

Perspectives on the Weighing of ICF Brief Core Set Components in Existing Hearing and Functioning Questionnaires

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June, 2026

CERTIFICATE

This is to certify that this dissertation entitled "**Perspectives on the Weighing of ICF Brief Core Set Components in Existing Hearing and Functioning Questionnaires**" is a bonafide work submitted as part of fulfilment of the degree of Master of Science (Audiology) of the student with Registration Number P011124S023020. This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other university for the award of any other Diploma or Degree.

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CERTIFICATE

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DECLARATION

This is to certify that this dissertation, entitled "**Perspectives on the Weighing of ICF Brief Core Set Components in Existing Hearing and Functioning Questionnaires,**" is the result of my own study under the guidance of Dr. Saransh Jain, Assistant Professor of Audiology, All India Institute of Speech and Hearing, Mysuru, and has not been submitted earlier to any other university for the award of any other Diploma or Degree.

A handwritten signature in black ink, appearing to be 'S. Jain', written over a set of diagonal lines.

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ABSTRACT

Background: Hearing loss affects communication, social participation, emotional well-being, and overall quality of life. Although several hearing-loss questionnaires have been developed based on the International Classification of Functioning, Disability and Health (ICF) framework, limited evidence exists regarding their relative coverage of the Brief ICF Core Set for Hearing Loss and the relevance stakeholders assign to different ICF domains. The present study aimed to establish stakeholder-informed consensus on the representation and relevance ratings of ICF domains and categories across selected hearing-loss questionnaires.

Methods: A modified Delphi methodology was employed involving rehabilitation professionals ($n = 20$) and adults with hearing loss ($n = 10$). Three ICF-aligned questionnaires, i.e., HEAR-COMMAND, the Hearing and Functioning in Everyday Life Questionnaire (HFEQ), and the ICF e-Intake Tool, were evaluated. Item-to-category mapping was performed using WHO-recommended ICF linking rules. Stakeholders provided qualitative feedback regarding questionnaire coverage and comprehensiveness and completed quantitative domain-relevance rating exercises. Prespecified consensus criteria were applied to derive a stakeholder-informed relevance rating matrix.

Results: Item-linkage analyses revealed that the Activities and Participation and Body Function domains were more widely represented in the questionnaires, whereas the Body Structure categories were least represented. Qualitative feedback highlighted strengths and limitations of each questionnaire and potential gaps involving psychosocial functioning, family-related contexts, and structural domains. Quantitative analysis revealed that Activities and Participation had the highest relevance ratings consistently across the questionnaires. Adults with hearing loss rated

participation-related domains much higher than did rehabilitation professionals. Friedman analyses revealed significant differences in domain relevance rating across the questionnaires, with Kendall's W values suggesting moderate to large effect sizes. Categories that were often perceived as more relevant included hearing functions, listening, conversation, receiving spoken messages, managing stress, and family relationships.

Conclusion: The results indicate that the currently available ICF-aligned questionnaires differ in their representation of the Brief ICF Core Set domains and do not equally reflect stakeholder consensus. The stakeholder-informed relevance rating matrix derived in this study offers empirical guidance for questionnaire refinement and facilitates the development of more comprehensive, contextually relevant, and person-centered approaches to hearing assessment.

Keywords: hearing loss; ICF; modified Delphi; stakeholder relevance rating; questionnaire assessment; person-centred assessment; hearing rehabilitation

CHAPTER I

INTRODUCTION

Hearing loss is a common health problem that affects more than 1.5 billion people worldwide, including 63 million in India (Verma et al., 2021). It affects many aspects, including communication, social interaction, education, and employment, thereby influencing the overall quality of life of individuals with hearing loss (WHO, 2021). Traditionally, hearing assessment has focused mainly on audiological measures, such as hearing thresholds and speech perception. While these measures are important for diagnosis and intervention planning, they may not sufficiently capture the broader functional, emotional, and participation-related consequences experienced in everyday life. This broader understanding of hearing loss means assessment tools have to do more than measure hearing thresholds to capture the full lived experience of the person.

To address these limitations, the World Health Organization introduced the International Classification of Functioning, Disability and Health (ICF) framework in 2001. Unlike traditional biomedical approaches that primarily focused on impairment, the ICF adopts a biopsychosocial perspective that recognizes the interaction between health conditions and contextual influences. The ICF framework conceptualizes functioning across Body Functions, Body Structures, Activities and Participation, and Environmental Factors (Meyer et al., 2016).

To make the ICF framework more practical in clinical and research settings, Core Sets were developed for different health conditions, including hearing loss. Danermark et al. (2013) developed the Comprehensive ICF Core Set for Hearing Loss, comprising 117 ICF categories that represent the broad spectrum of hearing-loss-related functioning. From this, the Brief ICF Core Set for Hearing Loss was derived to provide a concise framework for describing the most essential aspects of functioning in adults with hearing loss. The Brief ICF Core Set for Hearing Loss

comprises 27 categories considered most relevant for describing functioning among individuals with hearing loss. This core set serves as a conceptual framework describing domains that should ideally be represented in a comprehensive hearing assessment.

Three questionnaires have been developed to translate these 27 categories into patient-friendly items suitable for clinical use. These are the HEAR-COMMAND tool (Afghah et al., 2022), the Hearing and Functioning in Everyday Life Questionnaire (HFEQ) developed by Karlsson et al. (2021, 2024), and the ICF e-Intake Tool (van Leeuwen et al., 2020). HEAR-COMMAND was developed to provide a comprehensive assessment of hearing-related functioning across a broad range of everyday listening situations and communication contexts. The HFEQ was designed as a concise self-report instrument to assess functioning and participation restrictions associated with hearing loss in daily life. In contrast, the ICF e-Intake Tool was developed as a structured intake instrument directly linked to the ICF framework, enabling systematic identification of functioning, participation, and contextual factors relevant to hearing rehabilitation. Together, these instruments represent contemporary efforts to operationalize the ICF framework in hearing-loss assessment while differing in content emphasis, scope, and intended clinical application.

Although the HEAR-COMMAND, HFEQ, and ICF e-Intake Tool were all developed using the ICF framework, they differ in their structure, content distribution, and intended clinical applications. Previous studies have primarily focused on the development, content validation, construct validation, psychometric evaluation, and implementation of these instruments. Collectively, these investigations have demonstrated that the questionnaires can capture important aspects of hearing-related functioning and are broadly aligned with the Brief ICF Core Set for Hearing Loss.

Despite these advances, an important question remains largely unexplored. During questionnaire development, individual items are typically linked to specific ICF domains and categories by researchers and expert panels using established ICF linking procedures. Although such procedures provide a theoretically grounded framework for content development, it cannot be assumed that stakeholders necessarily perceive questionnaire items in the same way as their developers intended. A questionnaire item designed to represent a particular ICF category may be interpreted by stakeholders as reflecting a different category or aspect of functioning. Consequently, the extent to which the intended representation of questionnaire content corresponds to stakeholder perceptions remains unclear.

This issue is particularly important because hearing-related functioning is inherently multidimensional and influenced by cultural, environmental, social, and personal factors. These ICF-based hearing-loss questionnaires were developed and validated predominantly within Western populations. Communication demands, social participation patterns, family interactions, rehabilitation expectations, and environmental listening conditions may differ considerably across settings. Therefore, the way questionnaire items are interpreted and linked to specific categories of functioning may vary across populations and healthcare systems.

Another important consideration is whether rehabilitation professionals and adults with hearing loss perceive questionnaire items as representing the ICF categories intended by the developers. Although previous studies have established the relevance, comprehensiveness, and validity of ICF-based instruments, relatively little attention has been given to stakeholder perceptions of item-to-category linkage. Because questionnaire items may encompass multiple aspects of functioning, stakeholders may differ in how they conceptualize and classify item

content. Systematic evaluation of these perceptions may therefore provide valuable insights into domain representation, potential overlap between categories, and aspects of functioning that may be underrepresented within existing assessment tools.

In addition, understanding the extent of agreement among stakeholders regarding item-to-category linkages is important for determining whether questionnaire content is interpreted consistently across groups. Areas of strong agreement may support the appropriateness of existing category representation, whereas areas of disagreement may indicate ambiguity in item interpretation, overlap between constructs, or potential gaps in questionnaire coverage. Establishing stakeholder consensus may therefore provide a more comprehensive understanding of how existing ICF-aligned questionnaires represent hearing-related functioning in clinical practice.

The modified Delphi technique was considered particularly suitable for this purpose because it facilitates structured consensus-building among diverse stakeholder groups while integrating both professional expertise and lived experience. In the present study, rehabilitation professionals and adults with hearing loss were invited to evaluate the extent to which questionnaire items represented specific categories of the Brief ICF Core Set for Hearing Loss and to provide feedback regarding questionnaire coverage, comprehensiveness, and potential gaps in content representation. Aggregation of stakeholder linkage ratings enabled examination of domain-level representation patterns and consensus regarding the perceived coverage of functioning-related constructs across questionnaires.

The inclusion of adults with hearing loss alongside rehabilitation professionals was considered particularly important because previous research has consistently shown that audiometric findings alone do not fully explain the difficulties they experience in everyday life.

Individuals with similar audiometric profiles may differ substantially in communication performance, participation restrictions, coping strategies, emotional responses, and rehabilitation needs. Consequently, lived-experience perspectives provide important insights beyond conventional clinical indicators and contribute meaningfully to person-centered assessment approaches.

The World Report on Hearing (Chadha et al., 2021) emphasizes the importance of person-centered hearing care and advocates assessment approaches that reflect meaningful outcomes and experiences for individuals with hearing loss. Incorporating both professional and lived-experience perspectives within the consensus process therefore strengthens the clinical relevance, contextual applicability, and ecological validity of findings derived from the present study.

Consequently, a stakeholder-based evaluation of the representation of Brief ICF Core Set categories within existing hearing-loss questionnaires was considered necessary to determine the extent to which intended questionnaire content aligns with stakeholder perceptions and to identify potential areas of overlap, underrepresentation, and future refinement.

1.1 Need for the Study

Although three hearing-loss questionnaires have been developed using the ICF framework, important questions remain regarding the extent to which these instruments represent the domains and categories of the Brief ICF Core Set for Hearing Loss as perceived by relevant stakeholders. Existing questionnaires, including HEAR-COMMAND, HFEQ, and the ICF e-Intake Tool, differ in their content distribution, structure, and clinical focus. While these instruments have undergone content validation, psychometric evaluation, and implementation studies, limited evidence is

available regarding whether stakeholders perceive questionnaire items as representing the ICF categories originally intended by their developers.

An additional concern relates to the limited examination of stakeholder perceptions during questionnaire evaluation and refinement. Rehabilitation professionals and adults with hearing loss may interpret questionnaire content differently based on their respective clinical expertise and lived experiences. Consequently, questionnaire items designed to represent a particular aspect of functioning may be perceived as reflecting a different ICF category or construct. Understanding these perceptions is important because such differences may influence the apparent representation of ICF domains and categories within a questionnaire.

The Indian context introduces further considerations that may influence the interpretation of hearing-related functioning. Linguistic diversity, complex listening environments, collectivistic family structures, variable access to rehabilitation services, and culturally influenced communication practices may affect how hearing difficulties are experienced and understood. However, most currently available ICF-aligned hearing-loss questionnaires were developed and validated predominantly within Western populations. As a result, the extent to which their intended representation of ICF categories corresponds to stakeholder perceptions in the Indian context remains unclear.

Furthermore, limited evidence is available regarding stakeholder consensus on the representation of Brief ICF Core Set categories within existing hearing-loss questionnaires. Examining the extent to which stakeholders agree on item-to-category linkages can provide valuable insights into domain coverage, category representation, potential construct overlap, and areas of underrepresentation in current assessment tools.

Consequently, a systematic evaluation of existing ICF-aligned hearing-loss questionnaires involving both rehabilitation professionals and adults with hearing loss was considered necessary. Examining stakeholder perceptions of item-to-category linkage, questionnaire coverage, comprehensiveness, and consensus regarding category representation may help identify potential gaps within existing instruments and provide evidence to support future questionnaire refinement, contextual adaptation, and person-centered hearing assessment practices.

1.2 Aim of the Study

The present study aimed to establish a multidisciplinary, stakeholder-informed consensus on the extent to which existing ICF-aligned hearing-loss questionnaires reflect the domains and categories of the Brief ICF Core Set for Hearing Loss, and to examine stakeholder perceptions of item-to-category linkage, questionnaire coverage, and category representation relevant to adult hearing assessment.

1.3 Objectives of the Study

The objectives of the study were to:

1. Construct a transparent item-to-category mapping of selected questionnaires using WHO-recommended ICF linking rules;
2. Obtain qualitative stakeholder feedback regarding perceived coverage, comprehensiveness, and identification of missing content across questionnaires;
3. Determine quantitative linkage ratings and derived relevance rating allocations for ICF domains and categories from multidisciplinary stakeholders.;

4. Apply prespecified consensus criteria to derive a stakeholder-informed relevance rating matrix reflecting relative clinical and contextual priorities; and
5. Identify specific ICF domains and categories requiring greater emphasis during future questionnaire refinement and person-centered clinical assessment.

Chapter II

REVIEW OF LITERATURE

Hearing loss continues to be the most common sensory impairment on the globe, affecting individuals in various ways throughout their lives. The World Health Organization estimates that more than 430 million people need rehabilitation for hearing loss, defined as hearing loss greater than 35 dB in the better ear, including approximately 34 million children (Chadha et al., 2021). Recent projections have also been made that indicate an increased burden, such that 2.5 billion people will be experiencing some form of deafness by 2050, while over 700 million will require rehabilitation services. This shows that health care providers should go beyond assessing impairment and embrace broader models of understanding hearing loss (WHO, 2021).

Yet, the effects of hearing loss extend beyond the auditory system, impacting communication, social behavior, and quality of life (Singh et al., 2024). One aspect of the Lancet Commission report is the finding that “untreated hearing loss is an important modifiable risk factor for dementia in midlife,” with a global contribution to dementia load of close to 8% (Livingston et al., 2020). This adds a layer of significance to the problem, as it shows that hearing loss needs to be recognized not only for the sensory deficits it causes but also for its cognitive, psychological, and functional aspects. There can be extensive social consequences to hearing loss at any stage of an individual’s life (Podury et al., 2023).

In the Indian context, these challenges are compounded by a unique combination of structural and socio-cultural factors. India bears a substantial share of the global burden of hearing loss and faces constraints in healthcare infrastructure and the availability of specialists (Gupta et al., 2023; Verma et al., 2021). Hearing assessment and rehabilitation are made more complex by the country's highly multilingual communication environment, busy public places, and multi-

generational family structures(Valliappan et al., 2023). Many currently available assessment tools have primarily been developed and validated within Western populations. They may therefore fail to capture culturally embedded communication demands and contextual factors relevant to Indian adults with hearing loss. This limitation becomes particularly important when instruments are intended for person-centered assessment and rehabilitation planning.

2.1 The International Classification of Functioning, Disability and Health

The ICF was developed by the World Health Organization (WHO) in 2001 and represents a paradigm shift in how we view health and disability. Unlike the older system that promoted the biomedical model of health, in which disability was viewed as a result of pathologies in the body, the ICF employs a comprehensive biopsychosocial model that combines aspects of body structures, body functions, activities, participation, and the environment (World Health Organization, 2001). The model takes into account the fact that at any point in time, an individual's functioning level is a complex result of the interplay among a health condition, personal characteristics, and a specific environment (World Health Organization, 2001).

The ICF is structured as a hierarchical classification system that uses alphanumeric codes. Body Functions (b) and body structures (s) cover physiological or anatomical elements of the body; activities and participation (d) refer to tasks and life situations; and environmental factors (e) account for physical, social, and attitudinal aspects of the environment that can either enable or impede functioning (World Health Organization, 2001). Such a common language helps interdisciplinary communication, cross-country comparisons, and the standardization of measures, making the classification a unique tool for addressing the highly heterogeneous clinical nature of hearing loss (Meyer et al., 2016). Despite its conceptual strengths, implementation of the ICF

framework in routine audiological practice has remained challenging. Several investigators have observed that clinical interactions continue to emphasize biomedical dimensions of hearing impairment, while psychosocial and participation-related consequences receive comparatively less attention. Meyer et al. (2016) highlighted an important discrepancy between the theoretical scope of the ICF framework and routine audiological practice. Although the majority of hearing-related ICF categories fall under activities/participation and environmental domains, clinical interactions often remain centered on biomedical concerns and audiometric findings. Psychosocial concerns and participation restrictions are frequently underexplored or reframed as technological issues. Such observations suggest that implementation barriers persist despite growing acceptance of person-centered care principles in audiology.

The importance of this multifaceted understanding of functioning in hearing impairment within the biopsychosocial model, which serves as the conceptual basis for the ICF framework, is that the impact on a person's life can vary widely from one patient to another. As stated by Van Leeuwen et al. (2020), a person's level of functioning depends not only on the degree of their impairment but also on a range of other factors, including psychosocial skills such as mastery or coping, environmental resources, and demands.

2.2 The ICF Core Set for Hearing Loss

The full ICF taxonomy, comprising over 1,400 categories, is impractical for routine clinical and research. In response, the WHO ICF Research Branch coordinated the development of condition-specific ICF Core Sets. These rationalized subsets retain only the categories most relevant to a condition, enabling targeted, reproducible, and internationally comparable

functioning assessments. For hearing loss, this effort produced both a Comprehensive and a Brief ICF Core Set, formally published (Danermark et al., 2013)

The development of these Core Sets followed a multistage, consensus process. The development of this core set is based on the results of a previous expert survey, in which more than 53% of all categories within the ICF classification system were considered relevant for adults with hearing impairment (Afghah et al., 2022; Granberg et al., 2014a). After combining the information obtained during systematic literature reviews on outcome measures in audiological research, focus group discussions among adults suffering from hearing loss, expert surveys from rehabilitation specialists, and scientific research, the developers reached the final consensus list of core set items by using the consensus conference method (Danermark et al., 2013).

Table 2.1

ICF domains, number of codes, and descriptions relevant to hearing loss.

ICF Domain	No. of Codes (Brief Core Set)	Description
Body Functions (b)	7	b126 Temperament and personality functions b140 Attention functions b144 Memory functions b152 Emotional functions b210 Seeing functions b230 Hearing functions b240 Sensations associated with hearing and vestibular functions
Body Structures (s)	4	s110 Structure of the brain s240 External ear s250 Middle ear s260 Inner ear
Activities & Participation (d)	9	d115 Listening; d240 Handling stress d310 Receiving spoken messages d350 Conversation d360 Communication devices d760 Family relationships d820 School education d850 Employment d910 Community life
Environmental Factors (e)	7	e125 Communication technology e250 Sound e310 Immediate family e355 Health professionals e410 Individual attitudes of the family e460 Societal attitudes e580 Health services and policies

Though the Brief Core Set substantially simplifies the complex nature of the ICF framework, it still requires effective tools to translate abstract categories into meaningful, patient-manageable questionnaire items. This taxonomy constitutes the foundational reference against which any ICF-aligned hearing loss questionnaire must be evaluated. The Brief Core Set has

subsequently undergone international validation. Studies conducted by Karlsson et al. (2021) with adult hard-of-hearing individuals across several countries supported the validity and clinical utility of the 27 categories. They revealed that the categories could be internationally generalized but, at the same time, had sources of variation within cultures and contexts that influence the experience of the category and the priority attached to it. Specifically, the sample used for the validation studies did not include participants from South Asia, which limits the generalizability of the core set in its current form to low- and middle-income groups with diverse socio-cultural backgrounds (Gupta et al., 2023; Karlsson et al., 2021)

An important step in using the ICF to measure outcomes with outcome measurement tools is the systematic linkage of questionnaire items to their corresponding ICF categories. To meet this need, Cieza et al. (2005) developed a formal set of ICF Linking Rules, a standardized protocol for systematically mapping the meaningful concepts within any health-status or outcome measure to the most precise applicable ICF category. The protocol stipulates that each distinct meaningful concept within an item be identified separately, that the most precise category be assigned, that multi-concept items be mapped to multiple categories, and that the degree of confidence in each linkage decision be recorded (Cieza et al., 2005).

A major development of the initial linking rules was proposed by Cieza et al. (2019), who incorporated experience gained over a decade of using the ICF across various health disorders and assessment tools. The updated guidelines offered more explicit direction on handling personal factors, recognized within the ICF but not yet formally classified, on coding concepts that fall outside the ICF altogether, and on resolving disagreements between independent coders. This set of new linking rules now represents the WHO-endorsed standard for ICF-based content mapping and is the methodology adopted in the present study (Cieza et al., 2019). The availability of a

standardized linking methodology is essential to ensuring transparency, reproducibility, and cross-study comparability in the construction of ICF coverage maps, which are among the primary outputs of this dissertation. The use of standardized linking procedures is particularly important in studies involving multiple raters, as variations in interpretation can substantially influence category assignment and subsequent estimates of questionnaire coverage.

The literature has described the application of ICF linking rules for hearing-related outcome measures. Systematic reviews conducted during the Core Set development process mapped large pools of audiological outcome measures onto ICF categories. They consistently demonstrated that most existing tools focus on body functions and activities, while providing sparse coverage of participation and environmental factors (Danermark et al., 2013). Such mapping analyses provide the foundation for identifying coverage gaps and setting priorities for questionnaire development.

2.3 ICF-Aligned Hearing Loss Questionnaires

To help the practical implementation of ICF principles in clinical and research settings, three hearing-related instruments have been developed to operationalize the Brief ICF Core Set domains into patient-reported outcome measures. These tools vary in their scope, domain emphasis, and intended clinical applications.

2.3.1 *The HEAR-COMMAND Tool*

The HEAR-COMMAND (Hearing, Communication, and Conversation Assessment and Management of Dysfunction) tool was developed through an international collaboration involving researchers from Germany, the United States, the Netherlands, and Egypt (Afghah et al., 2022).

The instrument was designed to operationalize the ICF Core Sets for Hearing Loss into a self-report questionnaire suitable for clinical and research applications. The development process incorporated ICF-based item generation, expert review, and stakeholder feedback to ensure representation of hearing-related functioning from a biopsychosocial perspective. The major developmental milestones of the questionnaire are summarized in Table 2.2.

The questionnaire contains 90 ICF-based items and an additional 30 items addressing demographic characteristics and personal factors (Afghah et al., 2022, 2024). Among the ICF-based items, 48 represent Body Functions, 26 represent Activities and Participation, and 16 represent Environmental Factors. Body Structures were not included in the questionnaire development because the emphasis was on functional, communicative, and contextual aspects of hearing loss rather than anatomical impairments (Afghah et al., 2022). Consequently, the instrument demonstrates a stronger representation of Body Functions than other ICF domains.

Psychometric evaluation of the HEAR-COMMAND tool was subsequently conducted in a multicentre study involving participants from Germany, the United States, and Egypt (Afghah et al., 2024). The findings supported the questionnaire's content validity, construct validity, and internal consistency. Factor-analytic results demonstrated a multidimensional structure reflecting key aspects of hearing-related functioning, and the instrument successfully differentiated individuals with hearing loss from those with normal hearing. The broad coverage of communication, participation, psychosocial, and environmental factors represents a major strength of the tool. However, the exclusion of Body Structure categories and the absence of validation within culturally and linguistically diverse populations, such as India, highlight areas requiring further investigation.

Table 2.2.

The developmental chronology of the HEAR COMMAND tool.

Year	Study	Major Contribution to HEAR-COMMAND Development
2015	Alfakir, Holmes & Noreen	Demonstrated the applicability of the Brief ICF Core Set for Hearing Loss in audiological rehabilitation and validated several ICF categories using clinical outcome measures. Established the feasibility of operationalizing ICF categories for hearing-loss assessment.
2017	Alfakir & Holmes	Developed and validated one of the first ICF Core Set–based hearing disability questionnaires for older adults. Demonstrated that ICF categories could be translated into patient-reported questionnaire items and identified multidimensional influences on hearing disability.
2022	Afghah et al. (Clinical Audiological Data Study)	Applied ICF linking procedures to routine audiological assessments and demonstrated substantial underrepresentation of Activities & Participation and Environmental Factors within conventional clinical data. Highlighted the need for a more comprehensive ICF-based assessment instrument.
2022	Afghah et al. (HEAL-COMMAND Development)	Developed the initial HEAL-COMMAND Tool using ICF Core Sets for Hearing Loss, expert consensus, item generation from existing questionnaires, and iterative revisions. Achieved comprehensive coverage of the Brief ICF Core Set domains except Body Structures.
2022	Afghah et al.	Refined the questionnaire through multinational expert review and pilot validation involving patients from Germany, Egypt, and the USA. Revised terminology and improved content clarity and cultural applicability. Finalized the HEAR-COMMAND beta version.
2024	Afghah et al.	Conducted large-scale psychometric validation of the HEAR-COMMAND Tool across three countries. Established content validity, construct validity, factor structure, and internal consistency,

Year Study	Major Contribution to HEAR-COMMAND Development
	supporting its use as an ICF-based hearing and functioning assessment instrument.

The development of the HEAR-COMMAND tool followed a progressive sequence of studies that included the application of the Brief ICF Core Set for Hearing Loss, the development of ICF-based questionnaire items, the identification of limitations within conventional audiological assessments, a multinational stakeholder review, and psychometric validation. Collectively, these investigations contributed to the development of a comprehensive instrument designed to assess hearing-related functioning, communication, participation, and contextual influences within the ICF framework.

2.3.2 The Hearing and Functioning in Everyday Life Questionnaire (HFEQ)

The Hearing and Functioning in Everyday Life Questionnaire (HFEQ) was developed to assess the impact of hearing loss on everyday functioning using the ICF framework. The instrument was developed as a concise self-report questionnaire intended to capture key aspects of hearing-related functioning while minimizing respondent burden. Unlike HEAR-COMMAND, which was designed as a comprehensive assessment tool, the HFEQ was deliberately constructed as a shorter instrument suitable for routine clinical and research applications. The major developmental milestones of the HFEQ are summarized in Table 2.3.

The original HFEQ consisted of 30 items derived from the validated Brief ICF Core Set for Hearing Loss. The questionnaire included 10 items representing Body Functions, 12 representing Activities and Participation, and 8 representing Environmental Factors. Similar to

other ICF-based hearing-loss questionnaires, Body Structure categories were not included because the instrument was designed to focus on everyday functioning rather than anatomical impairments.

The development process incorporated international expert consultation, item-generation workshops, and cross-cultural content validation involving adults with hearing loss from India, South Africa, and the United States. Participants evaluated the relevance, comprehensiveness, and comprehensibility of the questionnaire items, providing evidence of the instrument's content validity. Subsequent psychometric evaluation confirmed the questionnaire's underlying ICF-based structure and demonstrated acceptable construct validity and internal consistency. Minor revisions refined the factor structure and removed two items from the original version.

The HFEQ represents one of the first self-assessment instruments developed directly from the validated Brief ICF Core Set for Hearing Loss and specifically designed to measure hearing-related functioning in everyday life. Although the questionnaire underwent extensive content validation and psychometric evaluation, limited evidence is available on how stakeholders perceive the representation of Brief ICF Core Set categories in questionnaire items. Furthermore, validation studies have primarily focused on instrument development and psychometric performance rather than stakeholder consensus regarding item-to-category linkage. These considerations provide a rationale for further evaluation of the questionnaire within diverse clinical and cultural contexts.

Table 2.3.*The developmental chronology of the HFEQ tool.*

Year	Study	Major Contribution to HFEQ Development
2021	Karlsson & Gustafsson	Conducted a scoping review of ICF Core Set validation studies and highlighted the need for further validation of ICF-based instruments across diverse populations and perspectives.
2021	Karlsson et al.	International validation of the Brief ICF Core Set for Hearing Loss involving participants from India, South Africa, Sweden, and the United States. Established the Brief Core Set as a valid foundation for subsequent instrument development.
2022	Karlsson (Doctoral Thesis)	Synthesized evidence from validation studies and proposed the development of a self-assessment instrument based on the Brief ICF Core Set for Hearing Loss to measure everyday functioning.
2023	Karlsson et al.	Developed the HFEQ through expert workshops and international content-validation studies. Generated a 30-item questionnaire based on the validated Brief ICF Core Set for Hearing Loss and demonstrated satisfactory relevance, comprehensiveness, and comprehensibility.
2024	Karlsson et al.	Conducted psychometric evaluation of the HFEQ using confirmatory factor analysis and reliability testing. Confirmed the ICF-based structure, refined the factor model, and produced a revised version of the questionnaire.
2025	Mahomed-Asmail et al.	Applied the ICF framework and hearing-loss categories in a multinational study examining predictors of hearing-loss disability, providing additional support for the relevance of multidimensional ICF-based assessment approaches.

The development of the HFEQ followed a systematic sequence of studies beginning with validation of the Brief ICF Core Set for Hearing Loss and culminating in the development and psychometric evaluation of a concise self-assessment instrument focused on everyday

functioning. The developmental process incorporated international validation, expert consultation, content validation, and psychometric testing, resulting in an instrument designed to operationalize the multidimensional constructs represented within the Brief ICF Core Set for Hearing Loss. Collectively, these studies support the HFEQ as a clinically relevant and theoretically grounded measure of hearing-related functioning in everyday life.

2.3.3 The ICF e-Intake Tool

The ICF e-Intake Tool was developed to operationalize the Brief ICF Core Set for Hearing Loss into a practical digital assessment instrument for use in routine otology and audiology practice. Unlike HEAR-COMMAND and the HFEQ, which were primarily designed as self-report outcome measures, the e-Intake Tool was specifically intended to facilitate comprehensive intake assessment, support patient-centered care, and improve communication between patients and hearing healthcare professionals during clinical consultations (Van Leeuwen et al., 2020). The major developmental milestones of the e-Intake Tool are summarized in Table 2.4.

The developmental process of the e-Intake Tool emerged from a series of studies examining the applicability of the ICF Core Sets for Hearing Loss in clinical practice. Initial investigations conducted in Dutch otology and audiology settings demonstrated substantial overlap between existing intake procedures and the Brief ICF Core Set for Hearing Loss, while also identifying inadequately represented areas in routine clinical documentation (Van Leeuwen et al., 2017). These findings highlighted the need for a standardized intake instrument capable of capturing the multidimensional aspects of functioning described within the ICF framework.

Subsequent studies explored the feasibility of implementing an ICF-based intake instrument in clinical settings (Van Leeuwen et al., 2018, 2020). Hearing healthcare professionals

and patients identified several potential benefits, including improved preparation for consultations, enhanced understanding of patient functioning, and facilitation of patient-centered care. These findings informed the development of implementation strategies and guided the operationalization of the Brief ICF Core Set categories into a digital patient-reported outcome measure.

The final e-Intake Tool was developed through a systematic process involving item selection, expert review, stakeholder consultation, pilot testing, and integration into an online clinical platform. The instrument operationalized the Brief ICF Core Set for Hearing Loss and additional clinically relevant categories into 62 items distributed across six domains, including body functions, body structures, activities and participation, environmental factors, and personal factors. Content validation demonstrated satisfactory relevance, comprehensiveness, and comprehensibility, supporting its use as a screening tool for identifying functioning-related difficulties among adults with hearing and ear-related disorders van (Van Leeuwen et al., 2020).

The e-Intake Tool represents one of the first attempts to translate the Brief ICF Core Set for Hearing Loss into a clinically applicable digital assessment system. However, most developmental and validation work has been conducted within Dutch clinical settings, and evidence regarding its applicability in culturally and linguistically diverse populations remains limited. Additional validation studies are therefore required before widespread implementation across different healthcare systems and cultural contexts can be recommended.

Table 2.4.

The developmental chronology of the ICF e-Intake tool.

Year	Study	Major Contribution to e-Intake Tool Development
2017	van Leeuwen et al.	Compared Dutch otology and audiology intake documentation with the ICF Core Sets for Hearing Loss and demonstrated substantial overlap, while identifying gaps in routine assessment. Recommended development of a practical intake instrument based on the ICF Core Sets.
2018	van Leeuwen et al.	Conducted a qualitative pre-implementation study examining barriers and facilitators associated with implementing an ICF-based intake tool from both patient and hearing healthcare professional perspectives.
2019	Alfakir et al.	Evaluated overlap between clinical documentation and the ICF Core Sets for Hearing Loss at Mayo Clinic, providing further support for the clinical relevance of ICF-based intake assessment and multidisciplinary documentation.
2020	van Leeuwen et al.	Developed a behavior-change intervention strategy to support implementation of an ICF-based e-Intake Tool in clinical otology and audiology practice.
2020	van Leeuwen et al.	Operationalized the Brief ICF Core Set for Hearing Loss into a digital e-Intake Tool consisting of 25 items, conducted stakeholder validation and pilot testing, and integrated the tool into an online clinical platform.

The development of the ICF e-Intake Tool followed a structured translational pathway from validation of the ICF Core Sets for Hearing Loss to implementation within routine clinical practice. The process included empirical evaluation of existing intake procedures, stakeholder consultations, implementation research, intervention development, and operationalization of ICF categories into a digital assessment platform. Collectively, these studies established the e-Intake Tool as a clinically oriented application of the ICF framework designed to facilitate comprehensive, patient-centered assessment of hearing-related functioning.

2.4 Representation of Brief ICF Core Set Domains across existing hearing-loss questionnaires.

An important observation from the literature on ICF-based hearing-loss assessment is that existing questionnaires differ substantially in how they represent the domains and categories of the Brief ICF Core Set for Hearing Loss. Although these instruments were all developed using the ICF framework, differences in item selection, questionnaire objectives, and intended clinical applications have resulted in varying patterns of domain representation. Consequently, individuals assessed using different questionnaires may receive differing emphasis on particular aspects of functioning, participation, and contextual influences. Table 2.5 presents an overview of the distribution of questionnaire items across the principal domains of the Brief ICF Core Set for Hearing Loss.

Table 2.5.

Distribution of items across Brief ICF Core Set domains in existing ICF-aligned hearing-loss questionnaires

Tool	Total Items	Body Functions (b)	Activities & Participation (d)	Environmental Factors (e)	Body Structures (s)
HEAR-COMMAND	90	48	26	16	0
HFEQ	30	10	12	8	0
ICF e-Intake Tool	25	8	9	5	3

As shown in Table 2.5, the three questionnaires demonstrate distinct patterns of domain representation. HEAR-COMMAND contains the largest number of items and places substantial

emphasis on Body Functions, reflecting its objective of providing a comprehensive assessment of hearing-related functioning. The HFEQ adopts a more concise format and demonstrates relatively balanced representation across Body Functions, Activities and Participation, and Environmental Factors. In contrast, the ICF e-Intake Tool was designed primarily as a clinical intake instrument and is the only questionnaire among the three to explicitly incorporate Body Structure categories.

These differences in content distribution are not necessarily limitations but rather reflect differing conceptual and clinical priorities during questionnaire development. HEAR-COMMAND was developed to provide a broad multidimensional assessment of hearing-related functioning, whereas the HFEQ was designed as a brief measure of everyday functioning derived directly from the Brief ICF Core Set for Hearing Loss. The ICF e-Intake Tool was developed to support structured intake assessment and patient-centered clinical decision-making within routine healthcare settings. Consequently, variations in domain representation may be expected across instruments.

However, numerical representation of items within a domain does not necessarily indicate how respondents perceive those items or the extent to which they reflect the ICF categories originally intended by questionnaire developers. Individual questionnaire items often encompass multiple aspects of functioning and may be interpreted differently by rehabilitation professionals and adults with hearing loss. As a result, the perceived representation of ICF categories may differ from the theoretical categorization proposed during questionnaire development.

Despite the availability of these three ICF-aligned hearing-loss questionnaires, limited evidence exists on whether stakeholders perceive the questionnaire items as representing the ICF categories originally intended by the developers. Most previous studies have focused on questionnaire development, content validation, psychometric evaluation, or implementation.

Comparatively little attention has been devoted to examining stakeholder consensus on item-to-category linkage, domain representation, and perceived coverage of the Brief ICF Core Set for Hearing Loss.

Understanding stakeholder perceptions of category representation is important because questionnaire items form the basis for assessing hearing-related functioning, communication difficulties, participation restrictions, and contextual influences. Differences between intended and perceived category representation may identify areas of overlap, underrepresentation, or ambiguity within existing instruments. Such information may contribute to future questionnaire refinement and enhance the applicability of ICF-based assessment approaches across diverse clinical and cultural contexts.

Accordingly, the present study sought to systematically examine stakeholder perceptions of item-to-category linkage across three ICF-aligned hearing-loss questionnaires, HEAR-COMMAND, HFEQ, and the ICF e-Intake Tool, using a modified Delphi methodology involving both rehabilitation professionals and adults with hearing loss.

In addition to examining item-to-category linkage, aggregating stakeholder judgments can provide an overview of the relative representation of ICF domains across existing questionnaires. Such representation patterns can help identify domains that receive greater or lesser emphasis in assessment instruments and may provide useful information for future questionnaire refinement and clinical application.

2.5 Cultural and Contextual Factors in ICF-Based Hearing Assessment

The ICF was developed as a universal framework for describing functioning and disability across health conditions and populations. However, the interpretation and operationalization of

ICF categories are inevitably influenced by the cultural, linguistic, environmental, and healthcare contexts within which assessment occurs. Although the underlying ICF framework is intended to be universally applicable, the questionnaires developed to operationalize ICF categories are often constructed and validated within specific populations and healthcare systems (Danermark et al., 2013; Karlsson et al., 2021).

This issue is particularly relevant in hearing healthcare because hearing-related functioning extends beyond auditory impairment and encompasses communication, participation, environmental influences, and social interactions. Cultural factors may influence how individuals perceive communication difficulties, participation restrictions, family support, social stigma, and rehabilitation needs. Consequently, stakeholders from different cultural settings may interpret questionnaire items differently or associate them with different aspects of functioning.

The Indian context presents several characteristics that may influence perceptions of hearing-related functioning. Linguistic diversity, multilingual communication demands, collectivistic family structures, variable access to hearing healthcare services, and diverse listening environments may affect the way hearing difficulties are experienced and managed. Previous studies have highlighted the importance of considering contextual and environmental influences when applying ICF-based approaches within Indian hearing healthcare settings (Gupta et al., 2023).

Cross-cultural investigations have similarly demonstrated that perceptions of hearing loss and disability vary across countries and cultures. Manchaiah et al. (2015) reported differences in the way hearing disability, hearing aid use, stigma, and social participation were perceived across India, Iran, Portugal, and the United Kingdom. The authors highlighted the influence of cultural beliefs, family support systems, and societal attitudes on the lived experience of hearing loss. Such

findings suggest that stakeholder perceptions of hearing-related functioning may not be entirely consistent across populations.

These considerations are particularly relevant when evaluating ICF-aligned questionnaires, as item interpretation ultimately shapes how questionnaire content is linked to ICF categories. Instruments developed in one cultural context may not be perceived the same way by stakeholders in another context. Consequently, examining stakeholder perceptions of item-to-category linkage within the Indian context may provide valuable insights into the contextual relevance, comprehensiveness, and representation of ICF categories within existing hearing-loss questionnaires.

2.6 The Modified Delphi Methodology

The Delphi technique is a structured, iterative consensus-building methodology designed to systematically collect and refine expert opinions on topics where empirical evidence may be limited, inconsistent, or difficult to synthesize into clear recommendations. Originally developed by the RAND Corporation during the 1950s, the technique has subsequently been widely adopted across healthcare research, clinical guideline development, instrument validation, and outcome measure selection because of its ability to facilitate consensus among geographically dispersed experts while minimizing the influence of dominant individuals and group dynamics (Humphrey-Murto et al., 2017).

A conventional Delphi process typically involves multiple rounds of questionnaires administered to a panel of experts. Following each round, responses are aggregated and summarized, and controlled feedback is provided to participants before the next round. This iterative process enables participants to reconsider their responses in light of group perspectives

while preserving anonymity, thereby encouraging independent judgment and reducing potential biases associated with face-to-face group discussions (Humphrey-Murto et al., 2017).

Humphrey-Murto et al. (2017) identified several methodological principles that contribute to the rigor of Delphi studies. These include the use of predefined consensus criteria, iterative rounds of data collection, structured feedback between rounds, transparent reporting of agreement and disagreement, and careful selection of panel members who collectively represent the expertise required to address the research question. These recommendations have become widely accepted standards for Delphi-based research and provide the methodological foundation for many contemporary healthcare consensus studies.

The modified Delphi approach represents an adaptation of the classical Delphi method in which participants evaluate a predefined set of items during the initial round rather than generating items through open-ended questioning. This approach is particularly useful when the topic under investigation has an established conceptual framework or a clearly defined set of categories. In healthcare research, modified Delphi methods have been extensively used for guideline development, outcome measure selection, prioritization of clinical indicators, and evaluation of classification systems (Humphrey-Murto et al., 2017).

Within audiology and hearing healthcare, Delphi methods have been successfully applied to address a variety of clinical and research questions. For example, Sereda et al. (2015) employed a modified Delphi process to establish consensus regarding hearing-aid candidacy and fitting practices for individuals with mild hearing loss and tinnitus. Similarly, Delphi-based approaches have been used to identify patient-important outcomes, develop clinical recommendations, and incorporate consumer perspectives into hearing rehabilitation research. These applications

demonstrate the suitability of consensus methodologies for addressing multidimensional issues in hearing healthcare that require integration of both professional expertise and lived experience.

The rationale for applying a modified Delphi approach in the present study is closely linked to the development of the ICF Core Sets for Hearing Loss. The Brief and Comprehensive ICF Core Sets were themselves developed through an extensive international consensus process that integrated evidence from systematic literature reviews, expert surveys, qualitative studies, and consensus conferences (Danermark et al., 2013). Consequently, the use of a consensus-based methodology to evaluate the representation of Brief ICF Core Set categories within hearing-loss questionnaires maintains continuity with the methodological principles underlying the development of the Core Sets themselves.

An additional strength of the Delphi methodology is its ability to incorporate diverse stakeholder perspectives. Historically, many hearing-loss assessment tools have been developed primarily through expert-driven processes involving clinicians, researchers, and rehabilitation professionals. Although such approaches provide valuable clinical expertise, they may not fully capture the perspectives of individuals living with hearing loss. Contemporary hearing healthcare increasingly emphasizes person-centered care and recognizes the importance of integrating lived experience into assessment and rehabilitation planning (Chadha et al., 2021). Including adults with hearing loss alongside rehabilitation professionals, therefore, provides a broader understanding of how hearing-related functioning is perceived and represented in existing assessment instruments.

The modified Delphi methodology was considered particularly suitable for the present investigation because it enabled systematic evaluation of stakeholder perceptions regarding the representation of Brief ICF Core Set categories within existing hearing-loss questionnaires. By incorporating both rehabilitation professionals and adults with hearing loss, the approach

facilitated examination of consensus regarding item-to-category linkage, questionnaire coverage, comprehensiveness, and representation of functioning-related constructs. The methodology therefore provided an appropriate framework for evaluating the extent to which existing ICF-aligned hearing-loss questionnaires reflect stakeholders' perceptions of hearing-related functioning and disability.

2.7 Person-centered care and the role of patient-reported outcomes in audiological rehabilitation

Person-centered care, as emphasized in the WHO World Report on Hearing and contemporary audiological rehabilitation literature, advocates assessment and intervention approaches that are guided by patients' goals, experiences, preferences, and participation needs rather than solely by clinician-defined measures of impairment (Chadha et al., 2021; Meyer et al., 2016). Within this framework, patient-reported outcome measures (PROMs) have emerged as essential components of hearing healthcare because they provide information regarding functioning, communication, participation, and quality of life that cannot be captured through audiometric measures alone (Afghah et al., 2022, 2024). Consequently, evaluating hearing-loss questionnaires requires consideration not only of the number of items they contain but also of the extent to which they reflect aspects of functioning meaningful to both patients and clinicians.

A recurring finding in audiological research is the relatively weak relationship between audiometric hearing thresholds and self-reported hearing difficulties, a phenomenon often described as the audiogram-disability mismatch (Afghah et al., 2024). Individuals with similar audiometric profiles frequently report markedly different experiences of communication difficulty, participation restriction, and psychosocial burden. Such differences may be influenced by environmental demands, coping strategies, family support, communication requirements, and

access to rehabilitation services. These observations reinforce the importance of assessment approaches that extend beyond impairment and incorporate broader dimensions of functioning represented within the ICF framework.

Research examining counseling and rehabilitation practices similarly highlights the importance of addressing psychosocial and participation-related consequences of hearing loss. Meibos et al. (2019) used a modified Delphi methodology to identify counseling competencies that support person-centered audiological care, including communication, participation, self-management, and psychosocial adjustment. These findings align closely with the domains represented in the Brief ICF Core Set for Hearing Loss and further support the value of comprehensive assessment approaches that extend beyond traditional audiometric measures.

The literature reviewed throughout this chapter demonstrates substantial progress in operationalizing the ICF framework within hearing healthcare. The development of the Brief ICF Core Set for Hearing Loss and the subsequent creation of ICF-aligned instruments such as HEAR-COMMAND, HFEQ, and the ICF e-Intake Tool have provided important mechanisms for assessing hearing-related functioning from a biopsychosocial perspective. Collectively, these instruments represent significant advances in translating ICF principles into clinically applicable assessment tools.

However, despite extensive work on questionnaire development, content validation, psychometric evaluation, and implementation, limited evidence is available on how stakeholders perceive the representation of Brief ICF Core Set categories in existing hearing-loss questionnaires. Most previous studies have focused on establishing the validity and utility of these instruments rather than examining whether rehabilitation professionals and adults with

hearing loss interpret questionnaire items as representing the categories originally intended by developers.

Furthermore, although the ICF framework is intended to be universally applicable, stakeholder perceptions of functioning may be influenced by cultural, linguistic, environmental, and healthcare contexts. Consequently, the representation of ICF categories within existing questionnaires may be perceived differently across populations. Evidence regarding such perceptions within the Indian context remains limited, despite the unique communication environments, linguistic diversity, and contextual factors that characterize hearing healthcare in India.

The modified Delphi methodology provides an appropriate framework for examining these issues because it facilitates systematic evaluation of stakeholder judgments while integrating both professional expertise and lived experience. By engaging rehabilitation professionals and adults with hearing loss in a structured consensus process, the present study seeks to evaluate stakeholder perceptions of item-to-category linkage, questionnaire coverage, comprehensiveness, and representation of Brief ICF Core Set categories across three existing ICF-aligned hearing-loss questionnaires.

Collectively, the reviewed literature demonstrates that although substantial progress has been made in the development and application of ICF-based hearing-loss assessment tools, important questions remain regarding stakeholder perceptions of category representation, consensus regarding item-to-category linkage, and the contextual applicability of existing instruments. Addressing these issues through systematic evaluation of stakeholder perceptions of item-to-category linkage and category representation provides the conceptual foundation for the present study.

Chapter III

METHODS

3.1 Study Design

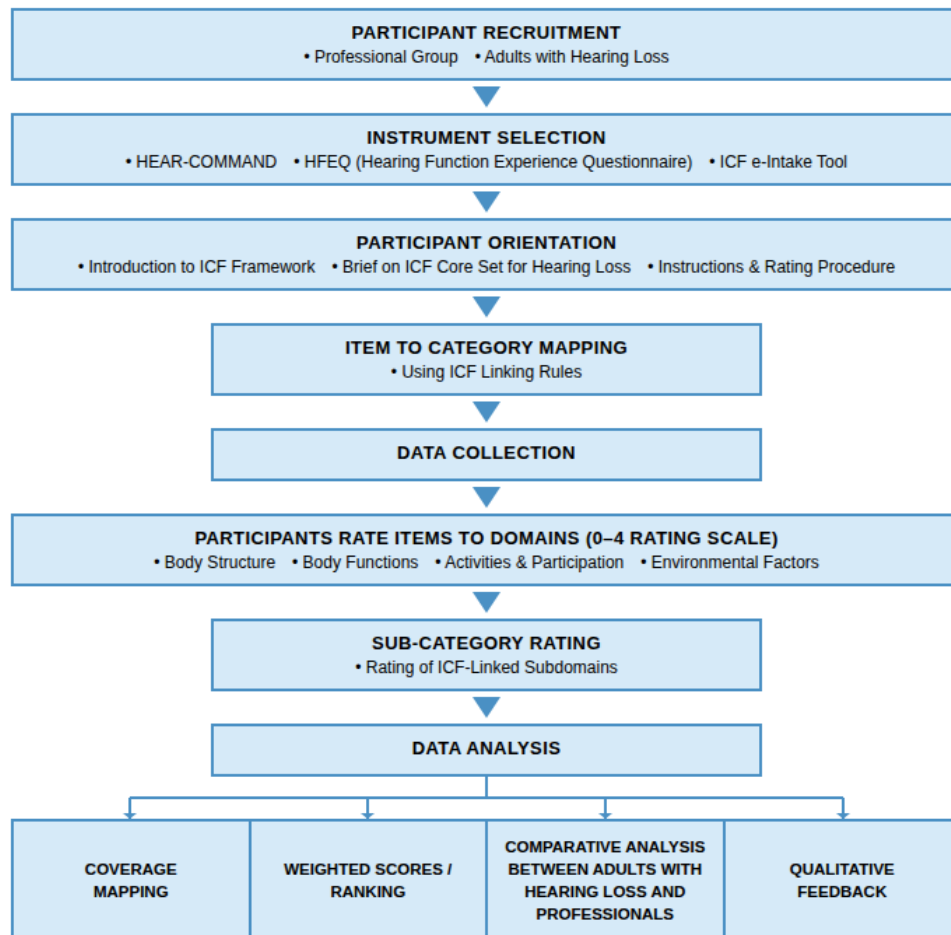
The study adopted a structured, sequential, modified Delphi method to collect and synthesize multidisciplinary and end-user perspectives on the representation of the Brief ICF Core Set for Hearing Loss categories across three existing ICF-aligned hearing-loss questionnaires. The study further examined patterns of domain representation, stakeholder consensus, and perceived relevance of linked ICF categories. The modified Delphi design was selected because it permits structured integration of expert opinion in areas where empirical evidence remains limited and enables inclusion of diverse stakeholder perspectives within a systematic consensus framework (Humphrey-Murto et al., 2017). The ICF-HL is the result of a multi-stage consensus process. Employing a Delphi approach to operationalize the ICF-HL ensures continuity in methodology and prioritizes service-user perspectives, which was not always the case in the development of previous core sets (Danermark et al., 2013; Humphrey-Murto et al., 2017).

The study was conducted in four sequential phases: (a) participant orientation, (b) questionnaire selection and item mapping, (c) item-to-category linking, and (d) subcategory relevance rating. In addition to the quantitative rating procedures, qualitative stakeholder feedback was obtained regarding questionnaire coverage, comprehensiveness, perceived strengths, and potential gaps in content representation. This feedback complemented the quantitative findings and provided contextual insights into stakeholders' perceptions of the questionnaires. Although classical Delphi studies involve repeated rounds with controlled feedback, the present investigation employed a modified Delphi approach using predefined content and structured rating procedures because questionnaire items and ICF categories had already been identified through

prior literature and linking procedures. Figure 3.1 gives a schematic representation of the four phases of the study and the relevant workflow.

Figure 3.1

Flowchart of the ICF linking process: Sequential phases of the modified Delphi study.



3.2 Participants Recruitment

The study panel is composed of two strata: (a) rehabilitation professionals and (b) adults with hearing loss.

3.2.1 The Professional Group: The professional group targeted a multidisciplinary group involved in adult hearing rehabilitation and ICF-based assessment. A total of 20 professionals were included

to ensure adequate representation of clinical and academic perspectives. The professional panel comprised 11 audiologists, 6 speech-language pathologists, 2 clinical psychologists, and 1 ICF methodologist/researcher.

Inclusion Criteria: The inclusion criteria for participants in the professional panel were:

- a) being 18 years of age or older;
- b) having at least 3 years of clinical or research experience in the field and familiarity with basic concepts of the ICF;
- c) having prior exposure to assessment questionnaires related to hearing and willingness to comment on the relevance and comprehensiveness of the questionnaire content;
- d) a minimum educational qualification of a graduate degree; and
- e) competency in the English language to understand the concepts of the ICF and to create meaningful linkages between items in the Brief ICF Core Set and the content of the questionnaire.

3.2.2 Adults with Hearing Loss: Ten adults with a confirmed diagnosis of hearing loss were recruited to provide lived-experience perspectives. Participants in this group presented with varying degrees of hearing loss, ranging from mild to moderate, as classified according to standard audiometric criteria.

The inclusion criteria for the adults with hearing loss were:

- a) PTA in both ears between 26-55 dB HL;
- b) Bilateral symmetric hearing loss (difference of both ear PTA was ≤ 5 dB HL);
- c) Sufficient educational proficiency to understand questionnaire content and provide informed responses;
- d) Competency in the English language to understand the concepts of the ICF and to create meaningful linkages between items in the Brief ICF Core Set and the content of the questionnaire;
- e) No other relevant associated pathology.

Professional participants were recruited through professional networks, direct email invitations,

and social media platforms. Adults with hearing loss were recruited from clinical audiology services.

3.3 Instruments

Three ICF-oriented hearing loss questionnaires were selected because they explicitly referenced the Brief ICF Core Set for Hearing Loss, demonstrated evidence of international validation, and represented different approaches to operationalizing ICF constructs.

- a) The HEAR-COMMAND Tool (Afghah et al., 2022, 2024): A 90-item self-rated tool developed through multinational collaboration, with items distributed mainly across body functions (48 items), activities and participation (26 items), and environmental factors (16 items), without body structures being represented.
- b) Hearing and Functioning in Everyday Life Questionnaire (HFEQ) (Karlsson et al., 2021, 2024): A 30-item instrument that captures daily functioning. The items are distributed across body functions (10 items), activities and participation (12 items), and environmental factors (8 items), with no items related to body structures.
- c) The ICF e-Intake Tool (Van Leeuwen et al., 2020): A 25-item standardized clinical instrument covering all four ICF domains, including body structures (3 items), body functions (8 items), activities and participation (9 items), and environmental factors (5 items).

3.4 Phase 1: Participant Orientation

Before data collection, all participants had undergone a structured orientation program to ensure a common understanding of the ICF framework and the Brief ICF Core Set for Hearing Loss. The orientation covered:

- a) an introduction to the ICF framework and its four domains, i.e., body functions, body structures, activities and participation, and environmental factors, and their specific relevance to the assessment of hearing loss;
- b) procedural instructions, including the format of data collection, the rating scales to be used in

subsequent phases, and the provisions for confidentiality.

Orientation was delivered through a purpose-developed prerecorded video. A summarised version was provided in the online forms to read before attending the questions, and was available to both professionals and adults with hearing loss. This orientation ensured that participants across both groups had the conceptual foundation to contribute meaningfully to subsequent data-collection phases. Figure 3.2 shows the screenshots of the orientation video.

Figure 3.2

Screenshot of orientation video



3.5 Phase 2: Item-to-Category Mapping Using ICF Linking Rules

Prior to participant-facing data collection, all the questionnaire items were mapped to the ICF Brief Core Set categories using the established ICF Linking Rules (Cieza et al., 2005, 2019).

These rules provide a standardized, reproducible method for assigning questionnaire content to ICF domains. The linking process involved:

- a) Identifying meaningful concepts within each questionnaire item (e.g., “difficulty understanding speech in noise” includes hearing function and participation).
- b) Assigning the most precise ICF category to each concept (e.g., b230 Hearing functions, d350 Conversation).
- c) Handling multi-concept items by linking each relevant concept to its corresponding category.
- d) Documenting decisions and rating confidence in each link (high, moderate, or low confidence).
- e) Resolving disagreements between independent coders through consensus or third-party adjudication.

This approach ensured that the mapping was transparent, reproducible, and consistent with WHO methodology, forming the foundation for Phases 3 (Item-to-Category Linking) and 4 (Subcategory Relevance Rating). Independent coding and documentation procedures were implemented to enhance transparency and reduce subjective interpretation bias.

3.6 Data Collection.

Data collection differed by participant groups in format but followed the same substantive rating procedure.

3.6.1 Professional Participants: Data from professional participants were collected through an online survey platform. The total instrument comprised 145 items generated from the ICF linking procedure applied across the three questionnaires. Each professional participant was provided all 145 items. Each participant independently filled his/her assigned form at a convenient time within the data collection period.

3.6.2 Adults with hearing loss: Given the potential challenges that adults with hearing loss may face with an online self-completion format, including variability in digital literacy, fatigue associated with lengthy questionnaires, and the need to clarify ICF terminology, data from end-

user participants were collected through structured personal interviews. The researcher administered each item from the relevant questionnaire sections verbally to the participant and recorded their responses. Where clarification was required, examples were provided without altering the item's meaning or suggesting responses. This face-to-face format enabled real-time clarification of item wording as needed. End-user participants presented with hearing loss ranging from mild to moderate severity, providing a range of functional experiences relevant to the questionnaire domains being assessed.

3.7 Rating Procedure.

The rating procedure was organized into two stages corresponding to Phases 3 and 4 of the study design, described below. These phases represented analytical stages rather than independent Delphi rounds.

At the end of the rating process, participants were invited to provide open-ended comments regarding the strengths, comprehensiveness, coverage, and perceived limitations of each questionnaire. These comments were subsequently analyzed qualitatively and used to identify recurring themes related to questionnaire representation and content coverage.

3.7.1 Phase 3: Item-to-Domain Linkage Rating

In the first stage of rating, participants independently assessed the extent to which each questionnaire item addressed each of the four broad ICF Brief Core Set domains: body functions, body structures, activities and participation, and environmental factors. Ratings were made using a five-point WHO ICF rating scale (Cieza et al., 2005; Danermark et al., 2013; Van Leeuwen et al., 2020), where

- 0 = no linkage (not relevant at all),
- 1 = mild linkage (minimal relevance),
- 2 = moderate linkage,
- 3 = substantial linkage, and
- 4 = complete linkage (highly relevant and well represented).

Participants were allowed to assign a single item to more than one domain whenever appropriate. Multiple domain assignments were permitted because questionnaire items frequently represented more than one functional construct. Ratings obtained during this phase were later used to generate domain-level relevance scores for the questionnaire items

3.7.2 Phase 4: Subcategory Relevance Rating

In the second stage of rating, participants were presented with only the specific ICF subcategories identified as linked to each questionnaire item during the Phase 3 mapping procedure. For each linked subcategory, participants rated the extent to which the questionnaire item captured its content, using a parallel five-point scale ranging from 0 (not relevant) to 4 (fully relevant). Restricting this stage to pre-identified linked subcategories was an intentional design decision to prevent unnecessary respondent burden and to focus analytic attention at the most granular level appropriate to the data. Ratings from this stage enabled identification of which existing questionnaire items adequately represented specific ICF subcategory components and which were underrepresented.

3.8 Data Analysis

As the methods of data collection differed for professionals and end-users, analyses were carried out separately for each group and later integrated for overall interpretation of findings. The

analysis focused on identifying the extent to which the three questionnaires captured the domains and subdomains of the Brief ICF Core Set for Hearing Loss and on determining the relative relevance participants assigned to different areas of functioning.

3.8.1 Analysis of professional participants' responses

Domain-level linkage

For item-to-domain linkage ratings in Phase 3, a frequency-based consensus criterion was employed. A domain was considered to be meaningfully linked to a particular questionnaire item when more than 60% of professional raters in that subgroup assigned a rating of at least 3 (i.e., substantial or complete linkage) on the 0-4 scale. Operationally, this translated to a minimum of 6 of 11 audiologists, 4 of 6 SLPs, and 2 of 3 “other” professionals (clinical psychologists and the ICF methodologist/researcher) rating the item–domain pairing as 3 or 4 for it to meet the consensus threshold within that subgroup.

While the Delphi protocol originally stated consensus at the overall panel level, this subgroup-specific 60% cutoff was identified during preliminary data inspection. Following pilot inspection of response patterns, several items demonstrated response compression and possible fatigue-related effects. Consequently, a frequency-based consensus criterion (>60% agreement with ratings ≥ 3) was adopted to improve sensitivity in identifying meaningful linkage.

Pilot analyses revealed floor effects and response patterns suggestive of possible respondent fatigue, particularly for items appearing later in each form, where ratings tended to cluster at the low end of the scale regardless of content. To prevent classifying these low scores associated with fatigue as a true lack of relevance, the ≥ 3 threshold and 60% rule were used as a

conservative definition of "meaningful linkage," allowing the analysis to differentiate between true non-coverage and artifacts of respondent burden.

Domains that did not reach this threshold were noted as not having consensus for that item among the relevant professional subgroup. Application of this rule generated domain-level coverage maps for each questionnaire, stratified by professional subgroups, for body functions, body structures, activities, participation, and environmental factors, across all 145 items.

Subcategory relevance and ranking

In Phase 4, participants rated only those ICF subdomains that had been previously linked to each questionnaire item. Mean relevance scores were calculated for each item–subdomain pairing within each professional subgroup. These subgroup scores were subsequently combined to obtain an overall relevance score across professionals.

Based on the obtained scores, weighted scores were calculated for each questionnaire item across all 145 items. The items were then ranked from highest to lowest according to their weighted scores, irrespective of questionnaire source. This ranking procedure helped identify the most strongly represented ICF-HL subdomains across the entire item pool and highlighted underrepresented areas.

In addition, comparisons were conducted across the three questionnaires at the domain and subdomain levels to examine patterns of representation and gaps within the brief core set for the hearing loss framework.

To determine whether significant differences existed in the representation of ICF domains across questionnaires, Friedman repeated-measures analyses were performed for HEAR-COMMAND, HFEQ, and the ICF e-Intake Tool. Kendall's coefficient of concordance (Kendall's W) was calculated as a measure of effect size and agreement for each Friedman analysis. The

analyses were conducted independently for rehabilitation professionals and adults with hearing loss.

3.8.2 Analysis of Responses of Adults with Hearing Loss:

Responses obtained from adults with hearing loss were analyzed using Friedman's Test, Kendall's W test, and descriptive statistics. Ratings of 2 or higher were considered indicative of meaningful relevance during analysis. A lower threshold was selected to ensure inclusion of viewpoints potentially influenced by lived experience rather than by technical familiarity with ICF constructs.

For each questionnaire item and linked ICF subdomain, mean relevance scores were calculated across end-user participants. Based on these scores, weighted values were derived for all items, and the items were subsequently ranked from highest to lowest across the complete set of 145 items.

This ranking procedure helped identify the areas of functioning that the end-users considered most relevant to their everyday hearing experiences. Comparisons were also made across domains and subdomains levels to determine which components of the Brief ICF Core Set for Hearing Loss were perceived as adequately represented and which appeared to receive less representation from the lived-experience perspective.

3.8.3 Analysis of Qualitative Feedback

Qualitative feedback obtained from participants was analyzed descriptively. Comments relating to questionnaire strengths, comprehensiveness, coverage, and perceived content gaps were reviewed and grouped into recurring themes. Similar responses were consolidated into broader

thematic categories, which were subsequently summarized across questionnaires to identify common strengths and areas requiring further refinement.

3.9 Reliability and Quality Assurance

To enhance methodological rigor, independent coding procedures, standardized participant orientation, uniform instructions, and predefined decision rules were implemented throughout data collection and analysis. Coding disagreements were resolved through discussion and consensus procedures.

3.10 Ethical Considerations

All participants gave their informed consent before taking part in the study. Professional participants provided consent via the online survey platform. Prior to the personal interview, informed consent was obtained from end-user participants. Confidentiality of individual responses was maintained during data collection, storage, and analysis. All data were processed in accordance with the institutional ethical guidelines after approval from the AIISH ethical board (/REF:SH/IRB/M.4/AUD.25/20205-26)

Chapter IV

RESULTS

The present study examined the extent to which three hearing-loss questionnaires represented the domains and categories of the Brief ICF Core Set for Hearing Loss and explored stakeholder perceptions of item-to-category linkage, domain representation, and category coverage using a modified Delphi approach.

4.1 Participant Characteristics

A total of 30 participants, comprising rehabilitation professionals (n = 20) and adults with hearing loss (n = 10), participated in the study. Among professionals, audiologists constituted the largest subgroup (55%), followed by speech-language pathologists (30%). The remaining participants included psychologists and ICF experts (15%). Equal representation was observed among adults with hearing loss with respect to sex distribution. Participant characteristics are summarized in Table 4.1.

Table 4.1. *Participant characteristics of rehabilitation professionals and adults with hearing loss.*

Variable	N	%
Professional Group		
Audiologists	11	55
Speech-language pathologists	06	30
Others (including Psychologists and ICF Experts)	03	15
Adults with Hearing Loss		
Male	7	70
Female	3	30

4.2 Item-to-Category Mapping Using ICF Linking Rules

A total of 145 questionnaire items across HEAR-COMMAND, HFEQ, and ICF e-Intake Tool were linked to categories of the Brief ICF-HL Core Set using standardized ICF Linking Rules. Multiple linkages were permitted where items represented more than one meaningful construct.

Questionnaire distribution included:

- HEAR-COMMAND: 90 items
- HFEQ: 30 items
- ICF e-Intake Tool: 25 items

Across questionnaires, the Activities and Participation and Body Function domains demonstrated a broader content representation, whereas fewer items represented the Body Structure categories. HEAR-COMMAND contributed the greatest number of linked items because of its larger item pool ($n = 90$), followed by HFEQ ($n = 30$) and e-Intake ($n = 25$). The overall study workflow and sequence of procedures employed during the modified Delphi process are shown in Figure 4.1. The process involved participant recruitment, orientation, questionnaire selection, item-to-category linkage, domain rating, subdomain relevance rating, and subsequent data analysis.

Figure 4.1. *Sequential phases of the modified Delphi study.*

Include:

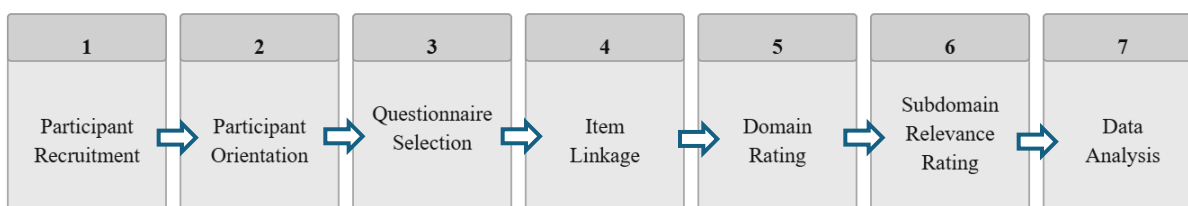


Table 4.2 presents the mean professional consensus ratings and the proportional domain representation across the HEAR-COMMAND, HFEQ, and ICF e-Intake questionnaires. Variations were observed in the relative distribution of ICF domains across questionnaires.

Table 4.2. Mean ($\bar{x}$) professional consensus ratings and relative domain representation across questionnaires.

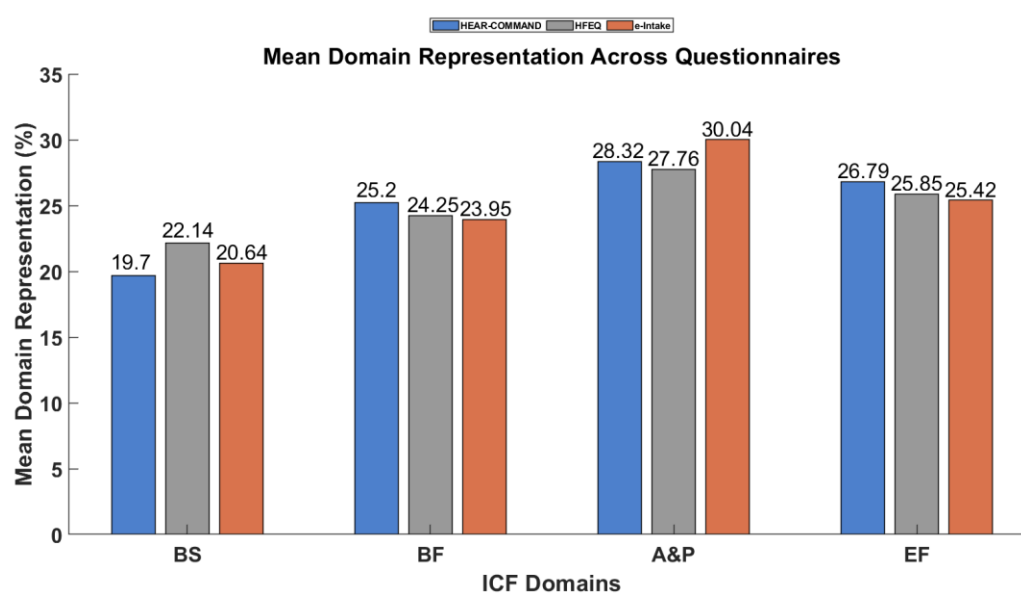
Domain	HEAR-COMMAND $\bar{x}$ (%)	HFEQ $\bar{x}$ (%)	ICF e-Intake $\bar{x}$ (%)
Body Structures	8.97 (19.70%)	11.13 (22.14%)	10.28 (20.64%)
Body Functions	11.32 (25.20%)	12.17 (24.25%)	11.28 (23.95%)
Activities & Participation	12.59 (28.32%)	13.77 (27.76%)	12.68 (30.04%)
Environmental Factors	11.83 (26.79%)	13.03 (25.85%)	11.64 (25.42%)

Note. Percentages indicate proportional domain representation.

For HEAR-COMMAND, Activities and Participation demonstrated the highest representation (28.32%), followed by Environmental Factors (26.79%) and Body Functions (25.20%). Body Structures showed the lowest proportional representation (19.70%). HFEQ demonstrated a comparatively balanced distribution across domains. Activities and Participation showed slightly greater representation (27.76%) than Environmental Factors (25.85%) and Body Functions (24.25%). Body Structures demonstrated the lowest representation (22.14%), although differences across domains were relatively small. Similarly, e-Intake demonstrated the strongest representation for Activities and Participation (30.04%), followed by Environmental Factors (25.42%) and Body Functions (23.95%). Body Structures again showed the lowest representation (20.64%).

Across all three questionnaires, Activities and Participation consistently emerged as the dominant domain, whereas Body Structures remained comparatively less represented. Figure 4.2 illustrates the relative distribution of domain representation across questionnaires.

Figure 4.2. *Relative representation of ICF domains across HEAR-COMMAND, HFEQ, and e-Intake questionnaires.*



Note. BS = Body Structures; BF = Body Functions; A&P = Activities and Participation; EF = Environmental Factors. Activities and Participation demonstrated the highest proportional representation across all three questionnaires, whereas Body Structures showed comparatively lower representation.

4.3 Qualitative stakeholder feedback regarding coverage and comprehensiveness

Table 4.3 summarizes the major themes identified from stakeholder feedback regarding the perceived strengths and limitations of the selected questionnaires. Overall, respondents valued ecological relevance, clinical applicability, and broad coverage of hearing-related functioning;

however, recurring concerns were identified regarding content balance and underrepresentation of specific ICF domains.

Table 4.3. *Qualitative themes derived from stakeholder feedback regarding questionnaire coverage and comprehensiveness*

Questionnaire	Strengths	Suggested gaps
HEAR-COMMAND	Real-world listening scenarios; ecological validity	Length; limited body structure representation
HFEQ	Practicality; administrative efficiency	Emotional, structural, and family domains
e-Intake	Comprehensive and broader environmental representation	Limited conversational and psychosocial depth

Professionals described HEAR-COMMAND as ecologically rich and representative of real-world listening demands. The questionnaire was perceived as highly relevant for capturing communication difficulties encountered in everyday situations. However, its relatively large item pool (90 items) was identified as a potential limitation for routine clinical use. Respondents additionally indicated comparatively limited representation of body structure domains.

HFEQ was consistently perceived as practical and clinically efficient because of its shorter administration time and focused content. Nevertheless, stakeholders highlighted limitations related to emotional functioning, body structure categories, and family-related contextual domains.

The ICF e-Intake tool was considered comparatively comprehensive because of its broader representation of environmental and structural constructs. However, respondents suggested that conversational demands and psychosocial consequences of hearing difficulties may require greater emphasis.

Across questionnaires, qualitative feedback suggested broadening the incorporation of psychosocial functioning, family-related contexts, and selected structural domains during future questionnaire refinement.

4.4 Quantitative relevance ratings and relevance rating allocations

Table 4.2 presents the quantitative linkage ratings and proportional domain representation derived from stakeholder relevance rating allocations across questionnaires. Variability was observed in the relative emphasis assigned to ICF domains.

Across all three questionnaires, Activities and Participation consistently received the highest relevance rating. In contrast, Body Structures demonstrated comparatively lower proportional representation, suggesting greater stakeholder emphasis on functional participation and communication-related consequences of hearing loss.

To determine whether statistically significant differences existed in relevance rating allocation across ICF domains, Friedman repeated-measures analyses were performed separately for HEAR-COMMAND, HFEQ, and e-Intake questionnaires among rehabilitation professionals. For HEAR-COMMAND, the Friedman test demonstrated a statistically significant difference in relevance rating across domains, $\chi^2(3)=46.70$, $p<.001$. Similarly, significant differences were observed for HFEQ, $\chi^2(3)=35.08$, $p<.001$, and e-Intake, $\chi^2(3)=45.52$, $p<.001$. As shown in Table 4.4, statistically significant variability was observed across all questionnaires, suggesting differential relevance rating of ICF domains by stakeholders. Kendall's W values demonstrated large effect sizes across HEAR-COMMAND (.78), HFEQ (.58), and e-Intake (.76), indicating substantial differences in relevance rating across domains.

Table 4.4. *Friedman analysis of domain relevance rating across questionnaires: Professionals.*

Questionnaire	χ^2	df	p	Kendall's W
HEAR-COMMAND	46.70	3	< .001	.78
HFEQ	35.08	3	< .001	.58
e-Intake	45.52	3	< .001	.76

Note. Friedman repeated-measures tests were conducted across Body Structures (BS), Body Functions (BF), Activities and Participation (A&P), and Environmental Factors (EF). Kendall's W represents effect size estimates.

Additional analyses were subsequently performed among adults with hearing loss to determine whether patterns of domain relevance ratings differed across questionnaires. Among adults with hearing loss, significant differences in domain relevance rating were similarly observed across all three questionnaires. HEAR-COMMAND demonstrated the strongest variability in domain relevance rating, $\chi^2 (3) = 26.04$, $p < .001$, followed by HFEQ, $\chi^2 (3) = 16.16$, $p = .001$. Although e-Intake also demonstrated statistically significant variation, the effect size for e-Intake was comparatively smaller ($W = .27$). As shown in Table 4.5, Kendall's W values suggested large effects for HEAR-COMMAND and HFEQ and a small-to-moderate effect for e-Intake.

Table 4.5. *Friedman analysis of domain-relevance ratings across adults with hearing loss.*

Questionnaire	χ^2	df	p	Kendall's W
HEAR-COMMAND	26.04	3	< .001	.87
HFEQ	16.16	3	.001	.54
e-Intake	8.16	3	.043	.27

Note. Friedman repeated-measures tests were conducted across Body Structures (BS), Body Functions (BF), Activities and Participation (A&P), and Environmental Factors (EF). Kendall's W represents effect size estimates.

Collectively, these findings indicate that domain representation ratings were not uniformly distributed across either professionals or adults with hearing loss and statistically support the

observed variability in ICF domain representation across questionnaires. Across all questionnaires, Activities and Participation consistently demonstrated the highest representation values, whereas Body Structures demonstrated the lowest representation values. These findings further support the observed predominance of participation-related constructs and the comparatively limited representation of structural domains within the evaluated questionnaires.

4.5 Prespecified consensus criteria and derivation of the relevance rating matrix

Table 4.6 presents domain-wise agreement percentages across professional subgroups according to the predefined consensus criterion ($> 60\%$). Agreement patterns demonstrated variability across questionnaires and stakeholder groups.

Table 4.6. *Domain-wise percentage agreement across professional subgroups based on prespecified consensus criteria.*

Questionnaire	Group	Body Structure	Body Function	Activity & Participation	Environmental Factors
HEAR-COMMAND	<i>Audiologists</i>	48.48	60.20	68.18	62.53
	<i>SLP</i>	36.44	47.78	54.00	53.56
	<i>Others</i>	60.37	77.04	79.63	75.93
HFEQ	<i>Audiologists</i>	45.45	50.91	59.39	55.45
	<i>SLP</i>	56.67	61.11	71.11	67.22
	<i>Others</i>	91.11	96.67	98.89	96.67
e-Intake	<i>Audiologists</i>	50.91	54.55	60.36	54.91
	<i>SLP</i>	51.20	42.67	52.00	51.33
	<i>Others</i>	70.67	90.67	97.33	84.00

Consensus criterion: $> 60\%$ agreement.

For HEAR-COMMAND, agreement values among audiologists exceeded the consensus threshold for Body Functions (60.20%), Activities and Participation (68.18%), and Environmental Factors (62.53%). In contrast, SLP ratings generally remained below the threshold across domains. Respondents categorized as Others demonstrated stronger agreement across all domains, with values ranging from 60.37% to 79.63%. For HFEQ, audiologist ratings remained below the

predefined threshold across domains. However, SLP respondents demonstrated agreement exceeding 60% for Body Functions, Activities and Participation, and Environmental Factors. The strongest agreement pattern was observed among respondents categorized as Others, where all domains demonstrated agreement values exceeding 90%. Similarly, for e-Intake, respondents categorized as Others demonstrated strong agreement across all domains, particularly for Activities and Participation (97.33%). Audiologists demonstrated threshold-level agreement only for Activities and Participation (60.36%), whereas SLP ratings remained below the threshold.

Overall, HFEQ and e-Intake demonstrated comparatively stronger agreement patterns than HEAR-COMMAND, suggesting greater convergence of stakeholder perspectives during relevance rating allocation.

4.6 Identification of the categories requiring greater emphasis in future refinement

Table 4.7 presents a comparison of domain-level ratings between rehabilitation professionals and adults with hearing loss. Distinct differences emerged between expert and end-user perspectives across questionnaires. For HEAR-COMMAND, adults with hearing loss assigned relatively greater relevance to Activities and Participation (33.68%) and Body Functions (30.19%) than professionals. In contrast, professionals demonstrated comparatively greater relevance rating for Environmental Factors (26.79%). More pronounced differences were observed for HFEQ and e-Intake. Adults with hearing loss showed a marked dominance of the Activities and Participation domains in the HFEQ (62.55%) and e-Intake (63.75%), whereas professionals showed a relatively balanced distribution across all four ICF domains. Notably, Body Structure domains demonstrated minimal representation among adults for both HFEQ (2.08%) and e-Intake (5.82%). Across questionnaires, adults with hearing loss consistently prioritized participation-

related and functional consequences of hearing difficulties more than professionals did. To facilitate comparison between stakeholder groups, absolute differences in domain representation were examined.

Table 4.7. *Absolute differences in domain representation between professionals and adults with hearing loss.*

Questionnaire	Domain	Professionals	Adults with HL	Absolute Difference
HEAR- COMMAND	<i>Body Structures</i>	19.70	14.40	5.30
	<i>Body Functions</i>	25.20	30.19	4.99
	<i>Activities & Participation</i>	28.32	33.68	5.36
	<i>Environmental Factors</i>	26.79	20.62	6.17
HFEQ	<i>Body Structures</i>	22.14	2.08	20.06
	<i>Body Functions</i>	24.25	16.41	7.84
	<i>Activities & Participation</i>	27.76	62.55	34.79
	<i>Environmental Factors</i>	25.85	12.30	13.55
e-Intake	<i>Body Structures</i>	20.64	5.82	14.82
	<i>Body Functions</i>	23.95	17.03	6.92
	<i>Activities & Participation</i>	30.04	63.75	33.71
	<i>Environmental Factors</i>	25.42	13.40	12.02

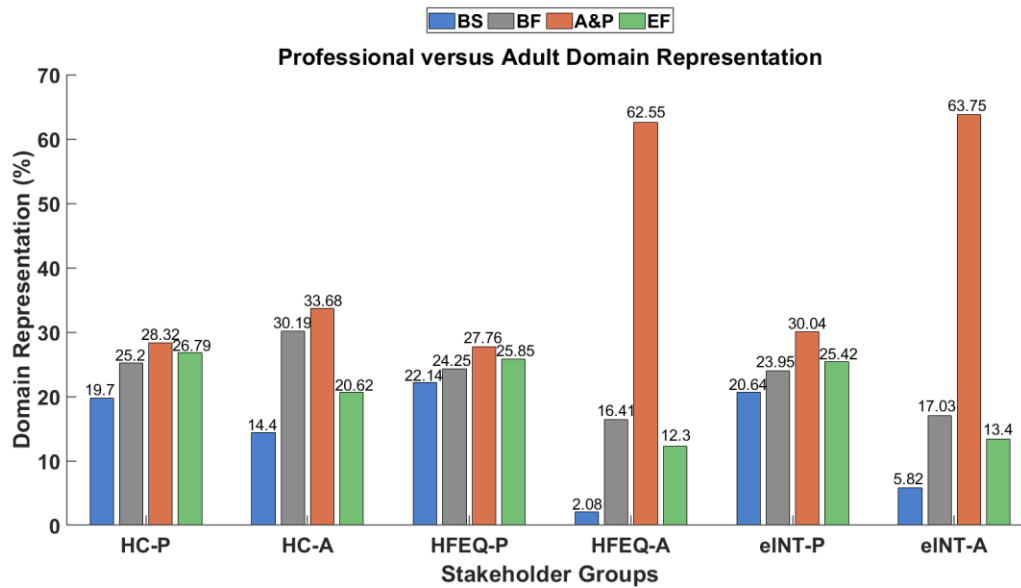
The largest differences were observed in the Activities and Participation domains of HFEQ (34.79%) and e-Intake (33.71%), indicating a substantially greater emphasis among adults with hearing loss. Conversely, differences within HEAR-COMMAND were comparatively smaller across domains. These findings suggest potential differences in perceived relevance between expert and lived-experience perspectives and highlight categories that may warrant greater emphasis during future questionnaire refinement. Table 4.8 summarizes the most frequently prioritized ICF categories among professionals and adults with hearing loss.

Table 4.8. *Frequently prioritized ICF categories among professionals and adults with hearing loss.*

Group	Categories
Professionals	b230, b140, d115, d310, d350
Adults with HL	d310, d350, d240, d760, b126

Subdomain prioritization differed across respondent groups. Professionals frequently emphasized hearing functions (b230), attention (b140), listening (d115), and communication-related domains, including receiving spoken messages (d310) and conversation (d350). In contrast, adults with hearing loss demonstrated stronger prioritization of communication, stress-related, and family-oriented categories, including handling stress (d240), family relationships (d760), and temperament/personality-related constructs (b126). These findings suggest that adults with hearing loss placed relatively greater emphasis on lived participation experiences and psychosocial consequences, whereas professionals demonstrated broader multidomain representation. Figure 4.3 illustrates differences in domain representation between professionals and adults with hearing loss across questionnaires.

Figure 4.3. Comparison of professional and adults-with-hearing-loss domain representation across questionnaires.



Note. BS = Body Structures; BF = Body Functions; A&P = Activities and Participation; EF = Environmental Factors. Adults with hearing loss demonstrated greater emphasis on the Activities and Participation domains, whereas professionals demonstrated relatively broader multidomain representation.

4.8 Summary of Findings

The major findings of the study are summarized in Table 4.9, which presents an objective-wise overview of the analyses performed and the principal findings derived from each objective.

Table 4.9. *Objective-wise summary of major findings.*

Objective	Analysis Performed	Major Findings
Objective 1: Construct item-to-category mapping using WHO-recommended ICF linking rules	Item linkage of HEAR-COMMAND, HFEQ, and e-Intake items to Brief ICF-HL Core Set categories	A total of 145 items were linked. Body Functions and Activities & Participation demonstrated broader representation, whereas comparatively fewer items mapped to Body Structure domains.
Objective 2: Elicit qualitative stakeholder feedback regarding coverage and comprehensiveness	Thematic analysis of professional feedback	Stakeholders valued ecological relevance and practical applicability. Suggested gaps included psychosocial, family-related, and body structure domains.
Objective 3: Obtain quantitative relevance ratings and relevance rating allocations	Domain-level relevance rating and proportional representation analysis	Activities & Participation consistently demonstrated the highest proportional representation across questionnaires.
Objective 4: Apply prespecified consensus criteria and derive a relevance rating matrix	Percentage agreement analysis across professional subgroups	HFEQ and e-Intake demonstrated comparatively stronger consensus patterns than HEAR-COMMAND. Several domains exceeded the predefined >60% threshold.
Objective 5: Identify categories requiring greater emphasis in future refinement	Professional versus adults-with-hearing-loss comparisons and subdomain prioritization	Adults with hearing loss emphasized participation-related and psychosocial categories, whereas professionals demonstrated broader multidomain relevance rating patterns.

The present study examined the representation and relevance rating of ICF domains and categories across selected hearing-loss questionnaires using a modified Delphi approach. Item-to-category linkage indicated broader representation of the Body Functions and Activities and Participation domains, whereas comparatively fewer items mapped to Body Structure categories.

Qualitative stakeholder feedback suggested that respondents valued ecological relevance, practical utility, and broader contextual representation across questionnaires. However, recurring recommendations highlighted potential content gaps related to psychosocial functioning, family-related contexts, and selected structural domains.

Quantitative relevance ratings indicated that Activities and Participation consistently emerged as the most strongly represented domain across questionnaires. Consensus analyses demonstrated variability across professional subgroups, with HFEQ and e-Intake exhibiting comparatively stronger agreement patterns than HEAR-COMMAND.

Distinct differences were observed between professional and end-user perspectives. Professionals demonstrated relatively balanced multidomain relevance rating, whereas adults with hearing loss consistently emphasized participation-related and communication-related consequences. Subdomain analyses similarly indicated stronger prioritization of communication, stress-related, and family-oriented constructs among adults with hearing loss.

Overall, the stakeholder-informed relevance rating process identified specific ICF domains and categories that may warrant greater emphasis during future questionnaire refinement and person-centered assessment workflows. These findings further support the value of incorporating both expert and lived-experience perspectives during the development and evaluation of hearing-related assessment tools.

Chapter V

DISCUSSION

The present study examined stakeholder perceptions of item-to-category linkage, domain representation, and category coverage across three ICF-aligned hearing-loss questionnaires, viz., HEAR-COMMAND, HFEQ, and the ICF e-Intake Tool, using a modified Delphi approach. Across all three questionnaires, activities and participation consistently emerged as the most strongly represented domain, whereas body structure categories demonstrated comparatively lower representation. Qualitative stakeholder feedback identified psychosocial functioning, family-related contextual factors, and structural domains as areas that need greater attention in the future. Quantitative relevance rating analyses showed significant variability in domain representation across both professional subgroups and adults with hearing loss, with adults placing substantially greater emphasis on participation-related consequences of hearing loss than rehabilitation professionals. Collectively, these findings reinforce the value of person-centered assessment approaches and further support the ICF framework's relevance in capturing the multidimensional consequences of hearing loss.

5.1 ICF domain coverage across questionnaires

The item-to-category mapping demonstrated that all three questionnaires achieved broad representation of the Brief ICF Core Set for Hearing Loss, although the extent of representation varied across domains. HEAR-COMMAND demonstrated the greatest overall category coverage because of its larger item pool, whereas HFEQ and the ICF e-Intake Tool provided more concise representations of the Core Set.

The dominance of the activities and participation domain across all three questionnaires is consistent with previous literature, which has given much attention to functional communication outcomes and everyday participation barriers (Lebeer et al., 2026). This finding is unsurprising because hearing-related questionnaires are generally designed to capture functional consequences experienced in everyday communication environments (de Andrade et al., 2022).

One possible explanation for this finding is the ease with which individuals with hearing loss can recognize and report participation-related difficulties. Difficulties involving speech understanding in noise, participation in conversations, and engagement in social situations are directly experienced and may therefore be more readily represented in questionnaire content (Alons et al., 2026).

These are consistent with prior ICF mapping studies, which also demonstrated that activity and participation tend to dominate (Gimeno & Lin, 2017; Granberg et al., 2014b). The consistent prominence of this domain across instruments suggests increasing recognition that the impact of hearing loss extends beyond sensory impairment and substantially affects social participation and everyday functioning (Podury et al., 2023). These might also indicate that the instruments are carefully designed to capture functional consequences prioritized by both clinicians and patients (Van Leeuwen et al., 2020).

In comparison, the body functions domain showed a balanced but lower score across questionnaires. The body functions domain primarily includes hearing functions, auditory attention, and related sensory and psychological processes that contribute to effective communication. The consistent representation of this domain across questionnaires indicates recognition of the importance of auditory and listening-related abilities in hearing assessment. However, body functions demonstrated comparatively lower representation than activities and

participation. Hearing-loss questionnaires are designed to measure the broader impact of hearing difficulties, rather than an individual's auditory performance alone (de Andrade et al., 2022). The disorders feature hearing impairment, but the impact on communication and participation is often seen as more significant in daily life.

Also, all three questionnaires did a good job of covering environmental factors. The relatively broad representation of this domain highlights the importance of contextual and environmental influences on hearing-related functioning (Rosati & Jamesdaniel, 2020). These results indicate that environmental conditions and contextual supports strongly influence communication outcomes. It appears that both professionals and people with hearing loss recognize that factors such as communication support, assistive devices, communication partners' attitudes, service accessibility, and family or social support can facilitate or hinder effective participation.

The inclusion of environmental factors in these questionnaires is consistent with the biopsychosocial perspective of the ICF framework that considers disability as the interaction between the individual and the environment (World Health Organization, 2001). Communication challenges in hearing loss are often situational, and environmental barriers can significantly impact listening success and participation outcomes (Aldè et al., 2025).

Categories of body structure were consistently underrepresented across questionnaires relative to other domains. This pattern may reflect the inherent limitations of questionnaire-based assessments in capturing structural or anatomical characteristics (Artino et al., 2014). Structural impairments related to hearing loss, such as abnormalities of the auditory system, are more commonly assessed through objective clinical procedures, including otoscopy, imaging, and audiological evaluation, rather than through self-report questionnaires.

The Friedman analyses further demonstrated that domain representation differed significantly across all three questionnaires for both professionals and adults with hearing loss. The associated Kendall's W values indicated moderate-to-large agreement effects, suggesting that stakeholder judgments regarding domain representation were systematic rather than random. These findings strengthen confidence in the observed predominance of Activities and Participation and the comparatively limited representation of Body Structures across the evaluated questionnaires.

5.2 Stakeholder Perspectives

5.2.1 Professional Rating

Across all three questionnaires, rehabilitation professionals assigned the highest proportional relevance rating to the activities and participation domain. Environmental factors and body functions received moderate and broadly comparable relevance ratings, whereas body structures consistently demonstrated the lowest proportional representation across all instruments. The large effect sizes observed across questionnaires indicate that professionals consistently differentiated among ICF domains and demonstrated stable judgments regarding their perceived representation within the questionnaires. The relatively balanced distribution across domains may reflect the broader biopsychosocial orientation of professional training, where clinicians routinely consider impairment-level factors, contextual influences, and participation consequences simultaneously during assessment and intervention planning.

At the subdomain level, professionals most frequently prioritized hearing functions (b230), attention (b140), listening (d115), receiving spoken messages (d310), and conversation (d350), as summarised in Table 4.10. This pattern indicates a multidimensional clinical conceptualization of

hearing loss from peripheral auditory processing to higher-order communicative function. Professionals' focus on b230 and b140 is consistent with their clinical training to view underlying sensory and cognitive functions as foundational to communication, and their focus on d115, d310, and d350 is consistent with the communicative activity focus of audiology practice. Professionals scored evenly across the body-/activity-level subdomains, acknowledging the wide range of functioning domains across which clinicians are trained to intervene simultaneously in rehabilitation and planning.

5.2.2 Ratings by Adults with Hearing Loss

Adults with hearing loss demonstrated a more concentrated pattern of relevance ratings, placing significantly greater emphasis on participation-related experiences than on impairment-level constructs. This finding underlines that hearing loss is often conceptualized in terms of its impact on meaningful communication, rather than as a sensory impairment alone.

The analysis of subdomains revealed a significantly different pattern of category representation among adults with hearing loss. The most endorsed categories were receiving spoken messages (d310), conversation (d350), handling stress and other psychological demands (d240), family relationships (d760), and temperament and personality-related constructs (b126), as shown in Table 4.10. The fact that d310 and d350 are salient in both groups points to the importance of speaking in the experience of hearing loss. But the categories that divided end-user ratings from professional ratings, i.e., d240, d760, and b126, suggest that adults with hearing loss tend to think of their challenges more in terms of emotional burden, relational tension, and individual resilience rather than in terms of audiological and functional constructs that are common in professional paradigms.

The prioritization of d240 (handling stress) is clinically relevant: the cognitive and emotional burden that the effort required to listen and communicate in everyday situations places on individuals with hearing loss (Pichora-Fuller et al., 2016) is a dimension seldom explicitly captured in the content of existing questionnaires. Similarly, the focus on d760 (family relationships) highlights the relational and interpersonal impact of hearing loss, well described by Hétu et al. (1993) and Scarinci et al. (2009), while b126 (temperament and personality) shows that adults with hearing loss individual coping is considered to be directly related to how they deal with hearing-related restrictions.

The concordance between professional and end-user ratings that the most important dimensions of impact were activities and participation, parallels a long-standing understanding in the rehabilitation literature that the functional and social implications of hearing loss are its most salient dimensions, both in clinical and experiential terms (Laplane-Lévesque et al., 2012; Scarinci et al., 2013)

However, the degree of concentration among adults with hearing loss, particularly the 62–64% allocated to activities and participation for HFEQ and e-Intake, is striking and suggests that end-user priorities are markedly more focused than those of professionals.

5.3 Qualitative Stakeholder Feedback

HEAR-COMMAND: Rehabilitation professionals described HEAR-COMMAND as ecologically rich, noting that it addresses real-world listening demands across a broad range of everyday communication scenarios. This ecological validity has been identified as a core strength of the instrument in its original development and validation literature (Afghah et al., 2022, 2024), and the present stakeholder feedback corroborates this assessment. However, the

instrument's length, i.e., 90 items, was identified as a practical barrier to routine clinical use. Moreover, professionals noted comparatively limited representation of body structure domains, suggesting that HEAR-COMMAND may be most appropriately used as a detailed clinical tool.

HFEQ: The HFEQ was perceived as clinically practical because of its shorter format and focused content, making it easier to administer. However, stakeholders consistently noted that important areas, such as emotional and psychological functioning, body structure categories, and family-related factors, were not adequately represented. Héту et al. (1993) highlighted the effect of hearing loss on family relationships, while Gopinath et al. (2012) demonstrated strong associations between hearing loss severity and mental health concern. A questionnaire that does not systematically address these dimensions may therefore provide an incomplete representation of an individual's overall functioning and quality of life, potentially limiting its clinical utility for rehabilitation planning.

ICF e-Intake Tool: The ICF e-Intake Tool was perceived as comparatively comprehensive due to its representation across all four ICF domains and was the only instrument in the present study to include dedicated body structure items. Stakeholders indicated that the conversational demands and the psychosocial consequences of hearing difficulties warrant more thorough coverage. As the shortest of the three instruments, the e-Intake Tool ensures high efficiency and data uniformity, thereby limiting the amount of in-depth qualitative data. Future refinement of this instrument might consider targeted expansion of conversational and psychosocial items while saving its efficiency.

Across all three questionnaires, qualitative feedback converged on the recommendation that psychosocial functioning, family-related contexts, and selected structural domains should receive greater emphasis in future instruments. The consistency of these recommendations across

diverse professional roles, including audiologists, speech-language pathologists, clinical psychologists, and an ICF researcher, strengthens confidence that they reflect genuine content gaps rather than professional preferences. The qualitative findings from this objective provide important context for the quantitative relevance rating analyses reported in subsequent objectives.

One of the most important findings of the present study concerns the divergent responses of professionals and individuals with hearing loss to patterns of domain relevance ratings, particularly for the HFEQ and ICF E intake tools. The professionals showed a balanced relevance rating across all four ICF domains, adults with hearing loss assigned greater relevance ratings to activities and participation – 62.55% for HFEQ and 63.75% for the e-intake tool, with lower endorsement for body structure and environmental factors. These differences are more pronounced, with activities and participation showing absolute differences of 34.79% for HFEQ and 33.71% for the e-intake tool between the two groups.

These findings are consistent with earlier studies documenting differences between clinician-defined outcomes and patient-defined outcomes in audiology and rehabilitation (Granberg et al., 2014b; Grenness et al., 2014). Professionals are trained to attend to the full spectrum of functioning, including body-level impairments and contextual determinants of health that may not be immediately salient to the individual experiencing a condition. In contrast, adults with hearing loss tend to place greater perceived relevance on the effects of hearing difficulties that most directly impact their daily lives, specifically communication, conversation, and social participation.

The HEAR-COMMAND instrument, on the other hand, demonstrated a much smaller between-group difference across domains (ranging from 4.99% to 6.17%), suggesting that its larger, more ecologically diverse items may elicit more multidimensional responses from

individuals with hearing loss. This conclusion has practical implications for questionnaire selection: whereas larger, ecologically rich instruments may more fairly reflect stakeholder consensus, shorter questionnaires focusing on particular ICF areas may exacerbate group-level differences in perceived relevance.

An important observation during the interview-based data collection with individuals experiencing hearing loss requires discussion in this context. During the interviews, it was apparent that several adults with hearing loss had long-standing communication difficulties. Participants frequently described developing compensatory strategies, including positioning themselves strategically during conversations, relying on contextual cues, and avoiding challenging communication environments. These findings may reflect adaptive functioning or response-shift processes, in which individuals gradually recalibrate expectations and normalize functional limitations over time.

5.4 Consensus patterns across professional subgroups

The observed variability across subgroups may reflect disciplinary differences in conceptualizing hearing-related functioning and rehabilitation priorities. HEAR-COMMAND audiologists rated above consensus threshold for body functions (60.20%), activities and participation (68.18%), and environmental factors (62.53%), whereas SLP ratings tended to remain below threshold for domains. The ‘Others subgroup’ included clinical psychologists and the ICF researcher and showed higher agreement (range 60.37% to 79.63% across domains). However, the strongest consensus was observed in the other subgroups for HFEQ, with all domains achieving over 90% agreement, and SLPs also reached the threshold for body functions, activities, and participation, as well as Environmental Factors. The other subgroup in e-Intake also showed the

highest level of consensus with activities and participation of 97.33%. In contrast, audiologists showed only threshold-level agreement on activities and participation (60.36%), with SLP ratings below threshold.

Note the relatively stronger and more consistent patterns of consensus for HFEQ and e-Intake compared to HEAR-COMMAND, which is consistent with the lower respondent burden of the shorter instruments. With fewer items to evaluate, raters may be more engaged with each item-domain pairing, leading to consensus patterns that better reflect true stakeholder views. This interpretation is consistent with the survey methodology literature, which has long established that questionnaire length is inversely related to response quality and completion accuracy (Krosnick, 1999). This finding has practical implications for future Delphi studies in this domain: where feasible, modular or phased rating procedures may reduce fatigue effects and improve the reliability of consensus.

The differential consensus patterns across professionals' subgroups also reflect meaningful disciplinary differences in how ICF domains are conceptualized. Audiologists and SLPs, who work predominantly with communication functioning, may conceptualize auditory and participatory domains differently from clinical psychologists or ICF researchers, whose training foregrounds broader biopsychosocial frameworks. The Others subgroup consistently shows higher agreement values, which may reflect greater familiarity with the ICF and enable more confident domain ratings. These observations highlight the importance of ensuring multidisciplinary panel composition in future Delphi studies on hearing assessment, so that a range of professional perspectives, including those with explicit ICF expertise, are represented in the consensus process. The relevance rating matrix derived from this objective provides an empirically grounded, stakeholder-validated reference point for future instrument development.

Taken together, the consensus patterns across subgroups and questionnaires indicate that the relevance rating matrix derived in the present study represents genuine stakeholder consensus rather than an artifact of any single disciplinary perspective and provides a principled, empirically grounded foundation for future instrument refinement.

5.5 ICF categories requiring greater emphasis in future refinement

The comparison of professional and end-user domain relevance ratings, combined with the subdomain prioritization analysis, identified several specific areas needing greater emphasis in future questionnaire development. The most important finding was the substantial divergence in the relevance rating of Activities and Participation, particularly for HFEQ and e-Intake, where adults with hearing loss assigned 62%-64% of item-to-category linkage to this domain. This concentration, substantially greater than observed among professionals (approximately 27–30%), likely shows the difficulties of everyday communication in the lived experiences of hearing loss, and suggests that current instruments, while reasonably comprehensive in their coverage of functional consequences, may still fall short of fully capturing the specific communication scenarios and social participation contexts that matter most to individuals with hearing loss.

In the subdomain analysis, the most frequently reported subdomains among adults with hearing loss were receiving spoken messages (d310), conversation (d350), handling stress and other psychological demands (d240), family relationships (d760), and constructs related to temperament and personality (b126). These representation patterns reflect the lived difficulties of communication, emotional burden, and relational strain in the experience of hearing loss, dimensions that remain incompletely represented in existing questionnaire content. This was confirmed by the qualitative feedback reported under Objective 2. Future instrument development

should focus on the systematic and substantive representation of these categories, particularly items addressing emotional consequences, interpersonal stress, relationship strain, and the relational impact of communication difficulties.

The lack of content on body structure in the end-user relevance ratings for HFEQ and e-Intake (2.08% and 5.82%, respectively) compared to the moderate professional relevance ratings (22.14% and 20.64%) suggests a real gap in the lived-experience representation of structural domains.

Another area for future attention is the relative underweighting of environmental factors among adults with hearing loss (which is consistently lower than professional ratings across all three instruments). This pattern may reflect the phenomenon of adapted functioning mentioned above, in which environmental barriers have become a background feature of the everyday lives of those who have fashioned their routines around their hearing limitations. Clinically, this is of concern because environmental modifications, including communication partner education, workplace accommodations, and assistive listening technologies, represent among the most modifiable targets for hearing rehabilitation (Manchaiah et al., 2015). Future instruments should consider whether environmental factor items can be reframed in more experientially grounded language to better elicit their relevance from adults with hearing loss.

Chapter VI

SUMMARY AND CONCLUSION

The present study evaluated the extent to which three ICF-aligned hearing-loss questionnaires represented the domains and categories of the Brief ICF Core Set for Hearing Loss and examined stakeholder perceptions of item-to-category linkage, domain representation, consensus, and questionnaire comprehensiveness using a modified Delphi methodology. Specifically, HEAR-COMMAND, HFEQ, and the ICF e-Intake Tool were evaluated with respect to category representation, stakeholder consensus, and perceived coverage of hearing-related functioning. Across the five study objectives, the findings provided important insights into the strengths, limitations, and contextual relevance of currently available ICF-based hearing assessment instruments.

6.1 Summary of Findings

Item-to-category linkage analyses showed broader representation of the Activities and Participation domains, followed by Body Functions, whereas Body Structure categories showed comparatively lower representation across questionnaires. This pattern may reflect the intended purpose of hearing-related questionnaires, which are designed primarily to capture functional and participation-related consequences of hearing loss.

The qualitative stakeholder feedback further supports the above findings. Across all three questionnaires, rehabilitation professionals identified family-related contexts and psychosocial functioning as areas requiring more emphasis. HEAR-COMMAND was perceived as ecologically rich and clinically detailed; however, its length was considered a potential limitation for routine use. In contrast, the HFEQ was appreciated for its practicality and ease of administration, although

the emotional and interpersonal aspects of hearing loss were not fully addressed. The ICF e-Intake Tool was considered structurally comprehensive; however, participants suggested that the conversational and psychosocial consequences of hearing loss may warrant greater representation.

Quantitative relevance rating analyses yielded several clinically meaningful findings. Professionals demonstrated relatively balanced representation ratings across all four ICF domains, reflecting a holistic understanding of hearing-related functioning. Adults with hearing loss demonstrated substantially greater representation of Activities and Participation-related constructs than professionals. Friedman analyses demonstrated significant differences in domain representation across all three questionnaires for both professionals and adults with hearing loss. The associated Kendall's W coefficients indicated moderate-to-large agreement effects, suggesting that stakeholder judgments regarding domain representation were systematic and consistent across questionnaires.

These findings are also further highlighted at the subdomain level. Adults with hearing loss consistently placed greater relevance on communication-related categories, emotional burden, family relationships, and the psychosocial consequences associated with hearing difficulties. These subdomains are closely related to day-to-day communication, emotional, and interpersonal challenges faced by listeners. These findings suggest that hearing difficulties influence participation, interpersonal functioning, and broader social experiences beyond auditory limitations alone. An additional observation emerging during data collection is that participants reported adapting to long-standing communication difficulties and gradually developing compensatory strategies to manage everyday listening demands. This observation may reflect adaptation or response-shift processes occurring over time.

Consensus analyses revealed significant variability in domain relevance rating patterns across stakeholder groups. Nevertheless, all questionnaires demonstrated significant within-group agreement regarding patterns of domain representation, supporting the stability of stakeholder judgments. HFEQ and the ICF e-Intake Tool demonstrated stronger, more consistent agreement patterns than HEAR-COMMAND. Variability was also observed across professional subgroups, emphasizing the importance of multidisciplinary representation during future Delphi studies. Furthermore, the results suggest that questionnaire length may directly influence rating consistency, highlighting instrument burden as an important consideration in consensus-based research.

The comparative and subdomain analyses highlighted psychosocial functioning, family and interpersonal relationships, and the broader environmental contexts of hearing loss, and called for stronger representation in future questionnaire development. There were clear differences in perceived representation and relevance between professionals and individuals with hearing loss, particularly in the HFEQ and ICF intake tools. The professionals favored a broader, holistic view of hearing assessment, whereas the adults with hearing loss placed greater emphasis on the condition's emotional, social, and participation-related limitations. These findings show that the existing instruments do not yet fully reflect end users lived experiences and priorities. Overall, the results emphasize that truly patient-centric and ICF-based hearing instruments should extend beyond auditory impairment measurement and systematically capture psychosocial well-being, communication experiences, and participation-related consequences of hearing loss.

6.2 Clinical Implications

The findings of this study carry several direct implications for audiological rehabilitation practice. First, although all three questionnaires demonstrated substantial representation of the Brief ICF Core Set for Hearing Loss, stakeholder feedback identified several domains and categories that may warrant stronger representation, particularly psychosocial functioning, family relationships, and participation-related experiences.

Second, the observation that individuals may adapt to hearing loss over time highlights the need for clinicians to look beyond patients' immediate difficulties and identify which activities they have altered, restricted, or avoided due to hearing loss. Without looking into these, the true impact of hearing loss on quality of life may remain underrecognized.

Finally, the stronger representation of family and relational categories among adults with hearing loss reinforces the need for a more family-centric approach to rehabilitation, where communication partners are actively involved in goal setting and intervention planning.

6.3 Limitations

Several limitations of the present study are acknowledged. The adults with hearing loss sample was relatively small ($n = 10$) and restricted to bilateral mild-to-moderate hearing loss from a single institutional setting, limiting the generalisability of findings to individuals with more severe hearing loss or different audiological profiles. The data were collected at a single time point; a longitudinal investigation may help determine whether stakeholder relevance rating patterns change over time. The considerable length and complexity led to fatigue and reduced concentration among the respondents. These factors may have influenced rating consistency and required consensus criteria, introducing some degree of imprecision. The professional panel, though

multidisciplinary, was also drawn from a geographically restricted population. Although groups of SLPs, psychologists, and ICF experts were recruited, they were limited in number.

6.4 Directions for Future Research

The present study provides a foundation for future investigations examining stakeholder perceptions of category representation within ICF-based hearing assessment tools. Future studies may build upon the present findings to refine existing questionnaires, improve representation of underrepresented domains, and develop assessment approaches that more comprehensively capture psychosocial, relational, and participation-related aspects of hearing loss. Future questionnaire development efforts should actively involve both rehabilitation professionals and adults with hearing loss throughout the development process to ensure that questionnaire content reflects both clinical expertise and lived experience. Replicating the present study with larger, more diverse participant samples would help determine whether similar patterns of category representation and stakeholder consensus are observed across different cultural, linguistic, and healthcare contexts.

6.5 Conclusion

The present study demonstrated that existing ICF-aligned hearing-loss questionnaires provide substantial coverage of the Brief ICF Core Set for Hearing Loss but differ in the extent to which individual domains and categories are represented. Stakeholder evaluations revealed consistent prominence of Activities and Participation-related constructs, comparatively limited representation of Body Structure categories, and important differences between professional and lived-experience perspectives. Qualitative and quantitative findings further identified

psychosocial functioning, family relationships, communication experiences, and participation-related consequences as areas warranting greater attention in future assessment instruments.

Collectively, the findings support the value of stakeholder-informed evaluation approaches and reinforce the importance of person-centered, multidimensional assessment frameworks in hearing healthcare.

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