Original Article

# Development and Validation of a Questionnaire to Measure a Medical Student's Interest in the Subject of Community Medicine

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## Abstract

**Background:** Lack of interest has been cited by many studies as the predominant cause for students undervaluing the subject of Community Medicine. However, there are few valid and reliable tools that could measure this interest. To develop and validate a questionnaire to measure a medical student's interest in the subject of Community Medicine. **Material and Methods:** Cross-sectional study conducted at MTMC Jamshedpur. The Community Medicine Interest Questionnaire (CMIQ) was developed in two phases: item generation and item reduction. Items were generated through a review of the literature, focused group discussions, and in-depth interviews. In the item reduction phase, the content and construct validity of the questionnaire were ascertained. Content validity was carried out by a group of experts based on three parameters: the interrater agreement on the representativeness of the item, the interrater agreement on the clarity of the items, and the content validity index. The construct validity was ascertained through pilot testing of 480 responses from undergraduate medical students. Exploratory factor analysis through principal axis factoring and Promax rotation. **Results:** Twenty-five items were generated. Three of these items were removed following expert validation. Furthermore, three items were removed after pilot testing. The resulting CMIQ consisted of 19 items distributed over three dimensions: feeling, value, and predisposition to reengage toward the subject. The internal consistency of each of the subscales was ascertained. **Conclusions:** CMIQ is a valid and reliable tool that can be used to measure such interest for providing educational interventions.

**Keywords:** Community medicine, exploratory factor analysis, interest

## Introduction

The world has set forth several ambitious goals to transcend the health and well-being of its citizens. Such goals can only be realized through the primary healthcare (PHC) approach.[1] The Graduate Medical Education Regulations (GMER),[2] 2018 identifies several goals, roles, and broad and subject-specific competencies for creating an Indian Medical Graduate (IMG) competent in providing PHC. The subject of Community Medicine and its principles serve as the central core for imparting most of the "broad" competencies relating to an IMG.

However, a young and novice student who primarily identifies a doctor as a curator of disease often faces problems in seeking the relevance, purpose, and future utility of community medicine.[3] To them, concepts such as health and prevention seem too innocuous, while the concepts of epidemiology, health policies, and biostatistics seem too difficult and alien. Indeed, as with any other subject, the journey to attain competencies is filled with excitement, distraught, frustrations, learning, and guidance.

Interest is a key mobilizer for starting, persisting, and eventually completing this journey.[4,5] Interest besides driving learning is also a powerful predictor of academic achievement, future carrier choices, and success.[6] A student having an interest in a subject usually outperforms a non-interested student in almost all the domains of learning, viz. the

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cognitive[7-9] (focused attention, recall, academic achievement, etc.), affective[10-12] (self-efficacy, goal setting, not feeling bored, etc.), and psychomotor domain[10,12] (persistence to a given task). Lack of interest in community medicine is often cited as the predominant cause for a student's poor performance and career choices.[13,14] Several educational interventional studies have documented an improved performance and renewed interest following their intervention.[15,16] However, in most of these, the construct of interest in community medicine was measured either by a single question framed as "are you interested" or by two or three questions. None of them considered the established theories and models relating to interest.

Any scale or questionnaire measuring interest must address its multidimensionality and must be validated and tested for its reliability. Although several such scales are available to measure interest, none were found to be developed for specifically measuring the interest of a medical student in the subject of Community Medicine.

**Objective of the study:** To develop and validate a comprehensive, easy-to-administered tool to measure an undergraduate medical student's interest in the subject of Community Medicine.

## Subjects and Methods

The four-phase model of interest development[17] served as the theoretical background for defining interest in our study. It explains the dynamicity of interest development over time. The first two phases are dependent on external situations for developing the interest, hence aptly named triggered and maintained situational interest. The phase of triggered situational interest is characterized by short-term changes in the dimensions of affective and cognitive processing of a learner.[17] These changes are dependent on external situational factors such as the classroom environment, peer pressure, and the type of teaching-learning methods employed. In the phase of maintained situational interest, these short-term changes persist over an extended period due to personal involvement and the meaningfulness of the task. However, such an interest is still characterized by its transitory nature and the dependence on external factors for its sustenance. Positive effects and focused attention of a student brought about by a change in surroundings or situation are characteristic of these phases.

The last two phases of interest development are termed emerging and maintained individual interest. An individual in these phases is characterized by self-efficacy, goal setting, valuing the context of the subject, stored knowledge, and a propensity to reengage with the subject content often involuntarily.[17] The student's interest is no longer dependent on external factors but is self-generated. The student values the subject and its content and searches for opportunities to engage with the subject content; in addition, completion of tasks seems effortless to him/her, sometimes even exceeding the demands. Individual interest is often stable and permanent. Such an interest is no longer dependent on external surroundings. These phases are characterized by positive feelings, focused attention, increased valuing of the subject, and a predisposition to reengage to the subject or its contents. With appropriate guidance and scaffolding, a learner can transcend from the initial phase of situational interest to a phase of well-developed individual interest.

A cross-sectional study was designed, and the study duration was 6 months (November 2022–April 2023) after securing the approval of the institutional ethics committee. The Community Medicine Interest Questionnaire (CMIQ) was developed in two phases: item generation and item reduction. We followed the seven-step process of designing a high-quality questionnaire proposed in the Association for Medical Education in Europe (AMEE) guide number- 87[18] [Figure 1].

**Step 1: Conduct a literature review-** To identify specific aspects related to the interest of an undergraduate medical student toward the subject of Community Medicine, a literature search was carried out in the PubMed directory to identify relevant studies done over the past 15 years in the English language. The keywords used in the literature search were as follows: search string ("Interest" OR "Carrier choice") AND ("Develop" OR "Improve" OR "Assess" OR "Measure") AND ("Community medicine" OR "Community health expert" OR "Community health specialist"). Only those studies were included which were in line with the four-phase model of interest development.

**Step 2: Conduct interviews and/or focus groups-** Six sessions of focused group discussion involving six students each were conducted to identify their perceptions regarding the construct and their coherence with the dimensions. This was further supplemented with an in-depth interview of five students. All the participating students belonged to the third-phase part-1 of the undergraduate MBBS curriculum.

**Step 3: Synthesize the literature review and interviews/ focus groups-** An operational definition of the construct "Interest in community medicine" was conceived.

**Step 4: Develop Items-** Items were developed based on the operational definition, literature review, results of focus groups, and in-depth interviews.

**Step 5: Conduct expert validation-** The content validity of the tool was determined by ascertaining its representativeness and clarity. Six experts of Community Medicine, with the designation of Associate professor or Professor and having a teaching experience of more than 8 years, were invited to validate the tool. The content validation form also included the operational definition of the construct, the details of the dimensions used to study the construct, and their working definition. The experts were instructed to grade each of these on a scale of 1–4. The content validity was determined based on three indices: the interrater agreement on the representativeness of the item, the interrater agreement on the clarity of the items (IRAC), and the content validity index of the item's representativeness. The cutoff for all three indices was kept at 80%.

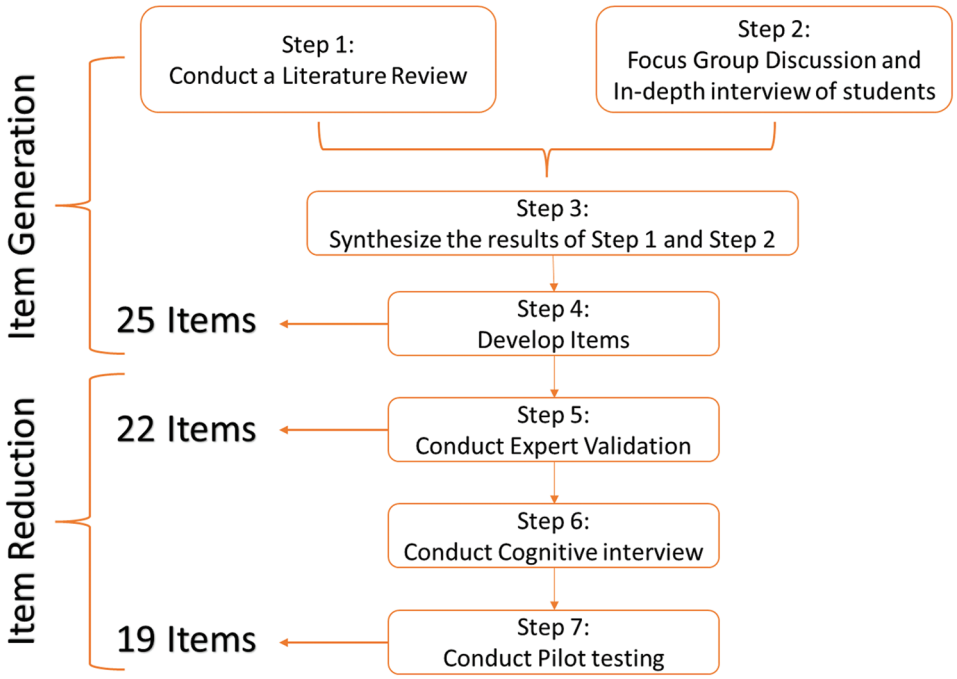


**Figure 1:** The seven-step process followed in designing the Community Medicine Interest Questionnaire (CMIQ)

**Step 6: Conduct cognitive interviews-** Eight students were invited to fill out the questionnaire tool, after which they were interviewed by immediate retrospective probing. The responses were coded and qualitatively analyzed to further refine the questionnaire. The questions were then framed in a language that was easily comprehensible to the undergraduate medical students.

**Step 7: Conduct pilot testing-** The construct validity was ascertained through exploratory factor analysis (EFA) by pilot testing.

Sample size: Based on the presumption that the questionnaire would contain a maximum of 24 questions, a sample size of 480, roughly corresponding to 20 responses per variable, was considered appropriate.[19,20] Stratified random sampling was used to select the study population of 480. Sixteen medical colleges located in India were randomly selected. Students studying in the phase-3 part-1 of these medical colleges were invited to take part in the study. Their responses were collected through web-based Google Forms. Those declining to consent for the study were not included in the survey. From each medical college, 30 completed responses were randomly included in the survey. In total, 480 responses were considered.

Principal axis factoring was used to extract variances from data. To ascertain the suitability of data for employing exploratory factor analysis (EFA), Kaiser–Meyer–Olkin (KMO) and Bartlett's test of sphericity were conducted. The cutoff value for KMO test was kept at 0.8. Multicollinearity was checked and items showing high correlation (>0.9 or <−0.9) and low correlation (<±0.3) with other items were dropped from further analysis. Scree plot, factors having eigenvalues >1, total variance explained >60%,[21,22] and theoretical considerations were the criteria used in determining the number of factors to retain.[21] We expected the factors to be correlated; hence, an oblique (Promax) rotation was used to identify the pattern matrix.[21] A pattern coefficient of >0.50 on the factor was considered sufficient for retention of the item, while a coefficient of >0.30 on any other factor was considered problematic. Such cross-loading variables/items were dropped from the questionnaire. The internal consistency of each factor was checked calculating Cronbach's alpha. A cutoff of 0.7 was deemed adequate for establishing the reliability. Statistical Package for Social Sciences (SPSS) version 23 was used for analysis of the data.

## Results

### Item generation

From the literature review, a total of 267 articles were screened from which 22 relevant articles were selected. An operational definition for "Interest in Community Medicine" was conceived after reviewing these articles-

*"A student having interest in Community Medicine will showcase the following three core attributes upon exposure to the subject or its contents- • Higher perceived value for the subject • Positive feelings towards the subject or its content and • A predisposition to re-engage with activities related to the subject of community medicine."*

Focus group discussions were conducted on the themes identified from the literature review. A total of 25 items were developed. Each of these items had five response options.

### Item reduction

Of the 25 items validated by the experts, three had an IRAC of <80% and hence were dropped. The three items were

"I always look forward to Community Medicine classes," "I feel more attentive in a class of Community Medicine as compared to other subjects," and "I find the concepts of Community Medicine relatable to my daily day-to-day life." All of them scored low on the clarity. Based on the feedback from cognitive interviews with prospective candidates, the item "Various concepts in Community Medicine fascinate me and I regularly search about them from sources other than my standard textbook" was rephrased as "I follow news stories and events related to Community Medicine via digital media". Hence, the remaining 22 items were subjected to pilot testing.

Among the 480 undergraduate medical students, 280 (58.3%) were females and 200 (41.6%) were males, with a mean age of 21.7 years. Three rounds of exploratory factor analysis were carried out [Figure 2].

First round of factor analysis: The KMO test value of the responses was 0.897, and the Bartlett' test of sphericity was found to be significant. Hence, the data were considered suitable for carrying out EFA. Multicollinearity among the items was found to be within the predetermined limits (<0.9 or >−0.9 or >±0.3); hence, no items were dropped. Furthermore, the item "The role of a doctor should be limited to treating patients" showed cross-loading on two factors. The item was, therefore, dropped. Principal axis factoring with oblique Promax rotation revealed the presence of four factors having eigenvalues >1.[22] The fourth factor, however, was represented by only two items: "I believe I have the necessary qualities required to become a specialist in Community Medicine" and "I consider community Medicine as a career option for me and would recommend it for my friends and juniors." The minimum number of items associated with each latent construct should be three.[22] Furthermore, the two-item latent factor had a Cronbach's alpha value of <0.7. Theoretically, we had considered the construct to be represented by three factors. Based upon the above considerations, a second round of factor analysis was considered restricting the analysis to three factors.

Second round of factor analysis: In this round, the number of factors was restricted to three, and 21 items were involved. The pattern matrix showed cross-loadings of two items: "The role of a doctor should be limited to treating patients" and "I find the subject and its application in health sciences fascinating." These two items were subsequently dropped.

Third round of factor analysis: The third round involved 19 items to be distributed among three factors. The pattern matrix showed seven, seven, and five items loading on factor 1, factor 2, and factor 3, respectively with a loading coefficient of >0.5 [Table 1]. These factors were subsequently named as "Feelings," "Predisposition to reengage with the subject or its contents," and "Value" based on the literature review. No cross-loadings were observed.

Internal consistency of subscales: The "Feelings," "Predisposition to reengage with the subject or its contents," and "Value" subscales had Cronbach's alpha values of 0.92, 0.85, and 0.79, respectively.

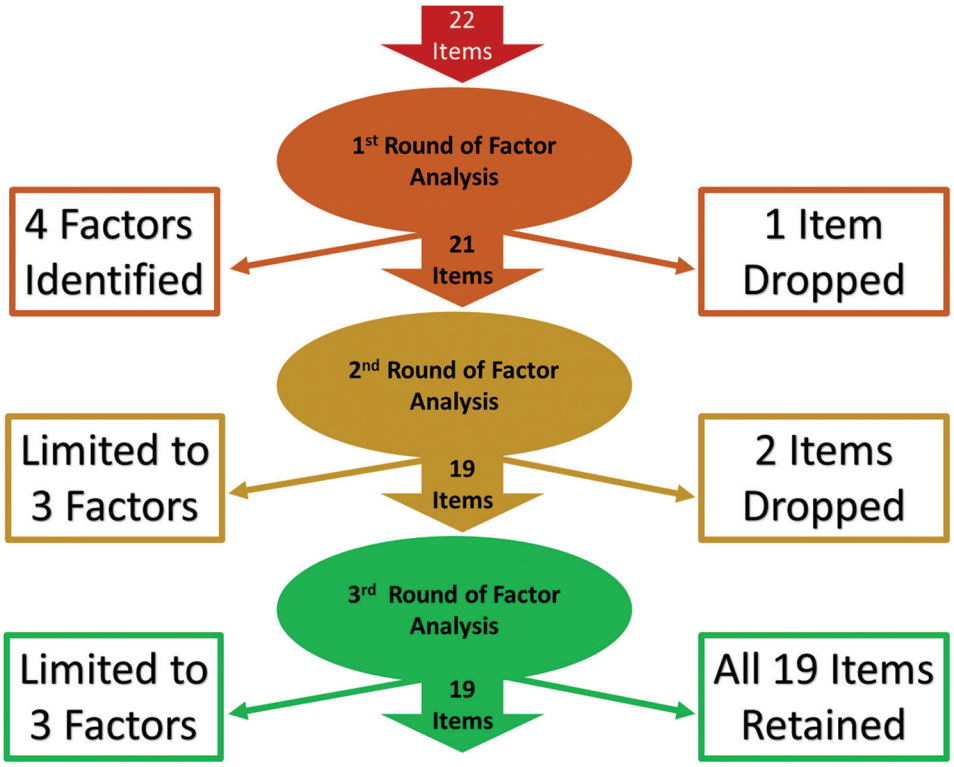


**Figure 2:** Three rounds of exploratory factor analysis using principal axis factoring and Promax rotation for ascertaining the construct validity of the questionnaire

**Table 1: Factor loading of the 19 Items after the third round of exploratory factor analysis using principal axis factoring with Promax rotation**

| Item of the Questionnaire | Factor Loadings | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| I had to put in a lot of effort to remain attentive in a class of Community Medicine as compared to other subjects. | | 0.626 | |
| I have started advising people to focus on healthy and health-seeking behavior, besides focusing on their disease. | | | 0.608 |
| I relate with the concepts of community medicine and actively participate in discussions related to community medicine during class hours. | | 0.876 | |
| Whenever I study Community medicine, I feel a lack of energy and start feeling drowsy. | 0.854 | | |
| I am not confident of getting good marks in Community medicine. | 0.716 | | |
| If there were no impending examinations, I would never read Community medicine. | 0.752 | | |
| I usually stop reading when I encounter a difficult concept which I do not understand. | | 0.535 | |
| I enjoy the field visits and look forward to the learning opportunities. | 0.588 | | |
| Of all the subjects I was taught in medical science, Community medicine is one of my favorites. | 0.850 | | |
| A thorough knowledge in community medicine is necessary to become a good doctor. | | | 0.645 |
| I have missed some community medicine classes in the past, as I found it boring. | 0.676 | | |
| Attendance is the predominant reason why I attend community medicine lectures. | | 0.574 | |
| When I read or watch any content related to community medicine, I feel fully focused. | 0.843 | | |
| I like to read the same topics in Community medicine again and again as I find them useful and interesting | | 0.710 | |
| The experiences from Corona pandemic, have helped me relate with the concepts of community medicine. | | | 0.777 |
| I follow news stories and events related to community medicine via digital media. | | 0.811 | |
| Some concepts of Community Medicine are difficult to understand. When faced with such concepts, I do some further reading on the internet to understand them better. | | | 0.771 |
| I voluntarily attend seminars and programs related to community medicine. | | 0.560 | |
| I consider Community Medicine as a career option for me and would recommend it to my friends and juniors. | | | 0.659 |

## Discussion

**Measures of interest employed in past studies:** Cross-sectional studies gathering the perceptions of students toward the subject have noted that the students find the subject "Not interesting,"[13,14,23] rarely selecting it as a future career option.[14,23,24] A Likert rating question asking the student "Do you find the subject of Community Medicine interesting?" or "Are you interested in research?" or "Do you find the classes boring?" captures some dimensions of the construct. However, predominantly such questions capture the "Feelings" or "Affective" domain of the construct, while neglecting other domains. Similarly, while interest in a subject is a strong predictor for the future career choice of an individual,[25] it represents a single dimension (Value) of a multidimensional construct. A student might still be interested in Community Medicine without actually opting it as a career choice.

**Interest is a multidimensional construct-** Interest is considered a construct of considerable educational significance; however, it is not a unitary concept.[26] Interest is a dynamic construct often transitioning between four phases- the initial phases of triggered and maintained situational interest followed by the more stable phases of emerging and well-developed interest.[17] Many dimensions get added to the construct of interest as it transcends between these phases.

Feeling, Value, and Predisposition to reengage with the subject or its contents are the three dimensions utilized by CMIQ to capture the construct of interest in community medicine. The Feelings subscale consisted of seven items. The items were designed to collect information about the affective domain of the construct. Positive effects or feelings, like those associated with motivation, satisfaction, content, and comfort when engaged with the subject, were represented by items 8, 9, and 13, while negative feelings associated with demotivation, frustration, and discomfort when engaged with the subject were represented by item numbers 4, 5, 6, and 11.

The value subscale consisted of questions gathering information about the students' perception relating to the role of community medicine and its concepts in their personal and professional lives. A student valuing the subject is more likely to incorporate the principles of the subject in his/her routine life. Such a student may also consider a career in Community Medicine. The value subscale has a total of five questions and is represented by item numbers 2, 10, 15, 17, and 19.

The predisposition to reengagement scale consisted of seven items. The questions were designed to identify the readiness of the student to reengage with the subject or its contents. Does the opportunity to reengage present randomly or do they willfully seek it out? And how do they feel while reengaging with the subject? It is represented by item numbers 1, 3, 7, 12, 14, 16, and 18.

The CMIQ provides an idea about which phase of interest the student is currently in. A student with situational interest would score heavily in the feelings domain; however, a student with individual interest will score equally in all three domains of feeling, value, and predisposition to reengagement.

**The teacher has different roles to play in different phases of Interest:** As the student transitions through these four phases, the role of a teacher varies from that of a supervisor providing instructions to that of a guide facilitating the students in their thirst for knowledge. Each phase demands a different teaching methodology to be employed by the teacher. Knowledge of which phase a student currently is in will help the teacher to design specific educational strategies for him/her. For example, a student with situational interest might require teaching methodology involving instructional designs[17] or pedagogical approaches. However, a student with individual interest would request more independent and task-based approaches toward learning.[17] Using CMIQ, a teacher can identify which phase of interest a student is in and therefore adopt relevant teaching learning strategies to facilitate the transitioning of the student from situational to individual phase of interest.

## Conclusion

The multidimensional nature of the construct necessitates a scientifically valid tool to account for all its dimensions. In the present study, the construct of interest is represented by the dimensions of feelings, value, and predisposition to reengagement in Community Medicine. This approach also enables us to measure both situational and individual interests. Both the content and the construct validity of the CMIQ were ascertained. The questionnaire consisted of a total of 19 questions, seven of which were negatively framed. Each of the 19 questions was provided with the following five response options- Not true at all, Not true for me, Neutral, True for me, and Very true for me.

**Possible uses of CMIQ:** The purpose of CMIQ is to help a teacher identify in which phase of interest the student is and provide the student with a teaching-learning experience or intervention appropriate to the identified phase. As the student transitions from one phase to another following educational interventions by a teacher, CMIQ serves as an ideal tool to capture these changes. CMIQ can be used as a valid and reliable tool to assess the utility of new teaching-learning techniques in both cross-sectional and longitudinal educational interventional studies.

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### Conflicts of interest

There are no conflicts of interest.

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