

Reproducible Multistage Mixed-Methods Sampling Methodology for Studying the Mental Health and Psychosocial Support (MHPSS) Workforce in Complex Humanitarian Settings: A Methodological Framework from Gambella, Ethiopia

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Abstract Evidence on the Mental Health and Psychosocial Support (MHPSS) workforce in refugee settings remains limited due to workforce diversity, staff mobility, multiple organizations, geographically dispersed services, and incomplete personnel records. This study developed and implemented a rigorous mixed-methods sampling protocol to assess the MHPSS-related workforce in Ethiopia's Gambella Region. A convergent mixed-methods design combined multistage stratified probability sampling for the quantitative component with purposive sampling for the qualitative inquiry. The sampling frame was developed using the June 2026 5Ws matrix and organizational staffing records, then verified with focal persons. Sample size was calculated using Cochran's formula with finite population correction, plus 10% for non-response. Proportional allocation across organizations was used with intentional oversampling of smaller professional cadres. The verified sampling frame included 1,336 eligible personnel from 12 organizations. After finite population correction, the required sample was 299 participants, with a final target of 332 after accounting for non-response. Systematic random sampling was conducted within final strata, supported by reserve lists and replacement procedures. Sampling weights were specified to account for unequal selection probabilities. This protocol provides a transparent, reproducible, and practical approach for studying heterogeneous humanitarian MHPSS workforces, informing workforce planning, capacity development, and service improvement in refugee-hosting settings.

Keywords Humanitarian Settings, MHPSS, Mixed-Methods, Refugees, Workforce.

Introduction

Mental Health and Psychosocial Support (MHPSS) is essential to humanitarian response because armed conflict, forced displacement, disease outbreaks, natural disasters, and other emergencies can have profound psychological and social consequences [1]. People affected by crises face increased risks of depression, anxiety, post-traumatic stress disorder (PTSD), prolonged grief, substance use disorders, severe mental illness, and psychosocial distress [2, 3]. In response, humanitarian agencies have increasingly integrated MHPSS into health, protection, gender-based violence (GBV), child protection, nutrition, and education programs to promote well-being and strengthen community resilience [1, 4].

Problem to be Solved

The effectiveness of MHPSS services depends largely on the availability of a competent, well-distributed workforce [5]. This workforce includes psychiatrists, psychologists, psychiatric nurses, social workers, counselors, community psychosocial workers, GBV case managers, GBV Response Officers, GBV Prevention Officers, General Practitioners, Nurses, Health Officers, Midwives, refugee incentive workers, program managers, supervisors, and personnel working with Refugee-Led Organizations (RLOs), Local NGOs, National NGOs, and International NGOs in the Health and GBV sectors [6]. Despite their important role, humanitarian settings continue to face workforce shortages, uneven geographic distribution, limited training opportunities, high staff turnover, and inadequate supervision [7]. These challenges can affect both service quality and people's access to services [8, 9].

Reliable information on the barriers and drivers of MHPSS workforces, as well as their characteristics, capacity, and distribution, is essential for effective workforce planning, policy development, and evidence-informed programming [10, 11]. However, collecting

representative workforce data in humanitarian settings is challenging. Populations and services are often geographically dispersed, organizational structures can change rapidly, personnel may move between locations or organizations, and comprehensive workforce registries are frequently unavailable [12, 13]. These factors make it difficult to develop accurate sampling frames and to implement probability-based sampling approaches [13, 14].

Existing Solutions and Their Limitations

Previous studies have employed various sampling approaches to study humanitarian workforces. Some have used convenience sampling, which is practical but introduces selection bias and limits generalizability [13]. Others have attempted probability sampling using organizational staff lists, but these lists are often incomplete, outdated, or not consolidated across multiple agencies [14]. Simple random sampling, while statistically robust in theory, is difficult to implement when the workforce is distributed across different organizations, sectors, and geographic locations with no single comprehensive registry [36]. Stratified sampling has been used in some contexts, but often without adequate representation of smaller professional cadres, limiting subgroup analysis [37].

Purposive sampling has been widely used in qualitative MHPSS research, providing rich contextual data on workforce experiences and organizational practices [14, 15]. However, qualitative findings alone cannot provide population-level estimates of workforce characteristics, distribution, or the prevalence of workforce challenges [16]. Mixed-methods approaches have been recommended for MHPSS research, but few studies have documented a systematic, reproducible protocol that integrates probability sampling for quantitative components with purposive sampling for qualitative components in complex humanitarian settings [14, 17].

Best Approach: Mixed-Methods Multistage Stratified Sampling

The most appropriate approach for studying the MHPSS workforce in complex humanitarian settings is a convergent mixed-methods design that combines multistage stratified probability sampling for the quantitative component with purposive sampling for the qualitative component [14]. This approach offers several advantages. First, stratified sampling ensures representation across key organizational, geographic, sectoral, and professional characteristics, improving the precision of estimates and enabling subgroup analysis [37]. Second, multistage sampling accommodates the hierarchical and dispersed nature of humanitarian service delivery [13]. Third, probability sampling enables valid statistical inference and population-level estimation [36]. Fourth, purposive qualitative sampling provides contextual depth and explanatory power that survey data alone cannot provide [16]. Fifth, integrating quantitative and qualitative evidence strengthens the credibility and comprehensiveness of the findings [14].

Limitations of Existing Approaches

Despite the advantages of mixed-methods approaches, several limitations persist in current practice. First, sampling frames are often incomplete due to staff mobility, multiple organizations, and lack of centralized workforce registries [12, 13]. Second, proportional allocation may underrepresent small but strategically important professional cadres, limiting the ability to conduct meaningful subgroup analysis [37]. Third, non-response is common in humanitarian settings due to competing operational demands, staff turnover, and mobility, yet replacement procedures are often not systematically

documented [36]. Fourth, sampling weights are frequently not specified when disproportionate sampling is used, limiting the ability to generate population-level estimates [38]. Fifth, the integration of quantitative and qualitative components is often not clearly described, reducing the reproducibility of the methodology [14].

Achievements of this Protocol

This protocol addresses these limitations through several key achievements. First, it establishes a verified sampling frame by consolidating multiple organizational records and verifying eligibility with designated focal persons [36]. Second, it uses proportionate allocation across organizations with intentional oversampling of smaller professional cadres to improve analytical representativeness while specifying sampling weights for population-level inference [38]. Third, it implements systematic random sampling within strata with reserve lists and documented replacement procedures to address non-response [39]. Fourth, it integrates quantitative and qualitative components within a convergent mixed-methods design, with clear documentation of sampling procedures for reproducibility [14]. Fifth, the protocol is implemented in a complex humanitarian setting with multiple organizations, dispersed service delivery sites, and diverse professional cadres, demonstrating operational feasibility [13, 14].

Conceptual Framework

Figure 1 illustrates the conceptual framework guiding this study. The framework depicts the sequential process of developing the sampling frame, applying multistage stratification, selecting participants through probability and purposive sampling, and integrating quantitative and qualitative data for comprehensive workforce assessment.

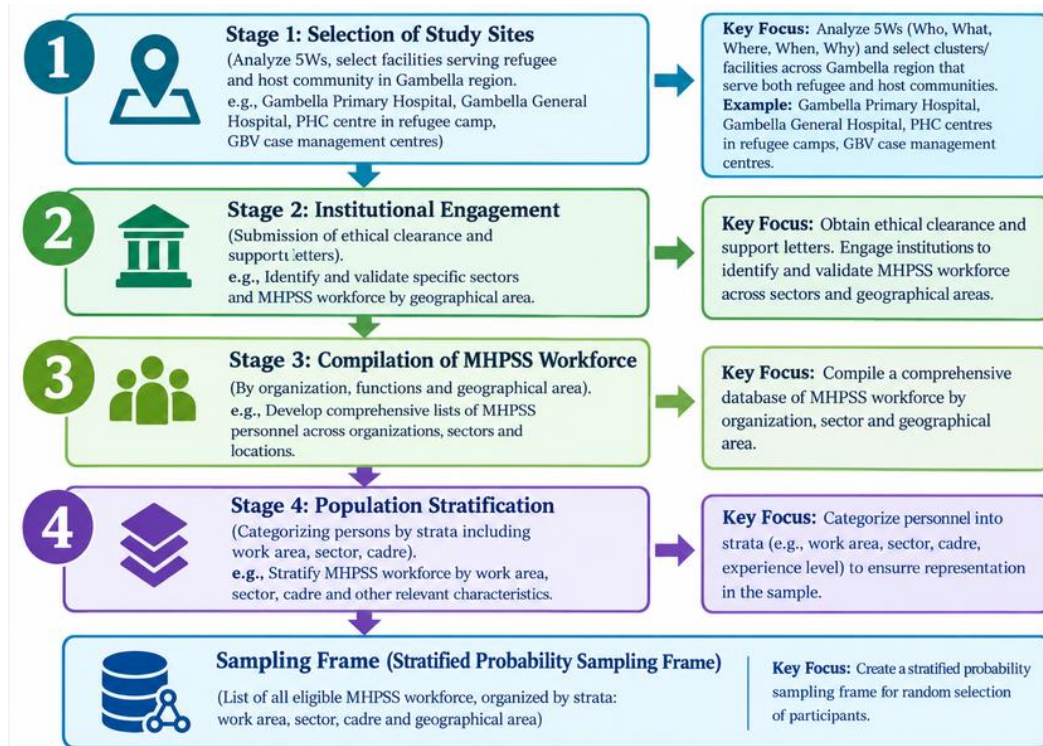


Figure 1. Conceptual Framework of the Multistage Mixed-Methods Sampling Protocol

Source: Original work of the author

Study Objectives

The overall objective of this study was to develop and implement a rigorous mixed-methods sampling protocol to assess the MHPSS-related workforce in the Gambella Region, Ethiopia. Specific objectives were to:

1. Develop a verified sampling frame of eligible MHPSS personnel across organizations, sectors, and professional cadres in the Gambella refugee response
2. Determine an appropriate quantitative sample size using finite population correction and account for anticipated non-response
3. Allocate the sample proportionally across organizations with intentional oversampling of smaller professional cadres
4. Implement systematic random sampling within strata with documented replacement procedures
5. Specify sampling weights to account for unequal selection probabilities

6. Recruit information-rich participants for qualitative inquiry using purposive sampling
7. Document the sampling procedures to ensure transparency and reproducibility

Novelty of the Work

This protocol makes several novel contributions to humanitarian workforce research. First, it provides a transparent, step-by-step framework for constructing a verified sampling frame in a setting with multiple organizations, dispersed service delivery, and incomplete personnel records—a common challenge in humanitarian contexts that is rarely addressed in methodological literature [13, 14]. Second, it demonstrates how to balance population representativeness with analytical representativeness through intentional oversampling of smaller professional cadres while specifying sampling weights to enable population-level inference [38]. Third, it provides a practical example of implementing systematic random sampling with reserve lists

and replacement procedures in a complex humanitarian setting, addressing non-response in a way that maintains probability-based selection [39]. Fourth, it integrates quantitative and qualitative sampling within a convergent mixed-methods design, with clear documentation of procedures to support reproducibility in other humanitarian settings [14]. Fifth, it applies these methods specifically to the MHPSS workforce, a critical yet understudied area in humanitarian response [10, 11]. This protocol contributes to the methodological literature on sampling in complex settings and provides a practical tool for researchers, program managers, and policymakers seeking to generate evidence on humanitarian workforces.

Materials and Methods

Study Setting

The study was conducted in the Gambella Region of western Ethiopia from July 15 to August 15, 2026, a major refugee-hosting area with a longstanding humanitarian response to displacement from South Sudan [18]. The response involves government institutions, United Nations agencies, International NGOs, National NGOs, and Local NGOs, including refugee-led organizations [19]. MHPSS services are delivered through refugee camps, health facilities, community platforms, schools, and protection programs, reflecting the multisectoral and inter-agency nature of humanitarian MHPSS programming [1].

Population

The study population included health and GBV sector personnel involved in planning, coordinating, managing, supervising, and delivering MHPSS services within the Gambella refugee response [20]. This included personnel from the Regional Health Bureau, INGOs, NNGOs, and local NGOs/refugee-led organizations [21]. Eligible personnel may be involved in program management, technical coordination, clinical and psychosocial

services, protection, GBV, community outreach, and supervision in the health and GBV sectors [22].

The target population included individuals who meet the predefined eligibility criteria and are actively involved in MHPSS implementation during the study period [23]. The source population comprised eligible personnel identified through verified organizational records, including human resources databases [24]. These sources were coded by cadre category and consolidated to establish the quantitative sampling frame [25].

Unit of Analysis and Eligibility Criteria

The primary unit of analysis for the quantitative component was individual humanitarian staff in the health and GBV sectors whose direct role involves providing MHPSS to people in need [26]. This aligns with research on mental health, psychosocial well-being, burnout, and work-related experiences among humanitarian personnel [27, 28]. For the qualitative component, the units of analysis included individual key informants, focus-group participants, and organizational representatives in the health and GBV sectors [29]. This approach reflects the multisectoral nature of MHPSS programming, in which responsibilities and knowledge are distributed among mental health professionals, psychosocial workers, primary health care staff, GBV prevention and response staff, program managers, coordinators, and other humanitarian actors, including refugee-led organizations [1, 30].

Participants were eligible if they were 18 years or older, employed or formally engaged by a humanitarian organization operating in Gambella, had at least one month of MHPSS-related experience prior to data collection, were directly involved in MHPSS planning, coordination, supervision, implementation, or support, were available during the data-collection period, and provided written informed consent [31]. These criteria align with

previous MHPSS research involving adult practitioners and humanitarian personnel actively engaged in MHPSS or humanitarian activities [32, 33]. Given the current global funding crisis, many front-line staff cannot work for more than six months. Therefore, the practical experience threshold was one month.

Individuals were excluded if they had less than one month of relevant experience, were on extended leave during the data-collection period, performed only administrative or logistical duties unrelated to MHPSS, or were unable or unwilling to provide informed consent [34]. The study obtained written informed consent before participation, in accordance with ethical requirements for research involving human participants [27, 35].

Sampling Frame Development

The research team developed a verified sampling frame of eligible MHPSS personnel through a systematic process of organizational engagement, compilation, screening, data cleaning, and verification. Following institutional approval and organizational authorization, updated personnel records, including the number and categories of personnel by duty station, were obtained from participating organizations and coded according to organization, duty station, professional cadre, and programme sector [36]. Duplicate records and individuals who did not meet the study eligibility criteria were removed. The resulting sampling frame included a unique identification number for each eligible participant, organization, duty station, professional cadre, programme sector, employment status, and duration of service [37].

The compiled staffing lists were double-checked against human-resource and programme records at facility level to confirm eligibility, employment status, professional role, duty station, and programme assignment [38]. Any discrepancies, duplicate records, or incomplete information were discussed and

resolved with the designated organizational focal person before the sampling frame was finalized. This verification process strengthened the accuracy and completeness of the sampling frame and ensured that each eligible individual was represented only once.

The Principal Investigator reviewed and approved the finalized sampling frame before participant selection commenced. Verification and double-checking were particularly important for establishing a valid probability-sampling frame in which each eligible individual had a known, non-zero probability of selection. Where a selected participant could not be located at the assigned workplace during data collection because of unforeseen circumstances, replacement was made from a pre-established reserve list generated using the same stratification and random-selection procedures. This approach minimized disruption to fieldwork while preserving the methodological integrity and representativeness of the sampling procedure.

Sampling Stratification and Coverage Control

To improve representativeness and reduce sampling error, the quantitative sample was stratified by study site (Jewi, Kule, Tierkidi, Nguenyiel, Luakdong, Akula, Pugnido I, Pugnido II, and Gambella Town), organization type (government, INGOs, NNGOs, and local NGOs/RLOs), program sector (health and GBV), and professional cadre. The professional cadres included program managers, coordinators and supervisors; mental health professionals, including psychologists, psychiatric nurses, general nurses, general practitioners, and midwives; health officers/clinical officers; GBV prevention and response officers; social workers; counselors; community psychosocial workers; case managers; and refugee incentive workers, including community health workers and GBV outreach workers.

To reduce coverage errors, the team compared staffing records from organizational, site, and facility-level sources before finalizing the sampling frame. This process helped identify and address duplicate records, missing personnel, staff transfers, recruits, resignations, and other inconsistencies. The study obtained access to personnel records, including the type and number of cadres at each facility, through written institutional authorization. The study collaborated with agency and facility heads, as well as cadre supervisors, to support random participant selection. The study did not use identifiable information, and participants were encouraged to participate freely and voluntarily without providing unique identifiers, such as their name, email, or phone number.

The study used a convergent mixed-methods design, combining probability sampling for the

quantitative survey with purposive sampling for the qualitative component. The study collected quantitative and qualitative data concurrently and analyzed them separately before integrating them during interpretation. The quantitative component described the characteristics and distribution of the MHPSS workforce and the status of professional quality, organizational support, and job satisfaction. In contrast, the qualitative component provided a deeper understanding of contextual experiences, organizational practices, implementation challenges, and priorities for strengthening the workforce. Bringing the two components together provided complementary perspectives and contributed to a more comprehensive and credible understanding of the MHPSS workforce. The convergent mixed-methods design is summarized in Figure 2 [39-41].

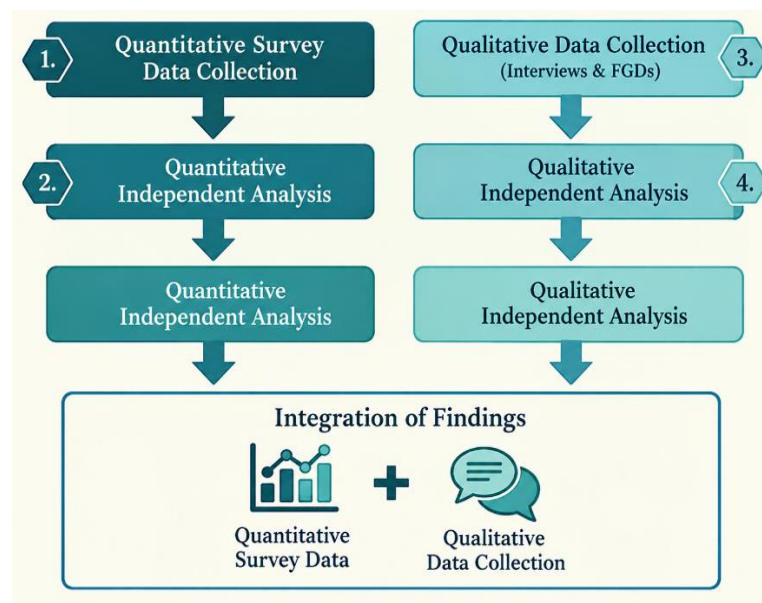


Figure 2. Convergent Mixed-Methods Design

Sampling Approach

The study used multistage proportionate stratified random sampling for the quantitative component and purposive sampling for the qualitative component. For the quantitative component, the study included all eligible MHPSS service locations, including refugee camps and designated health facilities, to capture the workforce's geographic and

organizational diversity. The study then identified eligible organizations and stratified participants by location, organization type, program sector, and professional cadre. Participants were allocated proportionally across strata and selected through systematic sampling. This approach ensured that each eligible individual had a known and equal probability of selection within their stratum [13, 14].

For the qualitative component, participants were purposively selected based on their relevant knowledge and experience in MHPSS leadership, programming, and service delivery, primarily from INGOs, NGOs, RLOs/CBOs/LNGOs, RHB, and hospitals. This approach helped identify information-rich participants who could provide detailed insights into the contextual and operational aspects of MHPSS implementation, including primary health care, hospitals, GBV case management facilities, women's and girls' safe spaces, and community-based activities [14, 16].

Proportionate Stratified Sampling

The quantitative component of the study used proportionate stratified random sampling. The eligible workforce population was first divided into relevant, mutually exclusive strata, and the number of participants selected from each stratum was proportional to that stratum's size within the total eligible workforce population. Proportionate allocation is an established stratified sampling approach in which the sample size assigned to each stratum reflects the stratum's proportion of the total population. The proportional allocation formula is:

$$n_h = (N_h / N) * n$$

Where:

n_h = Sample allocated to stratum h

N_h = Population size of stratum h

N = Total eligible population

n = Total sample size

After verifying the sampling frame, each eligible participant was assigned a unique identification number and entered into a secure spreadsheet for randomization. Participants were then ordered according to the resulting random sequence and selected within each stratum until the required sample size was reached. A reserve list was generated from the same random sequence to replace non-respondents or participants who became ineligible, while maintaining the original probability-based selection process. All

sampling and randomization procedures were documented to promote transparency and reproducibility, in line with established principles of stratified random sampling.

For the qualitative component, purposive sampling identified information-rich participants based on professional expertise, leadership responsibilities, humanitarian experience, program involvement, and knowledge of MHPSS planning and service delivery in the health and GBV sectors, primarily from RHB, Hospitals, INGOs, NNGOs, and CBOs/LNGOs. This approach suits qualitative inquiry because it intentionally selects participants whose experiences and knowledge provide detailed information relevant to the research questions.

Qualitative Sampling: Key Informant Interviews and FGDs

Key informant interviews (KIIs) purposively recruited focal persons from the health and GBV sectors in RHB, hospitals, INGOs, NNGOs, and CBOs/LNGOs involved in MHPSS programming, implementation, and supervision. Focus group discussions (FGDs) included frontline workers such as counselors, psychosocial workers, psychiatric nurses, social workers, refugee incentive workers, community health workers, GBV outreach workers, GBV case managers, the GBV Prevention Officer, and response officers.

Each FGD included approximately 6-10 participants with broadly similar professional roles to encourage open discussion and reduce potential power imbalances. The qualitative sample was expected to include approximately 8-12 program managers, 8-10 technical specialists, 6-10 RLOs, and 10-15 participants across 4-6 FGDs with frontline workers. However, the final qualitative sample size was guided by thematic saturation rather than determined solely by the initial estimates [14, 16].

Results

Identification of the Eligible Workforce

A review of the June 2026 Who is doing what, Where, When, and for Whom (5Ws) matrix, jointly compiled by the United Nations High Commissioner for Refugees (UNHCR), the Refugees and Returnees Service (RRS), and implementing partners, identified 12 organizations providing Health and/or Gender-Based Violence (GBV) services with MHPSS-related components in the Gambella refugee response. These organizations formed the organizational sampling frame.

Subsequent verification with designated organizational focal persons identified an eligible MHPSS-related workforce of 1,336 personnel across the health and GBV sectors. The workforce included medical doctors, nurses, midwives, Health Officers, MHPSS professionals, community health workers (CHWs), GBV prevention and protection officers, GBV response officers, GBV managers/supervisors, and GBV outreach agents/social workers. CHWs constituted the largest professional group (613; 45.9%),

followed by nurses (263; 19.7%) and social workers (256; 19.2%). MHPSS professionals represented the smallest group (14; 1.0%), followed by protection officers (22; 1.6%) and response officers (35; 2.6%).

Sampling Frame and Workforce Distribution

The team developed the final sampling frame by consolidating organizational staffing records and verifying participant eligibility with designated organizational focal persons. The team removed duplicate, inactive, and ineligible records and cross-checked information on organization, program sector, professional cadre, and duty station before sampling began.

The resulting workforce comprised 1,336 eligible personnel across the Health and GBV programs. DPO reported the largest workforce (n = 495), followed by GGH (n = 184), GPH (n = 147), PI (n = 124), Goal (n = 89), IRC (n = 79), RLOs (n = 74), CUAMM (n = 61), FRC (n = 46), DCA (n = 24), ASDEPO (n = 7), and RADO (n = 6) (Table 1).

Table 1. Distribution of Eligible MHPSS-Related Workforce by Professional Cadre

Professional Cadre	Population (N)	Proportion (%)
Community Health Workers	613	45.9
Nurses	263	19.7
Social Workers	256	19.2
Medical Doctors	46	3.4
Health Officers	45	3.4
Midwives	42	3.1
Response Officers	35	2.6
Protection Officers	22	1.6
MHPSS Professionals	14	1.0
Total	1,336	100.0

Determination of the Quantitative Sample Size

We determined the quantitative sample size using Cochran's formula for estimating a single

population proportion. In the absence of prior estimates of the distribution of the principal workforce characteristics in Gambella, we assumed a conservative 50% prevalence. We

specified a 95% confidence level and a 5% margin of error. The initial sample size was:

$$n_0 = (z^2 \times p \times q) / d^2$$

where $Z = 1.96$, $p = 0.50$, $q = 0.50$, and $d = 0.05$. This yielded an initial sample of 384.16 participants.

Because the eligible workforce was finite ($N = 1,336$), the finite population correction was applied:

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}}$$

The corrected sample size was approximately 298.6 participants. Allowing for an anticipated 10% non-response rate:

$$n_{adj} = 332$$

The final quantitative sample was therefore 332 participants (Table 2).

Table 2. Summary of Quantitative Sample-Size Determination using Cochran's Formula with Finite Population Correction

Parameter	Value
Eligible workforce (N)	1,336
Initial Cochran sample (n_0)	384.16
Finite population-corrected sample	298.6
Anticipated non-response	10%
Final sample size	332

Proportional Allocation Across Organizations

The final sample of 332 participants was initially allocated proportionally across the 12 organizations according to their representation in the eligible workforce. The allocation was calculated as:

$$n_h = (N_h / N) * n$$

where n_h represents the sample allocated to stratum h , N_h represents the eligible workforce in that stratum, N represents the total eligible workforce (1,336), and n represents the total sample (332).

The largest allocation was assigned to DPO (123 participants), reflecting its comparatively large workforce, followed by GGH (46), GPH (37), PI (31), Goal (22), IRC (20), RLOs (17), CUAMM (15), FRC (11), DCA (6), ASDEPO (2), and RADO (2) (Table 3).

Table 3. Initial Proportional Allocation of the Quantitative Sample Across Organizations, Calculated as $(N_h/N) \times n$, Before Applying Oversampling to Small Professional Cadres

Organization	Workforce (N)	Proportion (%)	Sample (n)
DPO	495	37.05	123
IRC	79	5.91	20
PI	124	9.28	31
Goal	89	6.66	22
CUAMM	61	4.57	15
ASDEPO	7	0.52	2
RADO	6	0.45	2
DCA	24	1.80	6
FRC	46	3.44	11
GPH	147	11.00	37
GGH	184	13.77	46

RLOs	74	5.54	17
Total	1,336	100.00	332

Multistage Stratification and Participant Selection

The final sampling procedure combined geographic, organizational, sectoral, and professional stratification before selecting individual participants. We retained all identified refugee camps and referral health facilities in the sampling frame, then stratified eligible personnel by organization, program sector, and professional cadre.

Within each final stratum, we selected participants using systematic random sampling. The sampling interval was calculated as:

$$k = \frac{N_h}{n_h}$$

where N_h was the number of eligible personnel in the stratum and n_h was the required sample size. We generated a random starting point between 1 and k , then selected every k th eligible individual until we reached the required allocation.

This procedure ensured that selection remained probability-based while accommodating the geographically dispersed and organizationally heterogeneous nature of the humanitarian workforce. We used a reserve list generated using the same randomization procedure when selected participants declined participation, were subsequently found

ineligible, or could not be contacted after three documented attempts. Replacement was restricted to the same relevant sampling stratum to preserve the intended sampling structure.

Representation of Small Professional Cadres

The workforce distribution demonstrated substantial imbalance across professional cadres. Under strict proportional allocation, the large CHW workforce would account for approximately 152 of the 332 participants, whereas only approximately 3 MHPSS professionals, 5 protection officers, and 9 response officers would be selected. Although proportional allocation accurately reflects the underlying workforce composition, such small subgroup samples would substantially limit the precision of cadre-specific analyses.

Accordingly, the sampling design incorporated disproportionate allocation of selected smaller professional cadres to improve their analytical representation. The MHPSS professional group was included through a census approach (14 of 14 personnel), while protection officers, response officers, medical doctors, health officers, and midwives received higher allocations than strict proportional sampling would allow. The remaining sample was distributed among the larger professional groups (Table 4).

Table 4. Final Sample Allocation by Professional Cadre, with Oversampling of Small Professional Groups to Improve Analytical Representativeness

Professional Cadre	Population (N)	Final Sample (n)	Sampling Fraction (%)
MHPSS Professionals	14	14	100.0
Protection Officers	22	20	90.9
Response Officers	35	30	85.7
Medical Doctors	46	30	65.2
Health Officers	45	30	66.7
Midwives	42	30	71.4
Social Workers	256	40	15.6

Nurses	263	40	15.2
Community Health Workers	613	98	16.0
Total	1,336	98	16.0

Because selection probabilities differed across professional cadres, we specified sampling weights for subsequent quantitative analysis. The stratum-specific weight was calculated as:

$$w_h = \frac{(N_h|N)}{(n_h|n)}$$

This weighting procedure allows population-level estimates to reflect the underlying workforce distribution despite the deliberate oversampling of smaller professional groups.

Discussion

This protocol demonstrates how a multistage mixed-methods sampling strategy can be adapted to a diverse and changing humanitarian MHPSS workforce. Its main methodological contribution is combining a verified organizational sampling frame, probability-based quantitative sampling, purposive qualitative recruitment, and deliberate representation of smaller professional cadres. Unlike a conventional workforce confined to a single geographic or organizational setting, humanitarian MHPSS personnel are distributed across different organizations, sectors, professional groups, and refugee-hosting locations. A simple random sampling approach would therefore be difficult to implement and could underrepresent professionally or strategically important cadres [13, 14].

The sampling frame identified 1,336 eligible personnel across 12 organizations, with considerable variation in workforce composition. Community health workers accounted for 45.9% of the workforce, while MHPSS professionals represented only 1.0%; nurses and GBV Outreach agents/social workers were also major workforce groups. This distribution highlights that MHPSS delivery extends beyond specialist mental

health professionals and reflects the multisectoral, layered, and task-sharing nature of humanitarian MHPSS programming [1, 4, 30]. Limiting the sampling frame to formally designated mental health professionals would therefore exclude many personnel who contribute to MHPSS services. At the same time, treating the workforce as a single homogeneous group would overlook important differences in roles, training, supervision, and responsibilities.

Using organizational records on staffing by cadre, along with the June 2026 5Ws UpToDate matrix, to construct the sampling frame was an important strength of the protocol. Humanitarian personnel may be distributed across multiple agencies, facilities, and program databases and may frequently transfer between locations, join organizations, or leave their positions. Relying on a single data source could therefore result in missing or duplicate records. Consolidating multiple sources and verifying eligibility with organizational focal persons improved the sampling frame's completeness and provided a practical foundation for probability-based sampling [36].

The sample-size calculation was appropriate for a defined population of 1,336 personnel. The conservative Cochran assumption of 50% prevalence provided a maximum-variance estimate, while the finite population correction reduced the required sample to approximately 299 participants. Adding 10% to account for anticipated non-response resulted in a final target of 332 participants. This approach is transparent and can be reproduced in other humanitarian settings by using the locally verified workforce population and relevant assumptions.

Proportional allocation across organizations aligned with workforce size and resulted in the largest allocations to DPO, GGH, GPH, PI,

Goal, IRC, RLOs, CUAMM, FRC, DCA, ASDEPO, and RADO. However, strict proportional allocation would have produced very small numbers for some professionally important cadres. For example, approximately 152 participants would have been selected from the large CHW group, while only about three MHPSS professionals would have been included. The protocol therefore used disproportionate allocation, included all 14 MHPSS professionals, and ensured substantial representation of other small cadres. This approach distinguishes population representativeness from analytical representativeness: proportional sampling reflects the actual workforce composition, whereas oversampling improves the ability to examine smaller but important groups.

Because disproportionate sampling creates unequal selection probabilities, appropriate sampling weights are needed to produce population-level estimates [36]. The final allocation included all 14 MHPSS professionals, 20 of the 22 GBV prevention officers, and 30 of the 35 GBV response officers, while also adequately representing other cadres. This strengthens subgroup analysis without preventing population-level inference, provided that the selection probabilities are accurately documented and incorporated into the analysis.

Random selection within the final strata and the use of a reserve list further strengthened the sampling procedures. A randomly determined starting point and sampling interval reduced the possibility of discretionary participant selection, while reserve participants were drawn from the same probability-based sequence and relevant stratum. This reduced the risk that field teams would substitute convenient participants and helped prevent non-response from turning the probability sample into a convenience sample [36]. Such procedures are particularly important in humanitarian settings, where staff mobility, leave, turnover, competing operational

demands, and unexpected disruptions can affect participant availability.

The qualitative component followed a different but complementary sampling logic. Purposive sampling recruited information-rich participants with relevant leadership, technical, frontline, community, and organizational experience. This complements the quantitative component by providing contextual explanations of workforce capacity, organizational practices, barriers, supervision, and service-delivery experiences that survey data cannot fully capture [14]. Separating frontline focus groups from senior managerial or technical groups may also reduce power-related constraints and create a more comfortable environment for discussing workload, supervision, organizational support, and resource limitations.

Including refugee-led organizations, incentive workers, and other community-level personnel is particularly important because MHPSS delivery depends not only on formally trained professionals but also on locally embedded and non-specialist actors. Their perspectives can highlight operational realities that may not appear in administrative workforce records and align with the community-based and multisectoral orientation of MHPSS [1, 30].

The one-month experience criterion provides a practical threshold to ensure participants have had sufficient exposure to MHPSS-related activities to comment meaningfully on workforce capacity and operational challenges. However, this criterion is study-specific rather than a universal standard and may need adaptation to workforce composition, staff turnover, and research objectives in other settings [32].

The convergent mixed-methods design strengthens the study by combining population-level estimates with contextual explanations. Quantitative findings can identify patterns in workforce composition, distribution, and experiences, while qualitative evidence can help explain the organizational and operational

factors underlying those patterns. Integrating the two components during interpretation allows the study to identify areas of convergence as well as differences between the two strands of evidence [14].

Several limitations should also be considered. The quantitative sample depends on the completeness and accuracy of organizational records and may not capture informal, temporary, newly recruited, or recently departed personnel. The workforce definition is also limited to personnel involved in Health and GBV programs with MHPSS-related components. It may not capture all actors contributing to MHPSS through sectors such as education, child protection, nutrition, livelihood, or community protection. Oversampling improves representation of smaller subgroups but requires appropriate weighting for population-level estimates. Similarly, purposive qualitative sampling provides contextual depth but is not intended to achieve statistical representativeness. Finally, because humanitarian workforces can change rapidly, the sampling frame represents the workforce at a particular point in time rather than a permanent or fixed structure.

Despite these limitations, the protocol provides a transferable framework for humanitarian workforce research. The approach involves defining and verifying the workforce, consolidating multiple administrative sources, establishing clear eligibility criteria, stratifying participants according to analytically relevant characteristics, determining and allocating the sample transparently, oversampling important small groups when justified, documenting unequal selection probabilities, and integrating quantitative and qualitative evidence. Overall, the protocol demonstrates that methodological rigor and operational feasibility can be achieved together in complex humanitarian settings.

Conclusion

This protocol provides a rigorous and operationally feasible framework for sampling the MHPSS-related workforce in a complex humanitarian setting. Using the June 2026 5Ws matrix and organizational verification, it established a sampling frame of 1,336 eligible personnel across 12 organizations and a quantitative sample of 332 participants based on a finite population-adjusted sample-size calculation and an allowance for anticipated non-response.

A key strength of the protocol is its balance between population-level representativeness and adequate representation of smaller but strategically important professional cadres. Proportional allocation across organizations reflects the overall workforce structure, while disproportionate sampling and census inclusion of small specialist groups support meaningful subgroup analysis. Sampling weights can then support population-level inference despite unequal selection probabilities.

The qualitative component complements the survey by purposively recruiting management, technical, frontline, community, refugee-led, health, and GBV-related personnel. Together, the two approaches provide both quantitative estimates and contextual understanding of workforce capacity, drivers, barriers, supervision, job satisfaction, professional quality of life, organizational practices, and service-delivery realities.

The protocol also addresses major threats to sampling validity, including incomplete records, duplicate entries, staff mobility, non-response, organizational heterogeneity, and geographically dispersed service delivery. Although developed for Gambella, its methodological structure can be adapted to other refugee-hosting and humanitarian settings by modifying workforce definitions, eligibility criteria, sampling strata, sample-size assumptions, and sectoral scope. Its broader contribution is a reproducible approach for generating workforce evidence that can inform

MHPSS planning, capacity development, supervision, recruitment, and resource allocation.

Conflict of Interest

The authors declare no conflicts of interest.

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Ethical Approval

Ethical approval for this study was obtained from the Institutional Review Board of Texila American University (Reference Number: 2026/TIMM-UCN/2/00026). The study also received administrative clearance from the relevant regional authorities (RHB and RRS-77/131/2018) and organizational leadership. Written informed consent was obtained from all participants prior to their involvement in the

study. The study was conducted in accordance with the Declaration of Helsinki and relevant Ethiopian national guidelines for research involving human participants.

Data Availability

The anonymized dataset generated from the sampling frame is available from the corresponding author upon reasonable request. The 5Ws matrix used to identify organizations is publicly available through RRS and UNHCR coordination channels. Due to privacy and confidentiality considerations, detailed organizational staffing records are not publicly accessible.

Author Contributions

AM: Conceptualization, Methodology, Data curation, Formal analysis, Writing – original draft, Writing – review & editing, Project administration. GA: Supervision, Validation, Methodology, Writing – review & editing. Both authors read and approved the final manuscript.

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