6(149). doi:https://doi.org/10.3389/fpubh.2018.00149

[9] Shalihin MSE, Md Aris MA, Nik Mohamed MH. Revised Version of Knowledge, Attitude and Practice of Medical Doctors on Smoking Cessation Guidelines Questionnaire. Malaysian Journal of Applied Sciences. 2020;5(1):95-104. doi:https://doi.org/10.37231/myjas.2020.5.1.237

[10] Downing SM. Reliability: on the reproducibility of assessment data. Medical education. 2004;38(9):1006-1012. doi:https://doi.org/10.1111/j.1365-2929.2004.01932.x.

[11] Heale R, Twycross A. Validity and Reliability in Quantitative Studies. Evidence Based Nursing. 2015;18(3):66-67. doi:http://dx.doi.org/10.1136/eb-2015-102129.

[12] Malaysia Demographics 2023 (Population, Age, Sex, Trends) - Worldometer. www.worldometers.info. Accessed June 6, 2024. https://www.worldometers.info/demographics/malaysia-demographics/#:~:text=The%20median%20age%20in%20Malaysia%20is%2030.8%20years%20(2023)M. Shell. (2002) IEEEtran homepage on CTAN. [Online]. Available: http://www.ctan.org/tex-archive/macros/latex/contrib/supported/IEEEtran/

[13] Al-Sheikh B. The Medical Profession: The Bright Past and Future Challenges. Journal of Family & Community Medicine. 2003;10(3):17-18. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3425747/

[14] Mahazan AM, Nurhafizah S, Rozita A, et al. Islamic Leadership and Maqasid Al-Shari'ah: Reinvestigating the Dimensions of Islamic Leadership Inventory (Ili) Via Content Analysis Procedures. Ijasos- International E-journal of Advances in Social Sciences. 2015;1(2):153. doi:https://doi.org/10.18769/ijasos.29171.

[15] Alfahmi MZ. Justification for requiring disclosure of diagnoses and prognoses to dying patients in saudi medical settings: a Maqasid Al-Shariah-based Islamic bioethics approach. BMC Medical Ethics. 2022;23(1). doi:https://doi.org/10.1186/s12910-022-00808-6.

[16] AUDA J. Maqasid Al-Shariah.; 2008. doi:https://doi.org/10.2307/j.ctvkc67c6brahim

[17] Ibrahim M. A celebration of the whole: how holistic therapy is embraced in Islam. Doha News | Qatar. Published July 26, 2023. https://dohanews.co/a-celebration-of-the-whole-how-holistic-therapy-is-embraced-in-islam/.

[18] Mwaikusa. 11 Characteristics of Good Questionnaire. Free Geography Notes. Published March 12, 2015. https://geographypoint.com/2015/03/eleven-11-characteristics-of-good-questionaire/

[19] Techniques in preparing good questionnaire – Research methodology and statistics for home science. ebooks.inflibnet.ac.in. https://ebooks.inflibnet.ac.in/hsp16/chapter/techniques-in-preparing-good-questionnaire/

[20] Cheung GW, Cooper-Thomas HD, Lau RS, et al. Reporting reliability, convergent and discriminant validity with structural equation modeling: A review and best-practice recommendations. Asia Pac J Manag 41. 2024;745–783. https://doi.org/10.1007/s10490-023-09871-y

[21] Jafari A, Tehrani H, Mansourian M, Nejatian M, Gholian-Aval M. Translation and localization the Persian version of diabetes distress scale among type 2 diabetes. Diabetol Metab Syndr. 2023; 14;15(1):201. doi: 10.1186/s13098-023-01173-z.

[22] Ahmad MM. Validation of the Cognitive Appraisal Health Scale with Jordanian patients. Nurs Health Sci. 2010;12(1):74-9. doi: 10.1111/j.1442-2018.2009.00492.x

[23] Brown TA. Confirmatory factor analysis for applied research. The Guilford Press. 2006.

[24] Aznan M, Aris M, Pasi H, Shalihin MSEB et al. Translation and Validation of Malay Version of the Simplified Diabetes Knowledge Test (DKT). Malaysian Journal of Medicine and Health Sciences. 2022;18(3):2636-9346. https://medic.upm.edu.my/upload/dokumen/2022052523082312_MJMHS_0965.pdf

[25] Shalihin MSEB, Md Aris MA, Nik Mohamed MH, Mohd Rus R, Aida Jamani N. Reliability and Construct Validity of Knowledge, Attitude, and Practice of Medical Doctors on Smoking Cessation Guidelines. IIUM Medical Journal Malaysia. 2018;17(1). doi:https://doi.org/10.31436/imjm.v17i1.1031