

Knowledge, Awareness, and Perceptions of Communication Disorders among Primary Healthcare Professionals in Bagalkote District of North Karnataka

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ABSTRACT

Background: Communication disorders affect speech, language, hearing, social interaction, learning, treatment participation, and access to care. Primary healthcare professionals often encounter children and families before specialist referral, particularly in semi-urban and district-level health systems. Their knowledge and perceptions are therefore important for early identification, counselling, and referral to audiologists and speech-language pathologists.

Aim: This study assessed knowledge, awareness, and perceptions of communication disorders among primary healthcare professionals in Bagalkote district of North Karnataka.

Method: A cross-sectional survey design was used. A total of 965 completed questionnaires were included. Participants were recruited through convenience sampling during awareness campaigns, monthly professional meetings, vaccination awareness programs, and mental health awareness initiatives. The questionnaire was available in English and Kannada. Knowledge/awareness items were Q1-Q12 and Q20; attitude/perception items were Q13-Q19. Aggregate descriptive and inferential outputs supplied in the draft were audited before manuscript preparation. Complete-case comparison of knowledge and attitude/perception scores was available for 947 participants.

Results: The complete-case mean knowledge score for Q1-Q12 was 34.4% (SD = 12.1; median = 33.3; range = 0-58.3), whereas the mean attitude/perception score was 68.9% (SD = 14.4; median = 75.0; range = 0-100). Knowledge was poor among 45.3% and moderate among 54.7%; no participant reached the good knowledge category. Knowledge was significantly lower than attitude/perception scores, $t(946) = -64.55$, $p < .001$; Wilcoxon $W = 778.0$, $p < .001$, with a large paired effect size (Cohen's $d = 2.10$). Knowledge and attitude/perception had a weak but statistically significant positive association (Spearman $\rho = 0.152$, $p < .001$), and categorized levels were associated by chi-square analysis (chi-square = 42.29, $df = 1$, $p < .001$). Reliability was low for the knowledge/awareness index ($\alpha = 0.22$) and attitude/perception index ($\alpha = 0.19$).

Conclusion: Primary healthcare professionals in this Bagalkote sample showed favourable perceptions toward communication-disorder support and training, but knowledge and referral-related indicators were limited. Findings support structured training, validated Kannada-English screening tools, clearer referral pathways, and interprofessional collaboration with audiology and speech-language pathology services.

Keywords: communication disorders; primary healthcare professionals; speech-language pathology; audiology; awareness; perception; Bagalkote; North Karnataka; cross-sectional survey

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INTRODUCTION

A speech disorder is a disability that affects the ability to create speech sounds effectively. In both clinical and community settings, these challenges can hinder an

individual's capacity to report their symptoms, follow health advice, get involved in decision-making and follow treatment or rehabilitation advice. At present, professional counsel refers to spoken language disorder as a persistent

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difficulty in learning and using listening and speaking skills across the language domains of phonology, morphology, syntax, semantics and pragmatics (ASHA, n.d.).

Recent international and national evidence confirms that communication disorders are a public health issue. According to the WHO World Report on Hearing, hearing care should be prioritized globally, and ear and hearing care should be delivered through a strengthened health systems based on integrated people-centred ear and hearing care (World Health Organisation, 2021). The worldwide agenda of equity for persons with disabilities also illustrates the need to recognize communication-related disability as a matter of access and equity and not only a specialized rehabilitation issue (World Health Organization, 2022).

If they are not detected and dealt with early on, children with speech, language or hearing difficulties may have educational, social, emotional and behavioural problems. Based on 2025 NIDCD's summary – nearly 7.2 per cent of children of ages 3-17 years in USA have a voice, speech or language disorder in the last 12 months. This shows that even in settings with more established surveillance systems, the size of this group is significant (National Institute on Deafness and Other Communication Disorders, 2025). Epidemiological estimates in India (which vary by study design, population and age range as well as screening method) continue to show a clinically significant burden of speech, language and hearing impairment among children (Ravi et al., 2021, South India; Varsha et al., 2020, South India).

The timely or early identification of communication disorders is the cornerstone or bedrock of the treatment care of communication disorders. Results from the early hearing detection and intervention studies reveal that compliance with benchmarks for early detection and intervention is linked to better spoken language outcomes in young children with hearing loss (Grey et al., 2022). Likewise, studies of service access indicate that children's paths to speech and language services are shaped by family, disorder and provider factors, and timely referral is an important aspect of access (Davidson et al., 2022).

Healthcare workers can detect developmental risk, delayed speech, hearing problems, poor intelligibility, inconsistent response to sound, social withdrawal, and concern from caregivers about communication problems. As opposed to the assessment carried out by specialists, they do identify warning signs, counsel families, and refer them for assessment and management to an audiologist, speech-language pathologist, otolaryngologist, pediatrician and developmental services as appropriate. According to the ASHA Practice Portal, speech-language pathologists have the responsibility of screening, assessing, referring, educating, and working with others. One particular guideline notes the need to educate other healthcare providers about the characteristics of language disorders (American Speech-Language-Hearing Association, n.d.).

In health systems at the district level, primary health care contact points are frequently the professionals dealing with children and families. The way they interpret the knowledge of a caregiver will determine whether the concern is normalized, dismissed, documented, followed up or referred. In low-resource and semi-urban circumstances where specialist speech-language and audiology services might not be always available, this gatekeeping role becomes even more important. Research conducted internationally among healthcare professionals has shown awareness of audiology and speech-language pathology services to be varied, and there is a continuing need for awareness campaigns and interprofessional practice (Alanazi et al, 2024). Indian evidence among medical professionals also suggests that the awareness about speech-language therapy may be more than the detailed knowledge of communication disorders that creates the gap between positive attitude and practical acknowledgement (Kumari et al., 2025). Lack of knowledge leads to procrastinated screening, ineffective referral pathways and missed opportunities to intervene. Conversely, positive perceptions and positive training interest create favorable conditions for capacity building. This study therefore focuses not only on knowledge but also on attitude and perception, as implementation is reliant on both knowing the facts and wanting to do so in terms of the screening and referral practices.

The Indian scenario calls for evidence at the district level since the burden of communication disorders, availability of services, health-seeking behavior, language background and access to referral vary widely. Verma et al. (2021) call for stronger hearing-loss surveillance and policy attention for India. In South India, school-based evidence from Ballari documented communication disorders in school children and the continued need for screening and referral mechanisms in the community (Ravi et al., 2021). The Bagalkote district of North Karnataka provides a relevant context of the study as primary healthcare professionals serve a variety of populations including children who may not directly use specialist audiology or speech-language pathology services.

There has been research on the prevalence of communication disorders and the awareness of professionals. However, the evidence that is published on the primary health professionals of the Bagalkote district is not many. The existence of Internal inconsistencies in the terminology and scoring in addition to a large aggregate ds ranging from possible 965 responses This paper thus treats the study as an aggregate secondary paper preparation exercise based on the available survey outputs and retains only internally consistent statistics while identifying analyses that require raw participant-level data before they can be validly reported.

The study was conducted to assess knowledge, awareness and perceptions of communication disorders among primary health care professions in Bagalkote district of north Karnataka. The specific objectives were to describe item-wise knowledge/awareness regarding communication

disorders, item-wise attitudes/perceptions towards communication-disorder support, inclusion, resources, referral, and training, compare composite knowledge and attitude/perception scores, determine the association between knowledge and attitude/perception, assess internal consistency of questionnaire domains using available aggregate outputs, and find implications for training, referral and interprofessional collaboration.

The symptoms of communication disorders vary widely and estimation is dependent on measurement used. According to the ASHA Practice Portal, prevalence estimates for spoken language disorders vary due to differences in definitions, study populations, and methodologies. Also due to under-identification or over-identification of marginalized groups (American Speech-Language-Hearing Association, n.d.). This heterogeneity is significant when interpreting cross-sectional survey results, as front-line health care professionals are likely to encounter a wide range of speech, language, hearing, fluency, voice, and social-communication impairments.

Recent global evidence highlights hearing loss as a leading and preventable cause of communication disability. The World report on hearing suggests hearing screening, hearing technology, rehabilitation, and public health action and proposes integrated people-centred ear and hearing care (World Health Organization, 2021) Guo et al. (2024) reported, based on the Global Burden of Disease 2021 estimates, that the worldwide burden of childhood and adolescent hearing loss remains significant, thereby indicating the necessity for preventing early detection. In India, Verma et al. (2021) reviewed the available evidence and argued that hearing-loss surveillance must be strengthened due to poor estimates.

Evidence from Indian schools and communities highlights the need for local screening initiatives. It was reported by Ravi et al. (2021) communication disorders among school children in Ballari, South India and the utility of district level identification. A screening study of rural school going children for speech, language and hearing impairments Varsha et al. (2020) conducted on 201 samples, which were not identified nor diagnosed nor rehabilitated before screening as per their author statement. All the studies found adequate need for stronger detection and referral capacity in primary.

The communication-disorder pathway has benefited from improved awareness of non-specialist health professionals. Alanazi et al. (2024) found an overall high level of awareness towards audiology and speech-language pathology services among healthcare professionals in Saudi Arabia. Knowing this, the study recommended more awareness campaigns to target other areas with a lower level of (or residual) knowledge. Kumari et al. (2025) found that the knowledge and awareness of speech-language therapy among medical professionals was better than their knowledge of communication disorders. This finding is directly relevant to the current study however as an awareness of service or favourable attitude does not

equal accurate identification of disorder characteristics or referral criteria.

System design also influences referral practices. In a study conducted by Davidson et al. (2022) examining access to speech and language services and providers for children who present with speech and language disorders showed that access is not just a family matter, but also a provider and pathway matter. Consequently, primary health care professionals do not need general knowledge, but rather practical screening cues, referral algorithms, local contact points and a feedback loop with specialists.

Patients with communication disorders may have difficulty articulating their symptoms, comprehending the medical explanation, and participating in consent and treatment planning, rendering the healthcare encounter complex. Usually, we all face barriers when we try to communicate with our healthcare providers. For people with communication disorders, communication barriers are compounded with their speech,... The WHO global report on health equity for persons with disabilities similarly frames disability-related barriers to health care as an equity problem which requires system-level action (World Health Organization, 2022).

Communication challenges in children can affect schooling, social interaction, psychosocial adjustment, and family stress. Adults with communication disability may be less able to work, join in social activities, manage chronic disease, and maintain dignity in care. The above impacts are so wide-ranging that they warrant training beyond specialist departments, along with support for the embedding of communication-disorder awareness in primary health, community medicine, child health, rehabilitation and public health programmes.

Interprofessional education is pertinent as communicative disorder care exists at the intersection of primary health care, pediatrics, audiology, speech-language pathology, psychologist, education and rehabilitation. van Diggele et al. (2020) mentioned that interprofessional education is a vital approach to preparing the health workforce for teamwork and collaborative practice.

In the current context, training should not be only limited to a lecture. The resource should contain symptom recognition, case scenarios, referral decision trees, Kannada-language counselling phrases, hearing-screening pathways, documentation formats, and follow-up procedures.

METHOD

The cross-section survey design was adopted to assess the knowledge, awareness and perceptions about communication disorders at one point in time. The research objective was descriptive and analytical, which made it appropriate to use a cross-sectional design. No measure was taken and there were no follow ups.

The survey was undertaken in professional and community health-related environments in the Bagalkote district of

North Karnataka. The participants were invited during an awareness campaign, monthly professionals' meeting, vaccination awareness program and mental health awareness program. The settings ensured access to primary health care workers who undertook community and primary care functions. The target participants were healthcare professionals working in various healthcare settings in Bagalkote district. Primary healthcare professionals are referred to in the paper. Some items in the rough questionnaire used teacher/classroom/student wording, so the items were reported in this manuscript using healthcare/community-child screening language where conceptually appropriate. The retention of this wording mismatch is explicitly noted as a limit of the instrument.

Participants were included if they are primary health care professionals who are involved in Community and or primary health service of Bagalkote district, present during data-collection and are willing to give consent to participate. Questionnaires which had a lot of missing information or incomplete answers were not included in final analysis. Due to the absence of demographic variables in the aggregate dataset provided for manuscript preparation, no criteria could be applied for a subgroup.

The final analysis included 965 completed questionnaires. Convenience sampling was used because participants were recruited on accessibility and willingness during awareness campaigns, monthly meeting, vaccination awareness programs, and mental health awareness activities. The usefulness of convenience sampling lies in collecting ample data in minimal time. However, the results lack external generalizability. Further, it also over-represents professionals attending training or awareness events.

Respondents were provided with a structured questionnaire. The knowledge/awareness items were Q1-Q12, Q20, and attitude/perception were Q13-Q19. The items covered knowledge about communication disorders, their common types and causes, appropriate age for screening, available resources and training, referral, perceived barriers to participation, impact of hearing impairment and social barriers, collaborative roles with

specialists, self-preparedness, inclusion and access to resources, past experience with training, confidence, and interest in training. The questioner was prepared in English and translated into Kannada for local access. The totality of survey output indicated a translation and back-translation procedure done by bilingual experts. Expert review by audiologists, speech-language pathologists, and public health professionals was also reported to assess relevance, clarity, comprehensiveness, cultural appropriateness, and suitability for the target population.

Before the data collection process, the Institutional Ethics Committee approved the study. Written consent was obtained from the participants. There was no coercion to participate, and the responses will be kept confidential. The information was collected and aggregated for research purposes.

According to their conveniences, the participants filled the questionnaire either in English or Kannada. Data for this study were collected from organized professional and health-awareness events. Respondents worked through the questionnaire independently, with clear instructions as needed. The forms which were filled up were collected and coded for analysis.

The report indicated that SPSS was used to code and analyze the data. The information on frequencies, percentages, mean, median, SD, minimum, maximum was presented in descriptive statistics. The various types of inferential analysis used in the study included paired-samples t-test, Wilcoxon signed rank test, Spearman correlation, chi-square analysis, and reliability analysis. The threshold of $p < .05$ was used.

RESULTS

A total of 965 completed questionnaires were included in the final aggregate dataset. Knowledge and attitude/perception scores were derived from valid responses for each item. Demographic variables were not available; therefore, participant characteristics by age, gender, designation, education, years of experience, or workplace type could not be described. Complete-case comparison of knowledge and attitude/perception scores was available for 947 participants.

Table 1. Study and Questionnaire Characteristics

Characteristic	Description
Study design	Cross-sectional survey
Study area	Bagalkote district, North Karnataka
Participants	Primary healthcare professionals
Final sample	965 completed questionnaires
Sampling technique	Convenience sampling during awareness campaigns, monthly meetings, vaccination awareness programs, and mental health awareness activities
Questionnaire language	English and Kannada
Knowledge/awareness domain	Q1-Q12 and Q20; Q1-Q12 used for complete-case inferential comparison
Attitude/perception domain	Q13-Q19
Knowledge categories	Poor <50%; moderate 50%-74%; good ≥75%
Complete-case score comparison	n = 947

Raw participant-level data	Not available for re-analysis
Demographic variables	Not available in the aggregate dataset

Note. The table summarizes the audited study features retained from the available aggregate outputs.

Knowledge/awareness responses showed substantial variation across items. The highest correct/optimal response percentages were observed for collaboration with speech-language/audiology specialists (Q12 = 90.2%), knowledge of characteristics of children with speech-language disorders (Q20 = 90.4%), importance of training primary healthcare personnel (Q7 = 73.8%), and perceived impact of hearing impairment on child functioning (Q10 =

65.7%). Correct responses were low for referral practice (Q8 = 18.1%) and familiarity with communication disorders (Q1 = 21.4%). Near-zero percentages were reported for multi-select items assessing common disorders, causes, and screening resources (Q2, Q4, Q6 = 0.1% each), which should be interpreted cautiously because all-or-none scoring of multi-select items can underestimate partial knowledge.

Table 2. Item-Wise Knowledge/Awareness Responses

Item	Knowledge/awareness indicator	Valid n	Correct/optimal n	Correct/optimal %	Missing n
Q1	Familiarity with communication disorders	961	206	21.4	4
Q2	Knowledge of common communication disorders among school-age children	953	1	0.1	12
Q3	Identification of speech or language problems during routine service/community contact	955	34	3.6	10
Q4	Knowledge of common causes of communication disorders	950	1	0.1	15
Q5	Optimal age for specialist screening	948	535	56.4	17
Q6	Knowledge of resources useful for early screening	944	1	0.1	21
Q7	Importance of training primary healthcare personnel	944	697	73.8	21
Q8	Referral of children to a specialist for communication disorders	930	168	18.1	35
Q9	Recognition of major barriers to screening	906	353	39.0	59
Q10	Perceived impact of hearing impairment on child functioning	926	608	65.7	39
Q11	Recognition of social interaction barriers	920	428	46.5	45
Q12	Collaboration with speech-language/audiology specialists	936	844	90.2	29
Q20	Knowledge of characteristics of children with speech-language disorders	923	834	90.4	42

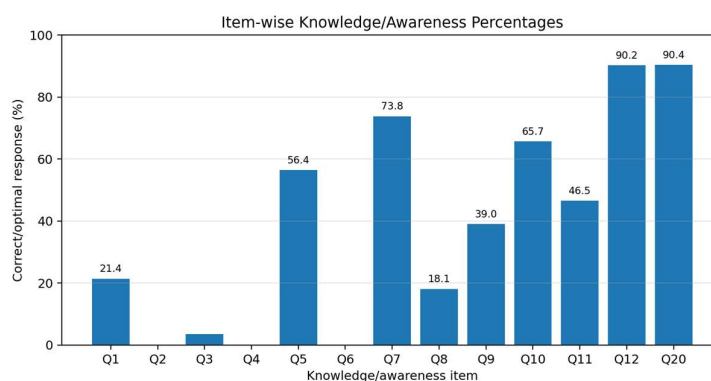


Figure 1. Item-wise percentage of correct/optimal knowledge/awareness responses. Percentages are based on aggregate valid responses from the audited aggregate output.

Based on the scoring cut-offs specified in the aggregate survey output, 45.3% of participants were in the poor knowledge category and 54.7% were in the moderate category. No participant reached the good knowledge

category. This distribution indicates that even though some individual items showed strong recognition, the overall knowledge index did not demonstrate high-level mastery.

Table 3. Distribution of Knowledge Levels

Knowledge level	n	%
Poor (<50%)	437	45.3
Moderate (50%-74%)	528	54.7
Good (>=75%)	0	0.0

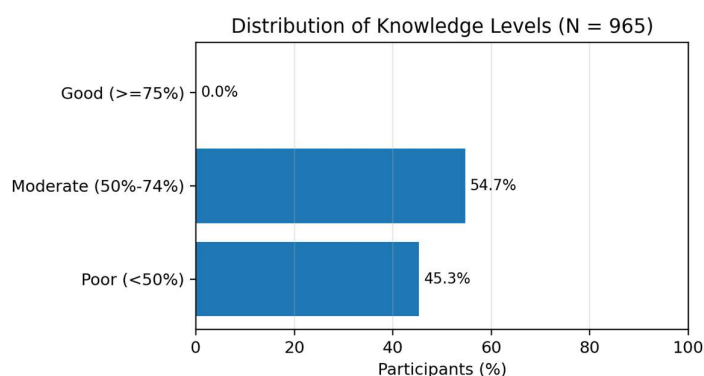


Figure 5. Distribution of knowledge levels. The good category was 0%, confirming absence of good knowledge scores in the aggregate dataset.

Attitude/perception items generally showed favorable responses. Strong willingness to participate in additional training was observed (Q19 = 97.2%), followed by preparedness to support children with communication disorders (Q13 = 92.7%) and confidence in identifying communication disorders (Q18 = 92.2%). Support for

inclusion was also high (Q15 = 87.1%). However, only 18.1% reported prior training exposure (Q17), and only 5.3% perceived screening resources as adequate (Q16). These two findings are practically important because they indicate that favorable attitude is not matched by adequate training or resource availability.

Table 4. Item-Wise Attitude/Perception Responses

Item	Attitude/perception indicator	Answered n	Favourable/aligned n	Favourable/aligned %	Missing n
Q13	Preparedness to support children with communication disorders	932	864	92.7	33
Q14	Supportive attitude toward children with communication disorders	908	619	68.2	57
Q15	Support for inclusion in mainstream/community settings	917	799	87.1	48
Q16	Perceived adequacy of screening resources	925	49	5.3	40
Q17	Prior training exposure	922	167	18.1	43
Q18	Confidence in identifying communication disorders	918	846	92.2	47
Q19	Interest in additional training	924	898	97.2	41

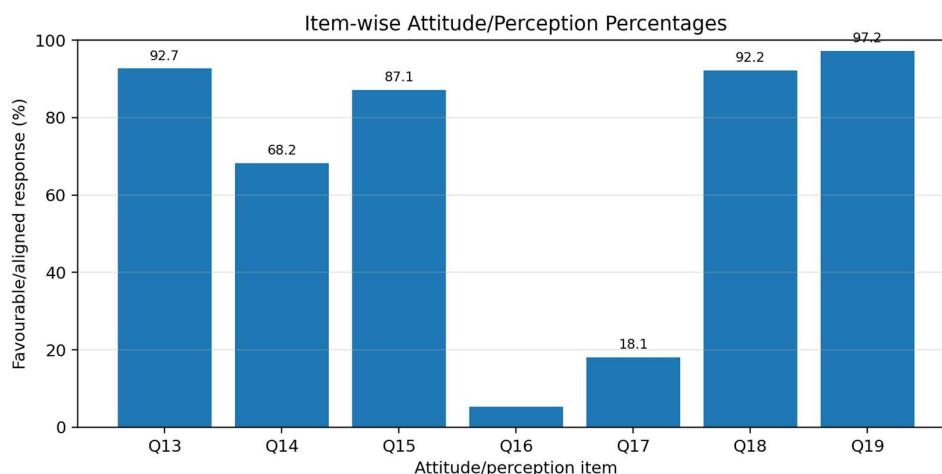


Figure 2. Item-wise percentage of favourable/aligned attitude/perception responses. Percentages are based on aggregate valid responses from the audited aggregate output.

Participant-level attitude/perception categories could not be reconstructed because the raw dataset and score-category counts were not available. Therefore, the manuscript reports item-level attitude/perception percentages and complete-case mean, median, standard deviation, minimum, and maximum scores, but it does not fabricate categorical attitude-level distributions.

Comparison of Knowledge and Attitude/Perception Scores

Complete-case score comparison was available for 947 participants. The mean knowledge score for Q1-Q12 was 34.4% (SD = 12.1; median = 33.3; range = 0-58.3), whereas the mean attitude/perception score for Q13-Q19 was 68.9% (SD = 14.4; median = 75.0; range = 0-100). Thus, attitude/perception exceeded knowledge by 34.6 percentage points.

Table 5. Comparison of Knowledge and Attitude/Perception Scores

Score component	n	Mean (%)	Median (%)	SD	Minimum (%)	Maximum (%)
Knowledge (Q1-Q12)	947	34.4	33.3	12.1	0.0	58.3
Attitude/perception (Q13-Q19)	947	68.9	75.0	14.4	0.0	100.0

Note. Values are complete-case aggregate outputs retained from the aggregate survey output after scoring audit.

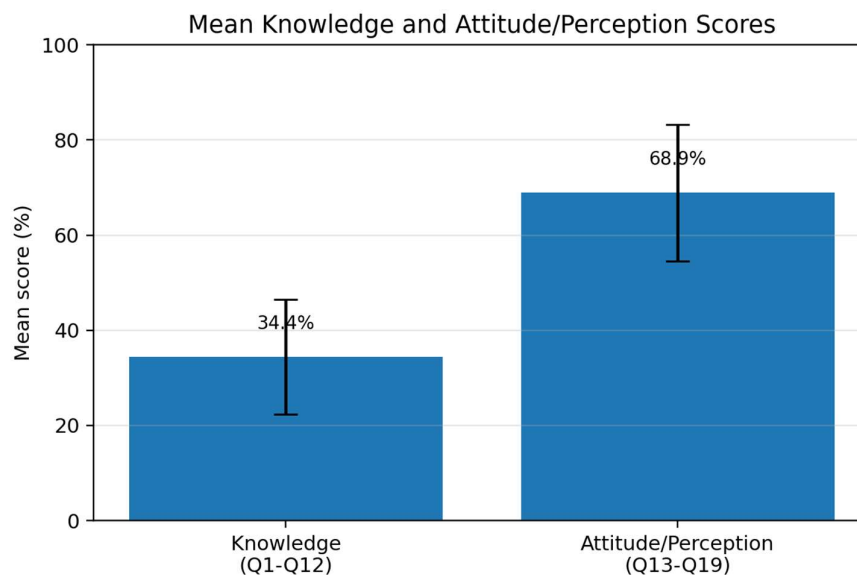


Figure 3. Mean knowledge and attitude/perception scores with standard deviation error bars.

The paired t-test showed that knowledge scores were significantly lower than attitude/perception scores, $t(946) = -64.55$, $p < .001$. The Wilcoxon signed-rank test confirmed the same conclusion ($W = 778.0$, $p < .001$). The mean difference was 34.6 percentage points in favour of

attitude/perception. The paired effect size was very large (Cohen's $d = 2.10$), indicating that the difference was not only statistically significant but also practically meaningful.

Table 6. Paired t-Test and Wilcoxon Signed-Rank Test

Comparison	n	Test	Statistic	p-value	Effect size / interpretation
Knowledge vs attitude/perception	947	Paired t-test	$t(946) = -64.55$	$< .001$	Cohen's $d = 2.10$; very large difference
Knowledge vs attitude/perception	947	Wilcoxon signed-rank test	$W = 778.0$	$< .001$	Non-parametric confirmation of significant difference
Attitude - knowledge	947	Mean difference	+34.6 percentage points	-	Attitude/perception substantially exceeded knowledge

Association between Knowledge and Attitude/Perception

Knowledge and attitude/perception scores showed a weak but statistically significant positive relationship (Spearman $\rho = 0.152$, $p < .001$). Chi-square analysis also indicated a

significant association between categorized knowledge and attitude/perception levels (chi-square = 42.29, $df = 1$, $p < .001$). The small correlation indicates that knowledge and attitude/perception are related but distinct domains; favourable perception alone should not be treated as evidence of adequate knowledge.

Table 7. Spearman Correlation and Chi-Square Association

Analysis	Statistic	df	p-value	Interpretation
Spearman correlation: knowledge score vs attitude/perception score	$\rho = 0.152$	-	$< .001$	Weak positive association
Chi-square: knowledge category x attitude/perception category	chi-square = 42.29	1	$< .001$	Categorized levels were statistically associated

Note. Participant-level scatter plotting could not be recreated because raw data were not available.

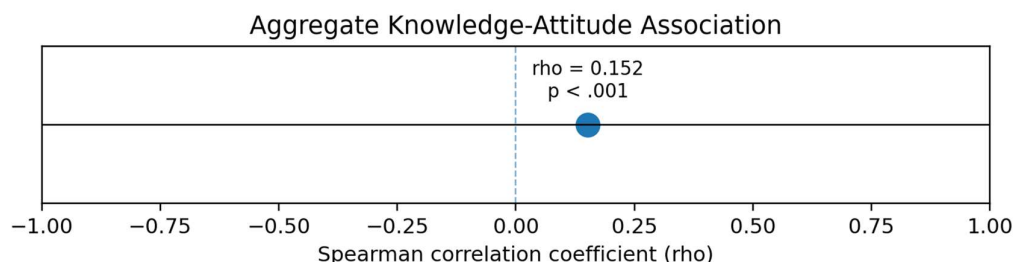


Figure 4. Aggregate correlation summary for the knowledge-attitude association. This is not a participant-level scatter plot because raw participant-level data were not available.

The internal consistency of the questionnaire domains was low. The knowledge/awareness index had Cronbach's $\alpha = 0.22$, and the attitude/perception index had $\alpha = 0.19$. These values indicate that the items should not be interpreted as a unidimensional psychometric scale.

Rather, the instrument functioned as a broad screening questionnaire that sampled diverse content areas such as familiarity, causes, screening age, resources, referral, perceived barriers, confidence, and training interest.

Table 8. Reliability Analysis of Composite Indices

Scale/index	Number of items	Reliability coefficient	Interpretation
Knowledge/awareness index	13	Cronbach's $\alpha = 0.22$	Low internal consistency; broad

			screening index
Attitude/perception index	7	Cronbach's alpha = 0.19	Low internal consistency; broad screening index

Note. KR-20 or ordinal reliability methods would be preferable for future validation depending on item type and scoring. Raw item-level data are required for such re-analysis.

Subgroup analysis was not retained as a valid finding. The uploaded draft included subgroup means for training status, confidence, preparedness, and interest in training; however, those subgroup knowledge means were in the range of approximately 83.5%-94.6%, which is incompatible with the complete-case knowledge mean of

34.4% and maximum of 58.3% reported for the Q1-Q12 knowledge score. Because raw data were unavailable, the inconsistency could not be resolved. Therefore, subgroup ANOVA findings are presented only as an audit note and not as valid empirical results.

Table 9. Subgroup Comparison/ANOVA Audit

Grouping variable in rough output	Status in final manuscript	Reason
Training status	Not retained as inferential finding	Reported subgroup knowledge means were inconsistent with the Q1-Q12 complete-case score range
Confidence	Not retained as inferential finding	Reported subgroup values could not be reconciled with the validated knowledge composite
Preparedness	Not retained as inferential finding	Raw participant-level data were unavailable for verification
Interest in training	Not retained as inferential finding	ANOVA outputs could not be independently checked from aggregate data

Note. No p-values or effect sizes were recalculated because raw data were unavailable. This conservative approach prevents overclaiming.

DISCUSSION

The present cross-sectional survey-based study revealed a clear difference between knowledge and attitude/perception among primary health care professionals in the Bagalkote district. The mean knowledge score for the complete case was found to be low to moderate at 34.4%, while none of the candidates fall in the good knowledge category. On the other hand, the average attitude/perception score was 68.9%, with a high willingness for extra training with high self-reported preparedness and confidence. Findings suggest that there was a statistically significant and practically large difference between their knowledge and attitude/perception. What this means is that the workforce may be amenable to communication-disorders initiatives. However, more a structured and specific content capacity building would be required.

The most recent literature on professional awareness supports this pattern. Kumari et al. (2025) stated that medical professionals' awareness of speech-language therapy may be more than their detailed knowledge of communication disorders. According to the findings of Alanazi et al. (2024), health care professionals were aware of audiology and speech-language pathology services. However, they still recommended campaigns due to some gaps. The Bagalkote data presented here extend this concern to a district-level North Karnataka context, showing that positive perception cannot be assumed to translate into accurate recognition or referral.

Observed that some multi-select items had an extremely low correct percentage point; hence, interpretation should be careful. All-or-none scoring indicates a situation in which a respondent may know the right options but not correctly accomplish a task if respondent misses one or selects an incorrect option. As such, the almost-zero results for common disorders, their causes, and screening resources indicate a lack of knowledge and strict scoring. Future surveys should continue with partial-credit scoring for multi-select items, report item difficulty and discrimination, and validate the scale prior to use of the composite score for high stakes interpretation.

Even with this caveat, the low mean knowledge score and no good-knowledge category is significant. The practice of referral was low, and the knowledge of communication disorder was poor. This issue signals a practical problem, whereby primary healthcare professionals may support the view of training and collaboration, but may not possess sufficient operational knowledge to make red flag identifications and counsel families, and initiated timely referral. This is especially the case as they only access specialist services where the primary system has recognized the need to refer.

The outcomes regarding attitude and perception were appealing but not uniform. The majority of participants indicated that they are interested in more training, support for inclusion, readiness to support children, and confidence in identification. Only 18.1% reported having

had prior training exposure and only 5.3% reported having sufficient screening resources. One of the most actionable findings from the study is the contrast between high willingness and low availability of training/resources. It means that training programs are possibly acceptable to employees / staff and they probably do not show a great deal of attitude resistance.

Thus, a training response must stress practical skill. The content should cover communication developmental milestones indicative of a child's progress, common communication red flags, auditory warning signs indicative of hearing difficulties, speech intelligibility milestones, indicators that the child is delayed in their language skills, communication concerns that could signify autism in the child, fluency and voice warning signs, counselling messages for parents (care-givers), referral directories and reporting formats. Materials in Kannada language are particularly useful as screening and counselling in the mother tongue enhances caregiver comprehension and adherence.

The study findings necessitate the incorporation of screening for communication-disorders within primary and community health activities. Professionals can be trained to ask a short trigger question: Is the child consistently responding to sound? Does the child use words appropriate for their age? Is speech intelligible for age? Is the child making little to no eye contact? Did the caregiver show concern? When a client responds positively, this should lead to a structured referral. Reassurance is not enough.

The primary healthcare expert should have access to audiologists, speech-language pathologists, pediatricians, otolaryngologists, and developmental specialists through referral pathways. It is essential for feedback to go to the primary provider through referral mechanisms in order to prevent families from being lost between screening and specialist assessment. According to the WHO framework for integrated people-centred ear and hearing care (World Health Organization, 2021), screening activities must be carried out through stronger systems. Awareness campaigns can be useful in relation to identification of communication-disorder, so long as they are linked to service pathways.

The healthcare systems at the semi-urban and district levels in India face unique challenges such as uneven distribution of specialists, transport barriers, multilingual populations, variable local caregiver awareness, and competing priorities in the primary care setting. Communication disorders may be viewed as educational or developmental issues rather than health issues causing delay in referral. Recent evidence from India on hearing loss and communication disorders in school-age children indicate screening and surveillance continue to be an important priority (Ravi et al.; Varsha et al.; Verma et al.). As indicated by experts in family health, training and provision of referral tools could transform

primary healthcare professionals into an important link between families and special services.

The difference in knowledge and attitude was statistically significant at $p < .001$ with a very large paired effect size. Consequently, the discrepancy is at least somewhat likely not to be a byproduct of mere statistical factors resulting from the huge sample. A gap of 34.6 percentage points in practice suggests that knowledge-focused training is required even in case of favourable attitudes. The weak correlation between the knowledge on zebras and the attitude/perception towards zebras shows that increasing the attitude may not adequately enhance the knowledge. Assessments of training programs should therefore include measures of knowledge (objective tests), referral accuracy, and follow-up behaviour, as well as satisfaction and self-confidence.

Low internal consistency is an important methodological finding. The alpha values indicate that the questionnaire measures multiple constructs and not a single narrow one. While this approach may be suitable for a general awareness survey, composite score interpretation is limited. Future efforts should be made to isolate domains of factual knowledge, screening competence, referral behaviour, perceived role, resource availability, confidence, and training interest. This would enable the easier measurement of these domains. Before you use the instrument for comparative or intervention studies, examine it using exploratory factor analysis, confirmatory factor analysis, item-response analysis, and test-retest reliability among the raw participant-level data.

SUMMARY AND CONCLUSION

A cross-sectional survey-based assessment of a total of 965 primary healthcare professionals in the Bagalkote district found a positive attitude with high training interest regarding communication disorders but limited knowledge and weak referral-related indicators. According to complete-case analysis, the attitude/perception scores were significantly higher than the knowledge scores. The weak correlation between knowledge and attitude implies that positive perceptions do not replace knowledge or skill. According to the study, training modules on Kannada-English spelling system, an innovative screening tool and formal referral pathways connecting primary care professionals with audiologists, speech-language pathologists should be developed. Since the manuscript relied on aggregate outputs, the authors recommend future studies to use raw participant-level data, validated instruments and pre-post training designs to strengthen the evidence.

LIMITATIONS OF STUDY

- As convenience sampling method was utilized, results cannot be generalized to all primary healthcare professionals in Bagalkote district or North Karnataka.
- The causal inference is avoided by the cross-sectional design. Although the study can describe associations, it

cannot show that knowledge causes better attitude or referral behaviour.

- The answers provided were self-reported which may be biased by social desirability and/or perceived expectations during the awareness events.
- The aggregate dataset did not provide any demographic variables; hence, analysis could not be done by gender, designation, education, experience, or type of work.
- Some of the questionnaire items in the aggregate survey output used teacher/classroom/student wording. Items were reported in healthcare/community-child screening language wherever relevant, but the mistake remains as an instrument limitation.
- The analysis showed that both composite indices had low internal consistency suggesting that the instrument is better treated as a non-validated unidimensional scale which screens broadly.
- The original participant-level information was not at hand. Thus, the procedures of confidence intervals, regression models, factor analysis, item-level reliability diagnostics and validated subgroup ANOVA could not be carried out.
- The subgroup ANOVA outputs found in the overall survey output were not retained because they were internally inconsistent with the full-case knowledge-score range.

FUTURE DIRECTIONS

- We should conduct a multicentric study with a larger sample size across various districts of Karnataka and neighbouring states that uses probability-based or convenient sampling or stratified sampling wherever feasible.
- To develop a valid Kannada-English Questionnaire for Primary Health Care Professional (PHCP) working at Kerala the subscales will include knowledge, competence in screening, referral practice, resources available, training need.
- A pre-post training intervention will be implemented to measure whether structured modules improve existing knowledge, referral accuracy, confidence, and referral behaviour.
- Involve ASHA workers, nurses, medical officers, Anganwadi workers, teachers, paediatric practitioners, and community rehab workers to map the full child-development referral network.
- Utilize unadulterated participant-level data to carry out multivariable regression structural equation modelling, or path analysis to investigate the predictors of referral readiness and training uptake.

- Establish referral registries and follow-up systems in the districts to assess whether screening results in completed specialist assessment and intervention.

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REFERENCES

- Alanazi, A. A., ALHarbi, M. F., AlMutairi, A. M., AlRashied, M. A., & Abed, R. (2024). Awareness of audiology and speech-language pathology services among healthcare professionals in Saudi Arabia. *South African Journal of Communication Disorders*, 71(1), a1043. <https://doi.org/10.4102/sajcd.v71i1.1043>
- American Speech-Language-Hearing Association. (n.d.). Spoken language disorders. In ASHA Practice Portal. Retrieved June 28, 2026, from <https://www.asha.org/practice-portal/clinical-topics/spoken-language-disorders/>
- Chadha, S., Kamenov, K., & Cieza, A. (2021). The world report on hearing, 2021. *Bulletin of the World Health Organization*, 99(4), 242-242A. <https://doi.org/10.2471/BLT.21.285643>
- Cummings, L. (2023). Communication disorders: A complex population in healthcare. *Language and Health*, 1(2), 12-19. <https://doi.org/10.1016/j.laheal.2023.06.005>
- Davidson, M. M., Alonzo, C. N., & Stransky, M. L. (2022). Access to speech and language services and service providers for children with speech and language disorders. *American Journal of Speech-Language Pathology*, 31(4), 1702-1718. https://doi.org/10.1044/2022_AJSLP-21-00287
- Grey, B., Deutchki, E. K., Lund, E. A., & Werfel, K. L. (2022). Impact of meeting early hearing detection and intervention benchmarks on spoken language. *Journal of Early Intervention*, 44(3), 235-251. <https://doi.org/10.1177/10538151211025210>
- Guo, Z., Ji, W., Song, P., Zhao, J., Yan, M., Zou, X., Bai, F., Wu, Y., Guo, Z., & Song, L. (2024). Global, regional, and national burden of hearing loss in children and adolescents, 1990-2021: A systematic analysis from the Global Burden of Disease Study 2021. *BMC Public Health*, 24, 2521. <https://doi.org/10.1186/s12889-024-20010-0>
- Kumari, S., Chowdhury, K., & Dubey, P. (2025). Medical professionals' awareness of communication disorders and speech-language therapy. *Journal of Indian Speech Language & Hearing Association*, 39(2), 119-129. https://doi.org/10.4103/jisha.jisha_25_25
- National Institute on Deafness and Other Communication Disorders. (2025). Quick statistics about voice, speech, language.

<https://www.nidcd.nih.gov/health/statistics/quick-statistics-voice-speech-language>

Ravi, S. K., Sumanth, P., Saraswathi, T., Chinoor, M. A. B., Ashwini, N., &Ahemed, E. (2021). Prevalence of communication disorders among school children in Ballari, South India: A cross-sectional study. *Clinical Epidemiology and Global Health*, 12, 100851. <https://doi.org/10.1016/j.cegh.2021.100851>

van Diggele, C., Roberts, C., Burgess, A., &Mellis, C. (2020). Interprofessional education: Tips for design and implementation. *BMC Medical Education*, 20(Suppl 2), 455. <https://doi.org/10.1186/s12909-020-02286-z>

Varsha, N. S., Sowmiya, R., Prasitha, P., &Praveena, J. (2020). Prevalence of speech language and hearing impairment in school going children of rural area: A

longitudinal study. *International Journal of Community Medicine and Public Health*, 7(10), 4043-4047. <https://doi.org/10.18203/2394-6040.ijcmph20204374>

Verma, R. R., Konkimalla, A., Thakar, A., Sikka, K., Singh, A. C., & Khanna, T. (2021). Prevalence of hearing loss in India. *The National Medical Journal of India*, 34(4), 216-222. https://doi.org/10.25259/NMJI_66_21

World Health Organization. (2021). World report on hearing. World Health Organization. <https://www.who.int/publications/i/item/9789240020481>

World Health Organization. (2022). Global report on health equity for persons with disabilities. World Health Organization. <https://www.who.int/publications/i/item/9789240063600>