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Original Research Article

Adoption and standardization of attitude scale for polio framed on oversees population from underdeveloped area of West Bengal

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ABSTRACT

Background: Study revealed fear from polio vaccination programme yet not completely has eradicated from the minds of immigrated communities resides in backward areas of Bengal. Due that, pre-established attitude tool was adopted for the formation of new tool for targeted population.
Methods: Interestingly, attitude tool found almost similar result after 5 years of its first administration (on minorities). Foundation of tool was set on 3-point Likert type scaling style. Classical test theory (CTT) was followed in which popularity index and discrimination index were taken for item-analysis for pilot study.
Results: CTT rejects 6 items and test-retest reliability with high r value 0.94 suggests the tool has excellent reliability. Standardized tool finally comes in 31 items with 9 different dimensions.
Conclusions: CTT method as handy method for small sample item-analysis where popularity index and discrimination index used to refine values on which item-total correlation was administered on Pearson's correlation at 99% confidence interval. Application of the same tool after some years in CTT method in constructing attitude tool have successfully applied.

Keywords: Attitude scale, Classical test theory, Polio

INTRODUCTION

Endemic transmission of polio has found stopped officially in the year of 2011 in India as the latest country in worldwide.[1] After getting the official confirmation of polio free continent in the year of 2014 from WHO, India still organizes oral polio vaccination (OPV) campaigns in various polio prone districts to eradicate polio from its root.[2,3]Accidental reactivation of virus strains in OPV may cause paralysis in vaccinated children, because, OPV has been claimed for causing more paralysis than the actual virus does (1% case on prevalence rate).[4] As a matter of fact, vaccine compliance are the major rifts that cut down the probability of the oral vaccination acceptances specially in backward areas.[5] Murshidabad was found among other backward districts of West Bengal, India, where last single case was filed in the year of 2011.[6,7] Factors which have drifted over oral vaccination compliance are mainly due to less literacy rate, poverty, poor sanitation, poor sewage systems and blind myths on religious grounds.[6] Awareness on vaccination acceptance hence often less transmitted among such residents who are from less literate zones. Study on same population in two different backward districts viz. Malda and Murshidabad, we have found comparatively similar results by adopting the tool.[8,9]

Results concluded that the problem still continues as an emerging issue. After a long pause, retesting of the tool ensures our team to make it available publicly for further researches.

METHODS

Type of research method

Normative survey is a way of investigating knowledge concerning human behaviors as survey poses originality of the preparation and standardization methods.[10,11] Backbone of the tool respectively was aligned on survey data. The data had been captured during post covid period from mid-September 2022 to December 2022. The preparation of the tool and the expert analysis was done prior to the original survey was initiated. The gap between the pre-tryout and try-out phase was idealized between two months i.e. between September 2022 to December 2022 for better intervention of the study.

Population

Polit and Hungler refer population as an aggregated of the subject which is essential for the conformation to the set of specification included in the study.[12] Target population was set on immigrated people of the Malda district, West Bengal, India and accessible population for the main study was 1200.

Inclusion and exclusion criteria

Inclusion criteria had been set only adult population with no age bar (after 18 years), resides in the Malda district having the core characteristics of immigration, i.e. recently settled in Bengal, minimum for 10 years, and exclusion criteria was exercised on all except immigrated adults.

Sampling technique

Multi-Stage Random sampling technique had been framed on oversees communities. Pre-tryout and try-out phase both were applied on randomly selected 120 individuals.

Tool for survey

Self-made questionnaire had been used which framed in choice-based format on multiple number of items.

Data collections

Data collection was done by visiting the places where the set of questionnaires were distributed among target population in hand to hand.

Statistical analysis

As we looked for Item-analysis on small samples, classical test theory was admitted for reliability measurement.[13] Pearson's correlation was ensured and tested between the test-retest scores to test the item reliability.[14] Initial calculations for discrimination index, popularity index and content validity were estimated by using formulas in pen and paper method. Rest of the calculations on descriptive statistics, test-retest correlations and graphs were administered on SPSS version 20 (Statistical Package for Social Sciences).

Steps

Choosing the attitude scale

Likert-type scales are the most popular form for the measurement of the attitudes. These types of scaling techniques often refer as ''attitude scales''.[15] Attitude scales are usually comprised of a set of statements or ''items'' that scale a respondent's level of agreement, favorability, or other similar perceptions.[16] Attitude is the parameter of positive or negative disposition associated with some psychological perceptions.[17] Statements were hence created to measure dimensions on degrees of attitude, on the other hand, scaling technique is the science of determining measuring instruments for human judgment. Dimensions mean psychometric properties or behavioral patterns that can measure psychological perceptions as of attitudes. Henceforth, delimitation of the tool construction had structured on Likert type of attitude scale as the scale used non-comparative scaling techniques which was unidimensional in nature.

Writing of the statements

Extensive reviews based on the discussion of the topic helps to understand similar tool formations so that statements can be formed in simple manner. Not only that but also, statements were created in such a way that it can easily handle by the respondents.

Scoring the items

Statements or items either be positive or negative in form. Reason why positive statements are meant to express the attitude which already a responded intended to express where, negative statements are formed for identifying negative thinking towards the concerned topic. The present scale was on 3-point Likert type scale. There were three possibilities for each statement, these were- a) agree, b) undecided and c) disagree. The favorable statements i.e. positive statements were scored from maximum to minimum as 3, 2, and 1 while the unfavorable or negative statements were scored as 1, 2 and 3 from minimum to maximum.

Dimensions

As attitude reveals the human's present behavioral pattern, to identify such pattern, dimensions are fabricated. Dimensions simply are the way of measurements of some intended behaviors. According to the nature of the targeted population, 9 dimensions had created for the alignment of the attitude scale viz. education, superstitions, prevention, transmission,

location, prognosis, information, socio-economic status and recovery as psychometric variables (Table 4).

Item pool of the attitude scale

Researcher had framed 60 statements and continued writing her items in both positive and negative forms until the item pool reached at least twice the size of the desired instrument.[18]

After preliminary revision, to look at the purpose, clarity, language, intensity, ambiguity, administer ability and appropriateness of statements, it was presented to the experts. 37 statements were kept which covered on all the influential factors that might have the capacity to reflect attitudes on polio.

Pre-tryout phase

Pre-try out phase is essential before the completion of any administered instrument. The purpose is to ensure the clarity of the language, complexities in ethical issues, flexibilities in respondents which might have been overlooked in previous stapes. Pre-try out phase is also important to justify if the measurement of the variables is fairly done, availability and feasibility of the sampling method is quite appropriate or not. It also helps to determine the length of the instrument. In pre-try-out phase, scale was tested on 120 individuals. Based on their responses, multiple steps like several rounds of screening, modification, and analysis of the statements had been carried further. At this stage, the questionnaire received the property of being respondent friendly.

Tryout phase

Tryout phase was administered on 120 respondents within 3 weeks but 15 days later of the first test.[14] Among 120, 60 of them were taken from rural areas and rest of them selected from urban areas. Researchers helped the illiterate respondents by reading and clarifying each statement and instructed them to tick on the boxes of each statement immediate after understanding their views. Literate respondents were directly handed over the questionnaire and were instructed to tick on the boxes. All data were subjected next to item analysis of each statement.

RESULTS

Item analysis

Item analysis scrutinizes the individual performance on items either for some external criterion or for the remaining items on the test as well as judges the quality of items in a test as a whole.[19] Classical test theory was adopted for reliability assessment under two steps: a) popularity index (PI) and b) index of discrimination (ID).[20]

Popularity index

It is the percentage of respondents who answered the item correctly in a test. Item shall be considered as the easy one if maximum respondents reply it correctly. Higher the difficulty index means the item was easier to understand.[21] To compute the item difficulty, divide the number of people answering the item correctly by the total number of people answering item. The proportion for the item is usually denoted as "p" and is called item difficulty.[22] Difficulty value or DV for popularity index was formulated under the following formula: $P_i = (n_i*N_i)/100$. Where, P_i = Popularity Index of the i^{th} item in percentage, n_i = Number of respondents who gave correct answers to i^{th} item and N_i = Total number of respondents. Here, 27% of high achievers and 27% of low achievers were selected and separated because, 27% has shown that this value will maximize differences in normal distributions when enough cases are provided for item-analysis.[23] The sum of high achieving and low achieving groups (27+27=54%) usually determine the index of difficulty which found almost same when the entire sample of the test was taken into account and rests 46% of the medium achievers' scores were set aside.[24] The difficulty value or DV was found in range of 17-79 percent for the entire 37 items for the whole scale. Items scoring 25-75 percent were retained followed by the rejection of 2-items (items numbers 3 and 7) from the whole (Table 1). Hence, total 35 numbers of items remained for the calculation of the discrimination index. Henning (1987) has proposed a general guide line that helps to interpret items with difficulty index values that allows rejection and retention of the items.[25]

Discrimination index

To identify the item discrimination value of rest of the 35 items, phi (ϕ) coefficient method was used.[26] Formula- $E^{1/3}= [(S_1+S_2) - (S_3+S_4)]/N/3$. Where, $E^{1/3}$ = item difficulty of an item, S_1 = rural female respondent, S_2 = rural male respondent, S_3 = urban female respondent, S_4 = urban male respondent and N = total number of respondent (120 respondents). Ebel and Frisbie both have commented on the DV or discrimination value that if D-value lies beyond the range of 0.40 ($D \geq 40$) then items should stay in the tool.[27] This range is idealised for the rejection and retention of items and also denoted as popularity index (Table 1). The calculated range of ID values were within 0.00 to 0.91. Items which stand between the range of 0.28 to 0.80 were selected for the final tool. We rejected four items (items number 10, 12, 18 and 28) that have failed the criteria (Table 1). Finally, total 31 numbers of items were remained for final tool (Table 1).

Table 1: Item-analysis.[8]

S. no. of items before item analysis	S. no. of items after item analysis	Item popularity index (%)	Item discrimination index
1	1	75.32	0.28
2	2	74.03	0.28
3*	-	16.88	0.87
4	3	63.64	0.43
5	4	41.56	0.51
6	5	64.93	0.32
7*	-	19.48	0.39
8	6	67.53	0.47
9	7	51.94	0.63
10*	-	54.54	0.20
11	8	42.86	0.32
12*	-	63.64	0.91
13	9	40.23	0.43
14	10	42.86	0.79
15	11	59.74	0.63
16	12	36.36	0.36
17	13	68.83	0.20
18*	-	46.75	0.08
19	14	57.14	0.28
20	15	58.44	0.59
21	16	35.06	0.32
22	17	67.53	0.28
23	18	46.75	0.47
24	19	50.65	0.55
25	20	48.05	0.32
26	21	44.16	0.32
27	22	35.06	0.47
28*	-	46.75	0.00
29	23	32.46	0.55
30	24	54.54	0.39
31	25	58.44	0.36
32	26	66.23	0.32
33	27	41.55	0.79
34	28	55.84	0.32
35	29	79.22	0.28
36	30	57.14	0.59
37	31	66.23	0.28

"*" Represents rejected items.

Table 2: Correlation between the tests for reliability measurement.[8]

Correlations			
		VAR00001	**VAR00002**
VAR00001	Pearson correlation	1	0.941**
	Sig. (2-tailed)		0.000
	N	120	120
VAR00002	Pearson correlation	0.941**	1
	Sig. (2-tailed)	0.000	
	N	120	120

** Correlation is significant at the 0.01 level (2-tailed). *Test= VAR00002, Re-test= VAR00001, VAR= Variables.

Reliability

Reliability finds the amount of random error during the measurement of test scores that might be hidden in test scores. Highly reliable test scores have such tendencies that appear frequently with same result whenever testing process is repeated in true sense. In respect of reliability coefficient, values that scores between the range of 0.00 with much error and 1.00 with no error usually reflects the amount of error in scores.[28] A positive correlation with "r" value 0.94 between test-retest scores was found by using same tool twice, which is quite high to accept the tool as reliable as well as valid (Table 2) (Figure 1).

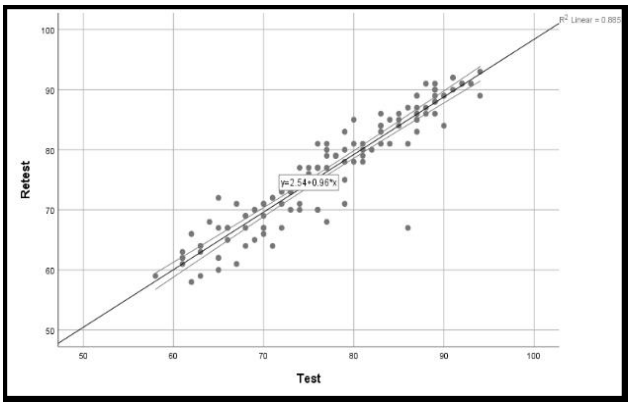

Figure 1: Correlation between test-retest on scatter diagram.

Test in 'x' axis and Re-test scores in 'y' axis has been shown (120 individual scores for each axis) and both variables are positively correlated with each other having R^2 linear value 0.885, which is much higher than the thumbs rule.

Validity

The validity of a test, or of any measuring instrument, depends upon the field with which it measures what is intend to measure.[29] Experts gave validity confirmation on content validity. Content validity is an important research methodology term that refers to how skilfully a test determines the behaviour for which it is intended.[30] Present test covers 60 content areas of the research. To construct the tool and set up the test, investigator has taken the help of expert team. Expert team screened and analysed the test items where 38% (23 items from 60 items) of items didn't satisfy expert's views. We received 37 items which fall under fair to excellent range on CVI. Face validation saturated on Kappa's formula that targets to identify the degree of agreement beyond chance of validation:[31] K=(I-CVI-Pc)/(1-Pc). Where, Pc = [N! /A! (N-A)!] * 0.5N, Pc = probability of chance agreement from experts, N = number of experts and A = number of experts who have agreed upon relevant items. Kappa values including ≥0.74 are excellent, ≥0.60≤0.74 are levelled as good and ≥0.40≤0.59 are considered as fair enough for accepting expert's views.[31] Extract values on Kappa model brought along content validation on which number of items retained for item-analysis (Table 3).

Table 3: Retention of items after analyzing content validity on Kappa score.

Total no. of items	Kappa scores	Interpretations
24	≥0.74	Excellent range
10	≥0.60≤0.74	Good range
3	≥0.40≤0.59	Fair range

Final tool

Final tool has 9 dimensions with 31 statements among which 15 are in positive statements and rest of the 26 are in unfavourable form (Table 4).

Table 4: Distribution of items among dimensions in final tool.[8]

Dimensions	Items		Total no. of items
	Positive	Negative	
Education	5, 26, 31	12, 22	5
Superstition		4, 8, 10, 23, 25, 27	6
Prevention	1,2,6	19	4
Transmission		9	1
Location	24	30	2
Prognosis	3, 11, 17		3
Information	13, 20, 29	18, 28	5
Socioeconomic status	14, 15	16, 21	4
Recovery		7	1
Total	15	16	31

Application

Newly administered attitude tool on polio was applied on 1140 samples according to the need and purpose of the study. After 4 years tool was administered again on 1200 individuals where significant difference was found in attitudes of both literate and illiterate people as well as Superstition as a psychometric variable, was found most effective independent variable among other independent variables unlike the first study.[8,9]

DISCUSSION

High reliability with high positive correlation (r=0.94, significant at 0.01 level) between the test-retest method initially validates the questionnaire.[28] However, at the primary stage expert validation was taken as granted to ensure the content validity of the tool.[31] We got 24 Items with excellent values ≥0.74, 10 items in good range (0.60-0.74) and 3 fair items for the final form of self-made tool. Item-analysis was done on behalf of 37 items after expert validation, where total 6 numbers of items were rejected followed by items no 3 and 7 that not fitting in the difficulty value or "p" value (16.88 and 19.48) as well as, items numbers 10 (0.20), 12 (0.91), 18 (0.08) and 28 (0.00) were rejected also for not falling between 0.28 to 0.80 for discrimination.[29] The tool has finally come

with 31 items which covers all relative factors that has the ability to measure attitudes on polio.

This study has some limitations. As the study have focused on minorities, immigrated population stays in backward district or areas of Bengal, the nature and the formation or the selection of the items in the tool have entirely plated on the specific demographic and psychological valuation of such population. No item was entertained or included that can over burden the mental status or their cultural values in short. The study was dare to conduct on the sensitive population untouched or unexplored, so, the limitations will suggest only such populations if another study is required for measuring attitudes of polio vaccination programme. However, the two-time validation of the similar tool applied on migrated population have successfully reflected significant statistical approval over the time

CONCLUSION

Classical test theory has again proved its flexible approach as well as relatively handy method when applied on small samples and tool with small sample item-analysis than other standard methods. Popularity index and discrimination index used to refine values on which item-total correlation was administered on Pearson's correlation which is significant at 99% confidence interval. Application of the same tool after some years supports CTT as suitable method in constructing attitude tool for specific community when data are small as well as tough to collect and concise in nature or rare to collect. Tool can be applied on other backward districts that must fixed with same nature and criteria. Government may improve relevant policies as well as set up more OPV campaigns in border areas in order to tag the honor truly as a polio free country.

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Ethical approval: The study was approved by the department of education, University of Kalyani during the survey

REFERENCES

1. Mahr K. How India fought Polio and Won. Time. 13th Jan, 2013. Available at: https://world.time.com/2013/01/13/how-india-fought-polio-and-won/. Accessed on 28 December 2019.
2. Anonymous. WHO Certifies India as Polio Free. Ministry of Health and Family Welfare (MHFW), Press Information Bureau, Government of India. Available from: https://pib.gov.in/newsite/PrintRelease.aspx?relid=104700. Accessed on 28 December 2019.
3. Rutgers Health. India to Vaccinated 300,000 Children after Polio Strain Found in Sewage; 2016. Available from: https://www.reuters.com/article/us-india-health-polio-idUSKCN0Z11Z5. Accessed on 15 November 2019.
4. Menaka R. If India is polio-free, why are children still getting paralysed by the polio virus? Scroll.in. Available from: https://scroll,in/pulse/803485/if-india-is-polio-free-why-are-children-still-getting-paralized-by-the-polio-virus. Accessed on 21 December 2019.
5. Donaldson LJ. Eradicating polio. BMJ. 2018;361:K2077.
6. Anonymous. Polio focus on Murshidabad. The Telegraph, Online Edition. 2011. Available from: https://www.telegraphindia.com/states/west-bengal/polio-focus-on-murshidabad/cid/433522. Accessed on 21 December 2019.
7. Samsunnehar S, Sarkar S. Spatio-Temporal Pattern of Gender Disparity in Literacy – A Case of Murshidabad District, West Bengal. J Social Work Social Dev. 2021;12:68-81.
8. Ali MA. The impact of attitude regarding polio among the Muslim community of Malda district, West Bengal. Department of Education, University of Kalyani, West Bengal. 2014.
9. Sengupta T. An investigation into the socio-economic status, knowledge and attitude towards polio among the people of Murshidabad District, West Bengal. University of Kalyani. Kalyani, West Bengal. 2019.
10. Koul L. Methodology of Educational Research. New Delhi, India: Vikas Publishing House Private Ltd.; 2004:432
11. Sharma KK, Pathak LC, Sharma SR. Normative survey method of educational research. New Delhi, India: Sarup and Sons; 2006:227-228.
12. Polit DF. Hungler BP. Instructors Manual to Accompany Nursing Research. Principles and Methods. U.S.A: Lippincott Publisher; 1999: 114-115.
13. Bichi AA, Embong R, Mamat M, Maiwada DA. Comparison of classical test theory and item response theory: a review of empirical studies. Aust J Basic Appl Sci. 2015;9(7):549-56.
14. Anastasi A, Urbina S. Psychological Testing. 7th edn. United Sates: Pearson Education; 1997.
15. Trochim WM. Research methods knowledge base; 2005. Available from: http://www.socialresearchmethods.net/kb/. Accessed on 12 August 2018.
16. Likert RA. Technique for the measurement of attitudes. Arch Psychol. 1932;22(140):5-54.
17. Baron RAB. Understanding Human Interaction. In 2nd edn. Boston: Allyn and Bacon; 1977.

18. Colin D. Beginning research in psychology: a practical guide to research methods and statistics. 5th edn. UK: Wiley Blackwell Publisher; 2004:131.
19. Thompson B, Levitov JE. Using microcomputers to score and evaluate test items. Coll Microcomp. 1985;3:163-8.
20. Lord FM, Novick MR. Statistical theories of mental test scores. Reading, MA: Addison-Wesley; 1968.
21. Wood DA. Test construction: development and interpretation of achievement tests. Columbus, OH: Charles E. Merrill Books, Inc; 1960.
22. Crocker L, Algina J. Introduction to classical and modern test theory. New York: Holt, Rinehart and Winston; 1986.
23. Wiersma W, Jurs SG. Educational measurement and testing. 2nd edn. Boston, MA: Allyn and Bacon; 1990.
24. Singh AK. Test measures and research method in behavioural science. Patna: Bharati Bhawan; 2002:38-51.
25. Henning G. A guide to language testing: Development, evaluation, research. Cambridge Mass: Newberry House Publisher; 1987.
26. Cohen RJ, Swerdik ME. Psychology Testing and Assessment. 6th edn. New Delhi, India: Tata McGraw Hill; 2005:132-133.
27. Ebel RL, Frisbie DA. Essentials of educational measurement. Engelwood Cliffs, New Jersey: Prentice Hall; 1991.
28. Carole D, Godard SE, Corinne G. Validity and Reliability. In: Thietart RA, ed. Doing Management Research. New Delhi: Sage Publication; 2001.
29. Garret HE. Statistics in Psychology and Education. Bombay, India: Vakils Feffeer and Simons Ltd.; 1984:334.
30. Pennington D. Essential Potentiality. UK: Edward Arnold Publishers Limited; 2003:37.
31. Cicchetti DV, Sparrow S. A developing criteria for establishing interrater reliability of specific items: applications to assessment of adaptive behavior. Am J Ment Defic. 1981;86(2):127-37.

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