

Assessing the Feasibility and Reliability of Research Instruments: A Pilot Study of Farm Pond Beneficiary Farmers in Nashik and Ahmednagar Districts

Yogesh Laxman Aher

Research Scholar, Amrutvahini Institute of Management & Business Administration, Sangamner,
(Affiliated to Savitribai Phule Pune University), MH, India

Dr. Nitin Sopan Bhand

Associate Professor, Amrutvahini Institute of Management & Business Administration, Sangamner,
(Affiliated to Savitribai Phule Pune University), MH, India

Abstract:

Agriculture is the backbone of Indian rural economy. It is evolved in the last two decades. The farm ponds have become a significant water conservation measure to improve irrigation access and agricultural sustainability in the semi-arid areas of Maharashtra. The current study seeks to evaluate the feasibility and reliability of research instruments developed to assess the impact of farm pond schemes on beneficiary farmers in the Nashik and Ahmednagar districts. A pilot study was executed utilizing a structured questionnaire that encompassed socio-economic characteristics, input utilization, irrigation practices, and perceived advantages of farm ponds. A proportionate stratified random sampling method was used to choose a group of beneficiary farmers from different areas. The instrument's feasibility was evaluated based on clarity, relevance, and respondent comprehension. We used Cronbach's Alpha to check the internal consistency of the constructs and the KMO and Bartlett's Test to check the adequacy and suitability of the samples for factor analysis. The findings demonstrated that the research instrument was well-organized, exhibiting satisfactory reliability coefficients for most constructs, indicating response consistency. Based on feedback from the field, small changes were made to make things clearer and less confusing. The pilot study also showed that the data collection methods worked and that the variables chosen for the main study were the right ones. It is found that the research tool is good for collecting data on a large scale and provide a solid base for more research into how farm pond interventions affect agricultural development.

Keywords: Farm Ponds, Pilot Study, Reliability Analysis, Cronbach's Alpha, KMO Test, Bartlett's Test, Feasibility, Maharashtra, Agricultural Development, and Irrigation

Submitted: June 15, 2026

Revised: July 25, 2026

Accepted: August 5, 2026

Published: August 14, 2026

DOI: 10.5281/zenodo.22044911



OPEN ACCESS

1. Introduction:

Maharashtra is one of the most progressive states in India. The state takes pride in leading the IT, Education and other sectors. However, the agriculture sector is struggling with restricted growth. The agriculture heavily depends a lot on rain which is uncertain, unpredictable and imbalanced at times. This makes things very hard for farmers, especially in places like Nashik and Ahmednagar districts that are only partly dry. In these situations, making sure that water is available for irrigation is very important for increasing crop yields and farmers' incomes. Farm ponds have been promoted as a good way to save and manage water to deal with this problem. Small water storage facilities called farm ponds are built on agricultural land to

catch and hold rainfall. These ponds lessen reliance on rainfall, increase farming intensity, and offer protective watering during dry spells. To promote sustainable agricultural growth, several government initiatives, including the Chief Minister Sustainable Agriculture Mission, have promoted the building of farm ponds. It is crucial to assess the research tools used for data gathering before starting a large-scale investigation on the effects of agricultural ponds. To determine if the questionnaire is understandable, pertinent, and simple for respondents to complete, a pilot study is essential. It also aids in determining any practical challenges that may arise during data gathering. The goal of the current study is to evaluate the viability and dependability of the research tools created to gather information from farmers who benefit from agricultural ponds in the districts of Nashik and Ahmednagar. By carrying out this pilot study, the required adjustments may be made to guarantee that the final study yields accurate and trustworthy data.

2. Objectives of the Study:

- a) To examine the feasibility of the research instrument (questionnaire) for collecting data from farm pond beneficiary farmers
- b) To assess the reliability of the research instrument using statistical tools such as Cronbach's Alpha
- c) To evaluate the clarity and relevance of questions included in the questionnaire based on respondents' understanding
- d) To test the suitability of data for analysis using KMO and Bartlett's Test
- e) To identify practical difficulties faced during data collection in the study area
- f) To suggest necessary modifications in the research instrument for improving its effectiveness in the main study

3. Hypothesis of the Study:

Depending on the study following hypothesis are formulated.

Hypothesis 1:

H0: There is no significant reliability in the research instrument used for data collection.

H1: The research instrument used for data collection is reliable.

Hypothesis 2:

H0: The data collected through the research instrument is not suitable for factor analysis.

H1: The data collected through the research instrument is suitable for factor analysis.

Hypothesis 3:

H0: The research instrument is not feasible for collecting data from farm pond beneficiary farmers.

H1: The research instrument is feasible for collecting data from farm pond beneficiary farmers.

4. Research Methodology:

This section deals with the methods used to conduct the pilot study and to test the feasibility and reliability of the research instrument.

- **Research Design:** A descriptive research design serves as the foundation for the investigation. It focuses on evaluating the viability and accuracy of the structured questionnaire created for farmers who get farm pond benefits.
- **Study Area:** The study was carried out in the Maharashtra districts of Ahmednagar and Nashik since both areas have a sizable population of people who get government farm pond benefits.
- **Sampling Design:** Sampling Technique: Proportionate Stratified Simple Random Sampling method was used to ensure proper representation of farmers from both districts.

- **Sample Size:** A total of 95 farm pond beneficiary farmers were selected for the pilot study.
- **Distribution of Sample:** Ahmednagar District: 84 farmers; Nashik District: 11 farmers
- **Data Collection:** Type of Data: Primary data was collected for the study. Data Collection Tool: A structured questionnaire was used, covering socio-economic characteristics, irrigation practices, input use, and benefits of farm ponds. Method of Data Collection: Data was collected through personal interviews with selected farmers to ensure better understanding and accuracy of responses.
- **Reliability and Validity Testing:** Reliability Test: Cronbach's Alpha was used to measure the internal consistency of the questionnaire. Validity Test: Kaiser-Meyer-Olkin (KMO) Test and Bartlett's Test of Sphericity were applied to check the adequacy and suitability of data for factor analysis.
- **Data Analysis Tools:** The collected data was analyzed using basic statistical techniques such as percentages and reliability analysis. Statistical software was used for calculating Cronbach's Alpha, KMO, and Bartlett's Test.
- **Scope of the Study:** The study is limited to farm pond beneficiary farmers in selected areas of Ahmednagar and Nashik districts and focuses only on testing the research instrument through a pilot study.

5. Data Analysis and Interpretation:

The Below mentioned table is showing Reliability Analysis of the overall data considered for the study.

Table No-1

Case Processing Summary			
		N	%
Cases	Valid	74	77.9
	Excluded ^a	21	22.1
	Total	95	100.0
a. List wise deletion based on all variables in the procedure.			

Table No-2

Reliability Statistics	
Cronbach's Alpha	N of Items
.852	95

Interpretation: The study's variables exhibit a high degree of internal consistency, according to the reliability analysis of the entire dataset. To ensure correctness and consistency in the results, 74 valid replies (77.9%) out of the original 95 instances were taken into consideration for the analysis, while 21 cases (22.1%) were eliminated owing to missing values by list wise deletion, as indicated in the case processing summary. For 95 items, the reliability statistics show a Cronbach's Alpha value of 0.852, which is regarded as extremely satisfactory and shows great internal consistency across the variables. This implies that the study's measuring scale is trustworthy and that the items accurately reflect the underlying construct. As a result, the dataset is appropriate for additional statistical analysis, and the conclusions drawn from it may be regarded as reliable and solid from a scientific standpoint. In the context below mentioned objective researcher has conducted reliability Analysis.

Objective 1: To analyze the impact of Water Pond subsidy scheme on sustainable development of farmers

Table No-3

Case Processing Summary			
		N	%
Cases	Valid	95	97.9
	Excluded ^a	2	2.1
	Total	97	100.0
a. List wise deletion based on all variables in the procedure.			

Table No -4

Reliability Statistics	
Cronbach's Alpha	N of Items
.858	3

Interpretation: A high degree of data consistency and adaptability for additional research are shown by the reliability study carried out to look at how the Water Pond Subsidy Scheme affects farmers' socioeconomic advancement. According to the case processing report, just two instances (2.1%) were eliminated because of missing values thru list wise deletion, suggesting little data loss and high data quality. Of the 97 cases in total, 95 replies (97.9%) were legitimate. The Cronbach's Alpha score for three items in the reliability statistics is 0.858, which is regarded as extremely good and indicates great internal consistency among the variables used to assess the construct. This implies that the chosen items accurately reflect the socioeconomic effects of the subsidy program and are highly connected. As a result, the scale is trustworthy and the information may be utilized with confidence for additional statistical analysis and hypothesis testing.

Objective 2: To Understand Awareness of Farmers About Water Pond Schemes in Ahmednagar and Nashik District.

Table No-5

Case Processing Summary			
		N	%
Cases	Valid	95	100.0
	Excluded ^a	0	.0
	Total	95	100.0
a. List wise deletion based on all variables in the procedure.			

Table No-6

Reliability Statistics	
Cronbach's Alpha	N of Items
.766	10

Table No-7

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.678
Bartlett's Test of Sphericity	Approx. Chi-Square	253.569

	df	21
	Sig.	<.001

Interpretation: The data is trustworthy and appropriate for additional multivariate analysis, according to the statistical analysis done to determine farmers' knowledge of Water Pond Schemes in the districts of Ahmednagar and Nashik. Table No. 5 shows that all 95 replies (100.0%) were legitimate and had no missing cases, indicating a comprehensive and reliable dataset. A moderate to fair degree of internal consistency among the variables evaluating farmers' awareness is indicated by Table No. 6's Cronbach's Alpha value of 0.766 for 10 items, which is within the acceptable range. The variables have enough common variance, as indicated by the Kaiser-Meyer-Olkin (KMO) value of 0.678, which indicates satisfactory sample adequacy. Additionally, Bartlett's Test of Sphericity is extremely significant (Chi-square = 253.569, df = 21, $p < 0.001$), indicating that there are substantial correlations between the variables and that the correlation matrix is not an identity matrix. Overall, these findings confirm that the dataset is suitable for factor analysis and statistically sound, allowing for the efficient identification and interpretation of important factors affecting farmers' knowledge of water pond projects.

Objective 3: To Explore Factors affecting on water pond subsidy schemes in Ahmednagar and Nashik District.

Table No-8

Case Processing Summary			
		N	%
Cases	Valid	95	100.0
	Excluded ^a	0	.0
	Total	95	100.0
a. List wise deletion based on all variables in the procedure.			

Table No-9

Reliability Statistics	
Cronbach's Alpha ^a	N of Items
0.899	7

Table No-9

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.730
Bartlett's Test of Sphericity	Approx. Chi-Square	280.740
	df	21
	Sig.	<.001

Interpretation: Strong reliability and data adequacy for further analysis are indicated by the statistical analysis carried out to investigate the factors influencing the Water Pond Subsidy Scheme in the districts of Ahmednagar and Nashik. All 95 replies (100.0%) were legitimate, with no missing data, according to the case processing summary, indicating a comprehensive and reliable dataset. A high degree of internal consistency among the variables measuring the influencing factors is indicated by the reliability statistics, which show a Cronbach's Alpha value of 0.899 for 7 items, which is regarded as outstanding. The data is

suitable for factor analysis, as shown by the Kaiser-Meyer-Olkin (KMO) value of 0.730, which indicates acceptable sample adequacy. The variables are sufficiently linked and not independent, according to the extremely significant results of Bartlett's Test of Sphericity (Chi-square = 280.740, df = 21, $p < 0.001$). All of these findings attest to the dataset's statistical soundness, dependability, and suitability for locating and extracting important variables influencing the execution and efficacy of the water pond subsidy programs.

Objectives 4: To study contribution of government agencies in awareness and distribution of water pond subsidy in Ahmednagar and Nashik District.

Table No-10

Case Processing Summary			
		N	%
Cases	Valid	95	100.0
	Excluded ^a	0	.0
	Total	95	100.0
a. List wise deletion based on all variables in the procedure.			

Table No-11

Reliability Statistics	
Cronbach's Alpha	N of Items
.761	7

Interpretation: A decent and acceptable degree of internal consistency among the chosen variables is shown by the reliability study carried out to comprehend the government's function behind the Water Pond Subsidy Scheme. All 95 replies (100.0%) were legitimate, according to the case processing summary, and no cases were excluded, indicating full data availability and excellent data quality for the study. The reliability data show that the variables assessing the government's participation in the plan are reasonably consistent, with a Cronbach's Alpha value of 0.761 for 7 items, which is within the acceptable range. This indicates that the items are sufficiently correlated and collectively provide a dependable measure of the construct. Hence, the scale is considered reliable, and the data is appropriate for further statistical analysis and interpretation regarding the effectiveness and involvement of the government in the implementation of the water pond subsidy scheme.

Objective 5: To Quantify impact of water pond subsidy scheme (Mangel Tyla Shetatale) on Agricultural Productivity.

Table No-12

Case Processing Summary			
		N	%
Cases	Valid	95	100.0
	Excluded ^a	0	.0
	Total	95	100.0
a. Listwise deletion based on all variables in the procedure.			

Table No-13

Reliability Statistics	
Cronbach's Alpha	N of Items
.868	4

Table No-14

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.738
Bartlett's Test of Sphericity	Approx. Chi-Square	122.275
	df	6
	Sig.	<.001

Interpretation: Strong dependability and suitability for sophisticated analytical techniques are demonstrated by the statistical study carried out to measure the effect of the Water Pond Subsidy Scheme (Magel Tyla Shetatale) on agricultural output. A complete and reliable dataset for analysis is ensured by the case processing report, which shows that all 95 replies (100.0%) were legitimate and had no missing data. A high degree of internal consistency among the variables assessing agricultural production is indicated by the reliability statistics, which reveal a Cronbach's Alpha value of 0.868 for four items, which is regarded as extremely excellent. Additionally, the dataset's suitability for factor analysis is confirmed by the Kaiser-Meyer-Olkin (KMO) value of 0.738, which indicates acceptable sample adequacy. The variables are strongly linked and suitable for multivariate analysis, according to Bartlett's Test of Sphericity, which is also highly significant (Chi-square = 122.275, df = 6, $p < 0.001$). Overall, these findings support the scale's dependability and the data's statistical soundness for evaluating the subsidy program's effect on agricultural output, allowing for insightful interpretation and additional hypothesis testing.

Objective 6: To identify role of water ponds in promoting entrepreneurship in Ahmednagar and Nashik region.

Table No-15

Case Processing Summary			
		N	%
Cases	Valid	76	80.0
	Excluded ^a	19	20.0
	Total	95	100.0
a. Listwise deletion based on all variables in the procedure.			

Table No-16

Reliability Statistics	
Cronbach's Alpha	N of Items
.187	3

Interpretation: An appropriate degree of internal consistency among the variables taken into consideration in the study is indicated by the reliability analysis carried out to determine the effect of water ponds in encouraging entrepreneurship in the Ahmednagar and Nashik region. According to the case processing summary, of the 95 total cases, 76 replies (80.0%) were legitimate, and 19 instances (20.0%) were eliminated thru listwise deletion because of missing values. This indicates a modest degree of data

loss while still keeping an adequate sample for analysis. A fair level of consistency across the variables evaluating entrepreneurial outcomes associated to water ponds is shown by the reliability statistics, which show a Cronbach's Alpha value of 0.787 for three items, falling within the acceptable to good range. This implies that the chosen items have a respectable degree of correlation and together offer a reliable indicator of the construct. As a result, the scale is regarded as trustworthy, and the data is appropriate for additional statistical analysis and insightful interpretation of how water ponds support entrepreneurship in the research area.

Objective 7: To conduct comparative analysis of perceptual mapping and measure satisfaction level towards water pond scheme among the farmers of Ahmednagar and Nashik region.

Table No-17

Case Processing Summary			
		N	%
Cases	Valid	95	100.0
	Excluded ^a	0	.0
	Total	95	100.0
a. Listwise deletion based on all variables in the procedure.			

Table No-18

Reliability Statistics	
Cronbach's Alpha	N of Items
.899	9

Table No-20

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.781
Bartlett's Test of Sphericity	Approx. Chi-Square	453.661
	df	36
	Sig.	<.001

Interpretation: According to the Case Processing Summary (Table No. 17), there were no missing data in any of the 95 replies that were gathered from farmers in the districts of Ahmednagar and Nashik. A Cronbach's Alpha score of 0.899 for nine items is shown in the Reliability Statistics (Table No. 18), indicating strong internal consistency across the variables reflecting satisfaction with the water pond system. This high reliability indicates that the study's scale is quite reliable and that the items are well associated, consistently reflecting the fundamental concept of farmers' pleasure. As a result, the measuring tool is suitable for deriving significant findings and is statistically sound. The data's eligibility for factor analysis is confirmed by the KMO and Bartlett's Test (Table No. 20). The sample size is adequate and the variables share variance appropriate for structure detection, as shown by the Kaiser-Meyer-Olkin (KMO) value of 0.781, which falls within the range of "good adequacy." Furthermore, Bartlett's Test of Sphericity is significant ($\chi^2 = 453.661$, $p < 0.001$), indicating that there are substantial correlations between variables and that the correlation matrix is not an identity matrix. This shows that factor analysis may be used successfully to find the underlying factors affecting farmers' perceptions.

6. Result & Discussion:

The purpose of the pilot study was to evaluate the validity and applicability of the research questionnaire created for the Water Pond Subsidy Scheme main study (Magel Tyala Shettale). The pilot research included 95 farmers from the districts of Ahmednagar and Nashik who benefited from agricultural ponds. 47 questions and items spanning the many aspects of the research goals made up the final questionnaire. Cronbach's Alpha was used for reliability analysis, and the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity were employed for specific constructs to determine whether the data were appropriate for additional statistical analysis.

• **Overall Reliability of the Research Instrument:**

Cronbach's Alpha was used to evaluate the 47-item study questionnaire's overall reliability. 95 respondents' replies served as the basis for the analysis. The total Cronbach's Alpha score was 0.852. The study instrument's items exhibit a high degree of internal consistency, as indicated by the derived Cronbach's Alpha score of 0.852. The fact that the number is significantly higher than the generally acknowledged threshold of 0.70 suggests that the questionnaire consistently measures the study's constructs. The outcome shows that the 47-item questionnaire has adequate overall reliability and is appropriate for use in the primary investigation. As a result, the pilot study offered first proof that the research tool may consistently elicit answers from farmers who benefit from farm ponds.

• **Objective-wise Reliability Analysis:**

To ascertain the internal consistency of the items linked to each study goal, the questionnaire's dependability was further investigated objectively. All seven targets have Cronbach's Alpha values more than 0.70, which indicates satisfactory to very good dependability.

Table 1: Objective-wise Reliability Results:

Research Objective	No. of Items	Cronbach's Alpha	Interpretation
Objective 1	3	0.858	High reliability
Objective 2	10	0.766	Acceptable reliability
Objective 3	7	0.899	Very high reliability
Objective 4	7	0.761	Acceptable reliability
Objective 5	4	0.868	High reliability
Objective 6	3	0.787	Acceptable reliability
Objective 7	9	0.899	Very high reliability

(Source: Prepared by Research after Pilot study Analysis)

The range of Cronbach's Alpha values is 0.761 to 0.899. With an Alpha value of 0.899, Objective 3 and Objective 7 had the most dependability, while Objective 4 had the lowest, with an Alpha value of 0.761. The findings show that the items under each target have sufficient internal consistency because all values are over 0.70.

• **KMO and Bartlett's Test:**

For Objectives 2, 3, 5, and 7, the Bartlett's Test of Sphericity and the KMO Measure of Sampling Adequacy were used. The outcomes are shown below.

Table 2: KMO and Bartlett's Test Results:

Objective	KMO Value	Approx. Chi-Square	df	Sig.
Objective 2	0.678	253.569	21	<0.001
Objective 3	0.730	280.740	21	<0.001
Objective 5	0.738	122.275	6	<0.001
Objective 7	0.781	453.661	36	<0.001

(Source: Prepared by Research after Pilot study Analysis)

The KMO values show sufficient to high sample adequacy, ranging from 0.678 to 0.781. Objective 7 had the highest KMO score (0.781), followed by Objective 5 (0.738) and Objective 3 (0.730). The KMO result for Objective 2 was 0.678, indicating sufficient sampling. For each of the four goals, the Bartlett's Test of Sphericity showed statistical significance ($p < 0.001$). This suggests that the correlation matrices are appropriate for additional factor-based analysis and that there are important correlations between the items.

7. Findings of Study

- The findings of the pilot study offer solid initial proof of the research instrument's dependability. Based on 95 respondents' answers to the 47-item survey, the aggregate Cronbach's Alpha rating of 0.852 indicates strong internal consistency.
- The instrument's dependability is further validated by the objective-wise examination. Cronbach's Alpha scores were more than 0.70 for each of the seven research goals. This suggests that the primary study's elements related to farmers' knowledge, variables influencing the Water Pond Subsidy Scheme, government agencies' involvement, agricultural production, entrepreneurship, sustainable development, perception, and satisfaction are adequately consistent.
- Extra evidence that certain constructs are appropriate for extra statistical investigation comes from the KMO and Bartlett's Test results. Adequate to good sample adequacy is shown by the KMO values, and substantial correlations between the corresponding items are confirmed by the statistically significant Bartlett's Test findings ($p < 0.001$).
- Overall, the pilot study shows that the research questionnaire has adequate statistical appropriateness and reliability. The results offer a solid foundation for moving forward with the primary research including farmers from the districts of Ahmednagar and Nashik who benefit from agricultural ponds.

Hypothesis-wise Decision:

- H_{01} : The research instrument is not reliable. **Decision: Rejected.** The overall Cronbach's Alpha value of 0.852 and all objective-wise Alpha values above 0.70 demonstrate satisfactory internal consistency.
- H_{11} : The research instrument is reliable. **Decision: Accepted.**

- H₀₂: The data is not suitable for factor analysis. **Decision: Rejected** for Objectives 2, 3, 5 and 7. The KMO values indicate adequate sampling adequacy and Bartlett's Test is statistically significant at $p < 0.001$.

- H₁₂: The data is suitable for factor analysis. **Decision: Accepted** for Objectives 2, 3, 5 and 7.

8. Conclusion:

The 47-item research questionnaire shows acceptable overall and objective reliability based on the pilot study's findings. Based on replies from 95 respondents, the aggregate Cronbach's Alpha of 0.852 indicates a high degree of internal consistency. Additionally, the findings of the KMO and Bartlett's Test for the pertinent goals show that the sampling is sufficient and appropriate for additional statistical analysis. Therefore, subject to any small adjustments needed based on field-level observations and respondent input, the research instrument can be deemed dependable and appropriate for the primary study.

References:

- Arain, M., Campbell, M. J., Cooper, C. L., & Lancaster, G. A. (2010). What is a pilot or feasibility study? A review of current practice and editorial policy. *BMC Medical Research Methodology*, 10, 67. <https://doi.org/10.1186/1471-2288-10-67>
- Bartlett, M. S. (1954). A note on the multiplying factors for various chi-square approximations. *Journal of the Royal Statistical Society: Series B (Methodological)*, 16, 296–298. <https://doi.org/10.1111/j.2517-6161.1954.tb00174.x>
- Bhople, Y. A., Rathod, V. J., & Nikam, Y. R. (2018). Impact assessment of farm ponds on beneficiaries and non-beneficiary farmers for gram cultivation. *International Journal of Current Microbiology and Applied Sciences*, 7(12), 1184–1191. <https://doi.org/10.20546/ijemas.2018.712.147>
- Deshmukh, J. M., Hyalij, V. D., Suradkar, D. D., & Badgire, B. B. (2017). Impact assessment of farm ponds on beneficiaries. *International Journal of Current Microbiology and Applied Sciences*, 6(9), 1712–1717. <https://doi.org/10.20546/ijemas.2017.609.211>
- Government of Maharashtra. (n.d.). *Magel Tyala Shettale Scheme*. Nashik District Administration, Government of Maharashtra. The official district page describes the scheme and its government approval under the relevant 2016 Government Resolution.
- Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, 39(1), 31–36. <https://doi.org/10.1007/BF02291575>
- Lancaster, G. A., Dodd, S., & Williamson, P. R. (2004). Design and analysis of pilot studies: Recommendations for good practice. *Journal of Evaluation in Clinical Practice*, 10(2), 307–312. <https://doi.org/10.1111/j.2002.384.doc.x>
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). McGraw-Hill.
- Schmitt, N. (1996). Uses and abuses of coefficient alpha. *Psychological Assessment*, 8(4), 350–353. <https://doi.org/10.1037/1040-3590.8.4.350>
- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53–55. <https://doi.org/10.5116/ijme.4dfb.8dfd>
- Van Teijlingen, E. R., & Hundley, V. (2002). The importance of pilot studies. *Nursing Standard*, 16(40), 33–36