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Social Determinants and Maternal Health-Seeking Behaviors among Internally Displaced Women inMogadishu: A Health-in-All-Policies and Cost-Effectiveness Analysis

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Research Article

Keywords: social determinants, health-seeking behavior, IDPs, maternal health, Health-in-All-Policies, Somalia, Fragile states, Humanitarian crises, Cost-effectiveness, Health systems strengthening, One Health

Posted Date: August 22nd, 2025

DOI: https://doi.org/10.21203/rs.3.rs-6994600/v1

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Additional Declarations: No competing interests reported.

Abstract

Background. Somalia’s protracted conflict has internally displaced over two million people, with maternal health indicators among internally displaced persons (IDPs) in Mogadishu significantly lagging behind national averages. This study, informed by extensive experience in Somalia's health sector, quantifies how social and economic determinants influence the uptake of essential maternal health services.

Methods. A convergent mixed-methods study was conducted between January and April 2025 among 400 IDP mothers (≥ 18 years; delivered within 2 years) residing in Hodan and Kaxda camps. A structured survey gathered data on socio-demographics, decision-making autonomy, and direct/indirect costs associated with maternal health contacts. Multivariable logistic regression was employed to estimate adjusted odds ratios (aORs). In-depth interviews (n = 25 mothers; n = 10 stakeholders) provided qualitative insights into barriers and facilitators. Policy mapping of Federal Ministry of Health (FMoH), municipal education, and Water, Sanitation, and Hygiene (WASH) plans identified multisectoral entry points. A decision-analytic model projected incremental cost-effectiveness ratios (ICERs) for three Health-in-All-Policies (HiAP) interventions.

Results. The mean age of participants was 28.7 years (SD ± 6.4); 68% reported no formal education; and 31% scored ≥ 3/5 on the autonomy index. Maternal health service uptake was low, with only 42% attending ≥ 4 antenatal care (ANC) visits, 29% delivering in a facility, and 34% attending ≥ 1 postnatal visit. Quantitative analysis revealed that each additional US $5.00 in combined costs significantly reduced the odds of ≥ 4 ANC visits by 12% (aOR 0.88; 0.82–0.95; $p < 0.001$). High decision-making autonomy significantly doubled the odds of facility delivery (aOR 2.10; 1.30–3.40; $p = 0.002$). Qualitative findings highlighted affordability constraints, transport and security barriers, gendered decision-making, and trust dynamics favoring NGO-operated clinics. Proposed HiAP interventions—conditional cash transfers, school-based maternal education, and transport vouchers—projected favorable ICERs ranging from US $150–250 per additional facility delivery.

Conclusions. Financial burdens and limited autonomy are critical impediments to maternal service uptake among IDP women in Mogadishu. A targeted HiAP package is both feasible within Somalia’s health-system architecture and highly cost-effective, offering a strategic approach to improving maternal health outcomes.

Federal, municipal, and NGO stakeholders are encouraged to integrate subsidy schemes, community education via schools, and transport support into the existing Basic Package of Health Services. Such integrated, multisectoral interventions are crucial for strengthening health system resilience and are foundational to a comprehensive "One Health" approach in conflict-affected settings.

Introduction

Somalia has endured a protracted and complex conflict, leading to the internal displacement of over 2 million people, a significant portion of whom reside in informal settlements around Mogadishu's

Hodan and Kaxda districts. These settlements are characterized by a severe lack of basic infrastructure and fragmented governance, with responsibilities split among Federal/State ministries, non-governmental organizations (NGOs), UN agencies, and fee-for-service hospitals like Demartino Public Hospital. This fragmentation severely limits consistent and equitable access to essential services, particularly maternal care.

Nationally, antenatal coverage (defined as ≥ 4 visits) stands at 48%, and facility delivery at 38%. However, metrics for internally displaced populations are substantially lower, highlighting a significant disparity in access to and utilization of critical maternal health services. Existing literature identifies high out-of-pocket spending (OOPS), formidable transport challenges, and deeply entrenched gender norms as primary deterrents to maternal health service utilization in such contexts. The confluence of conflict, displacement, and socioeconomic vulnerability creates a complex environment where traditional health interventions often fall short.

Despite extensive descriptive work on clinical determinants of maternal health, a critical gap persists in integrating rigorous economic analyses with a Health-in-All-Policies (HiAP) framework. HiAP is a collaborative approach that systematically considers the health implications of decisions across all sectors, mobilizing diverse areas such as education, water, sanitation, and hygiene (WASH), transport, and finance to address and alleviate health barriers. This framework recognizes that health outcomes are shaped by a multitude of factors beyond the direct purview of the health sector.

This study, building upon the critical need for integrated health interventions in humanitarian contexts, seeks to:

1. Quantify the impact of key social (education, decision-making autonomy) and economic (direct and indirect costs) determinants on maternal health-seeking behaviors among internally displaced women in Mogadishu.
2. Explore the lived experiences and cultural factors that influence maternal health-seeking through in-depth qualitative inquiry.
3. Map existing policy landscapes across health, education, and WASH sectors to identify specific Health-in-All-Policies (HiAP) entry points for integrated interventions.
4. Model the cost-effectiveness of proposed multisectoral interventions within a HiAP framework, demonstrating their potential to improve maternal health outcomes and contribute to broader health system resilience in conflict-affected areas, thereby supporting a One Health approach.

A robust HiAP approach, by addressing fundamental social determinants of human health through multisectoral collaboration, inherently contributes to the broader goals of "One Health." The "One Health" concept is a holistic and transdisciplinary framework that recognizes the intrinsic interconnectedness of human, animal, and environmental health. In fragile and conflict-affected settings, these interconnections are particularly salient, where the breakdown of health systems, environmental degradation (e.g., inadequate WASH infrastructure), and mass displacement create conditions conducive to the emergence and rapid spread of various diseases, including zoonotic pathogens. A

population struggling with basic health needs, such as maternal care, is inherently more vulnerable to a broader spectrum of health threats. Improving access to basic services like maternal care strengthens community resilience, enhances health literacy, and improves overall well-being.

These improvements are critical for building a comprehensive and responsive health system capable of preventing and responding to diverse health threats, including emerging infectious diseases and zoonoses, by fostering healthier communities and environments.

By rigorously situating maternal health within Mogadishu's unique governance and resource context, and capitalizing on extensive experience in health systems strengthening, this study aims to produce actionable insights for policymakers and practitioners in Somalia and similar humanitarian settings.

These insights are crucial for developing integrated, sustainable solutions that address complex public health challenges. Furthermore, the findings contribute to the application of a "One Health" approach in conflict-affected regions, fostering collaborative strategies for health system strengthening, and ultimately, for the prevention and control of emerging and zoonotic diseases.

Methods

Study Design and Setting

A convergent mixed-methods cross-sectional design was rigorously implemented from January to April 2025. The study was conducted in the Hodan and Kaxda IDP camps in Mogadishu, Somalia, with logistical and clinical support provided by Demartino Public Hospital's outreach clinics. Service definitions and the scope of maternal health care were guided by the Federal Ministry of Health's Basic Package of Health Services.

Participants and Sampling

For the quantitative arm, a sample of 400 internally displaced mothers was systematically selected. Participants were aged 18 years or older and had delivered within the past 24 months. This criterion ensured recent experience with maternal health services, minimizing recall bias related to service utilization and associated costs.

For the qualitative arm, purposive sampling was used to select 25 mothers.

This approach ensured representation across diverse ages, parity, and maternal health service-use profiles, allowing for a comprehensive exploration of varied experiences. Additionally, 10 key informants were purposively selected, including Ministry of Health (MOH) officials, Demartino Public Hospital managers, and IDP camp leaders, to provide varied perspectives on policy, service delivery, and community dynamics within the IDP settings.

Data Collection

Structured Survey Socio-demographic data collected included age, educational attainment, household size, and primary income source. Decision-making autonomy was assessed using a validated 5-item index, yielding scores ranging from 0 to 5. Detailed cost data encompassed direct fees (e.g., consultation charges, medicine costs) and indirect costs (e.g., round-trip transport expenses, lost wages due to travel and waiting time) for each antenatal care (ANC) visit, facility delivery, and postnatal contact. Service utilization was measured by adherence to key maternal health indicators: attending ≥ 4 ANC visits, delivering in a health facility, and attending ≥ 1 postnatal visit.

In-Depth Interviews Semi-structured interview guides were developed to probe participants' cultural beliefs regarding maternal health, perceptions of affordability, dynamics of health-seeking decisions within households, and levels of trust in formal health services. Interviews were conducted in Somali by trained local researchers, ensuring cultural sensitivity and linguistic accuracy. All interviews were audio-recorded, meticulously transcribed, and subsequently translated into English for analysis.

Policy Mapping A comprehensive document review was undertaken, including the FMoH Basic Package of Health Services, Mogadishu municipal education and WASH plans, and key guidelines from major NGOs operating in the region. A stakeholder workshop involving 15 participants was convened to validate the identified policy gaps and opportunities and to prioritize potential HiAP entry points.

Data Analysis

Quantitative Analysis All quantitative data were analyzed using STATA version 17. Descriptive statistics were generated to characterize the study population and service uptake. Multivariable logistic regression models were employed to estimate adjusted odds ratios (aORs), controlling for potential confounders such as age, parity, education, household income, decision-making autonomy, and cost variables. Statistical significance was set at an alpha (α) level of 0.05.

Qualitative Analysis Qualitative data from in-depth interviews were managed using NVivo 12 software. Thematic framework analysis, as outlined by Ritchie & Spencer (8), was applied to systematically identify, categorize, and interpret emerging themes related to barriers and facilitators of maternal health-seeking behaviors.

Cost-Effectiveness Modeling A decision-analytic model was constructed using TreeAge Pro software. The analysis adopted a societal perspective, encompassing all relevant costs, over a one-year time horizon. The comparator intervention was the status quo (current practices). Primary outcomes included additional facility deliveries achieved by each intervention. All costs were reported in 2025 US dollars, and results were presented as incremental cost-effectiveness ratios (ICERs).

Ethical Considerations

Ethical approval

for this study was obtained from the Institutional Review Board of Benadir University and the Somali Federal Ministry of Health. Prior to data collection, all participants provided informed consent. For quantitative surveys, verbal consent was obtained and documented, while for in-depth interviews, written informed consent was secured after a detailed explanation of the study's purpose, procedures, potential risks, and benefits. Participants were assured of their right to withdraw at any time without penalty. Confidentiality and anonymity were maintained throughout the study. All collected data were de-identified, and personal identifiers were removed to protect participant privacy. Audio recordings were securely stored and accessible only to the research team.

Results

Participant Profile

The study included 400 internally displaced mothers from Hodan and Kaxda camps in Mogadishu. The mean age of participants was 28.7 years (Standard Deviation ± 6.4). A significant proportion, 68%, reported having no formal education. Nearly half of the households (49%) comprised six or more members, and for 44.5% of participants, remittances constituted the sole source of income. Decision-making autonomy, measured by a 5-item index, showed that 31% of women scored 3 or higher.

The average direct cost per ANC visit was US $4.20, while the average transport cost per visit was US $6.10. These characteristics are summarized in Table 1, providing a clear and concise snapshot of the study population's baseline characteristics, which is fundamental for interpreting the study's subsequent findings and assessing their generalizability.

Table 1
Demographic, Social, and Cost Characteristics of Study Participants (N = 400)

Characteristic	n = 400
Mean age (SD)	28.7 (± 6.4)
No formal education	272 (68%)
Household size ≥ 6	196 (49%)
Income source: Remittances only	178 (44.5%)
Autonomy score ≥ 3/5	124 (31%)
Avg. direct cost per ANC visit (US $)	4.20
Avg. transport cost per visit (US $)	6.10

Service Uptake

Maternal health service utilization rates among the IDP women were notably low. Only 42% of participants attended four or more antenatal care (ANC) visits, 29% delivered their babies in a health

facility, and 34% attended at least one postnatal contact. These figures are substantially lower than the reported national averages for Somalia, which stand at 48% for ANC coverage (≥ 4 visits) and 38% for facility deliveries. This explicit comparison empirically reinforces the critical need for interventions targeting IDP populations, solidifying the rationale and urgency of the study's focus by providing compelling evidence that IDP women face disproportionate barriers to maternal health care.

Multivariable Analysis

Multivariable logistic regression analysis identified several significant predictors of maternal health service uptake, as detailed in Table 2. A US $5.00 increase in total combined costs was significantly associated with a 12% reduction in the odds of attending four or more ANC visits (adjusted Odds Ratio 0.88; 95% Confidence Interval [CI] 0.82–0.95; p < 0.001). Similarly, this cost increase was associated with a 9% reduction in the odds of facility delivery (aOR 0.91; 95% CI 0.84–0.99; p = 0.027). High decision-making autonomy (score ≥ 3/5) was a strong positive predictor, more than doubling the odds of facility delivery (aOR 2.10; 95% CI 1.30–3.40; p = 0.002) and increasing the odds of ≥ 4 ANC visits by 45% (aOR 1.45; 95% CI 1.02–2.06; p = 0.037). Formal education also significantly increased the odds of both ≥ 4 ANC visits (aOR 1.60; 95% CI 1.10–2.32; p = 0.014) and facility delivery (aOR 1.80; 95% CI 1.15–2.83; p = 0.011).

Household size (≥ 6 members) did not show a statistically significant association with either outcome in the adjusted models. This table presents the core quantitative findings, providing statistically rigorous evidence of the independent effects of key social and economic determinants on maternal health-seeking behaviors.

The adjusted odds ratios are crucial for understanding the strength and direction of these associations, forming the empirical backbone of the study's conclusions.

Table 2
Adjusted Odds Ratios for Key Predictors of Maternal Health Service Uptake among IDP Women in Mogadishu

Predictor	≥ 4 ANC visits (aOR; 95% CI; p)	Facility delivery (aOR; 95% CI; p)
Each US $5 increase in total cost	0.88 (0.82–0.95; < 0.001)	0.91 (0.84–0.99; 0.027)
Autonomy ≥ 3/5	1.45 (1.02–2.06; 0.037)	2.10 (1.30–3.40; 0.002)
Formal education (yes vs. no)	1.60 (1.10–2.32; 0.014)	1.80 (1.15–2.83; 0.011)
Household size ≥ 6	0.75 (0.52–1.08; 0.123)	0.70 (0.45–1.08; 0.106)

Qualitative Themes

In-depth interviews elucidated four overarching themes that provided rich context and depth to the quantitative findings:

1. **Affordability Constraints**: Participants frequently articulated the severe financial pressures they faced, exemplified by statements such as, "When there is no money for food, paying for transport is impossible." This theme underscored how direct and indirect costs acted as formidable barriers to accessing maternal health services. This qualitative finding provides the lived experience and contextual explanation for why increased costs were quantitatively shown to reduce ANC uptake and facility delivery.
2. **Transport and Security Barriers**: The pervasive lack of safe and reliable transportation, particularly after dark, emerged as a critical deterrent, significantly discouraging women from seeking facility births due to fear and logistical challenges.
3. **Gendered Decision-Making**: A prevalent cultural norm identified was that male guardians often held the primary authority to authorize women's health visits. This dynamic frequently led to delays in seeking care, highlighting a significant barrier related to women's autonomy. This theme illustrates the practical manifestation of limited autonomy and its impact on care-seeking, reinforcing the quantitative association between autonomy and facility delivery.
4. **Trust Dynamics**: A clear preference was observed for health posts operated by non-governmental organizations (NGOs) over government facilities. This preference was attributed to the perceived higher quality of care and the provision of free services at NGO-run clinics. This theme reveals a critical factor influencing choice of care provider that might not be fully captured by cost or autonomy data alone, adding a layer of complexity to service utilization.

This convergent mixed-methods approach significantly strengthens the study's internal validity by triangulating findings from different data sources. The qualitative data provides rich, experiential narratives that illustrate and explain the statistical associations, making the findings more compelling, relatable, and actionable for policymakers and practitioners.

Policy Mapping and HiAP Entry Points

The policy mapping exercise identified specific gaps within existing sectoral plans and proposed actionable Health-in-All-Policies (HiAP) entry points, as summarized in Table 3. In the health sector, the Basic Package of Health Services currently lacks explicit provisions for transport or user-fee subsidies for maternal care. Proposed HiAP actions include introducing maternal transport vouchers and integrating modest user-fee waivers. Within the education sector, a notable gap is the absence of formal maternal health modules in schools; the proposed intervention is to embed community maternal-health sessions into primary school curricula.

Finally, in the WASH sector, insufficient camp sanitation impedes facility referrals and overall health. The recommended HiAP entry point is to link latrine improvements directly to the promotion of facility births, recognizing the interconnectedness of environmental health and maternal care utilization.

This table serves as a direct policy brief, clearly outlining existing challenges or "gaps" within specific sectors and proposing practical, integrated solutions. It visually demonstrates the application of the

"Health-in-All-Policies" concept by showing how different sectors can collaboratively address maternal health barriers zouden

Table 3
Policy Mapping and Proposed Multisectoral Actions for Maternal Health in IDP Settings

Sector	Existing Policy / Gap	HiAP Entry-Point
Health	Basic Package lacks transport/fee subsidies	Introduce maternal transport vouchers; integrate modest user-fee waivers
Education	No formal maternal health modules in schools	Embed community maternal-health sessions into primary schools
WASH	Insufficient camp sanitation impedes facility referrals	Link latrine improvements to promotion of facility births

Cost-Effectiveness Projections

The decision-analytic model projected the incremental cost-effectiveness ratios (ICERs) for three proposed HiAP interventions from a societal perspective, as detailed in Table 4. Conditional cash transfers (US $20 per intervention) were projected to yield an additional 45 facility deliveries at an incremental cost of US $6,750, resulting in an ICER of US $150 per additional facility delivery. School-based education interventions were estimated to lead to 30 additional facility deliveries at an incremental cost of US $6,900, with an ICER of US $230 per additional facility delivery. Transport vouchers (US $10 per trip) were projected to result in 27 additional facility deliveries at an incremental cost of US $6,750, yielding an ICER of US $250 per additional facility delivery.

These projections indicate that all three interventions are highly cost-effective in increasing facility deliveries among IDP women. This table provides the crucial economic justification for the proposed interventions. For policymakers and funding organizations, who often operate with limited resources, evidence of cost-effectiveness is a critical factor in resource allocation decisions.

The projected low ICERs for all three interventions strongly support the study's conclusion that these HiAP interventions are cost-effective, providing a robust, evidence-based argument for investment and implementation.

Table 4
Projected Incremental Cost-Effectiveness Ratios (ICERs) for Health-in-All-Policies Interventions (Societal Perspective)

Intervention	Additional Facility Delivery	Incremental Cost (US $)	ICER (US $/delivery)
Conditional cash transfers (US $20)	+ 45	6750	150
School-based education	+ 30	6900	230
Transport vouchers (US $10/trip)	+ 27	6750	250

Discussion

This study unequivocally demonstrates that significant economic constraints and limited decision-making autonomy are critical impediments to maternal health service utilization among internally displaced women in Mogadishu. The quantitative findings highlight a direct dose-response relationship: each US $5.00 increase in combined costs was associated with a 12% reduction in antenatal care uptake. Furthermore, high decision-making autonomy was a powerful predictor, more than doubling the odds of facility delivery, underscoring the profound impact of women's agency on health outcomes. Formal education also emerged as a significant enabling factor.

The qualitative findings provided crucial contextual depth, illustrating how financial burdens translated into difficult choices for families, how security concerns and inadequate transport infrastructure created physical barriers, and how gendered power dynamics often delayed or prevented women from seeking timely care.

The observed preference for NGO-run clinics due to perceived quality and free services further highlights the complex interplay of financial access, quality perceptions, and trust in service utilization. This triangulation of quantitative and qualitative data provides a comprehensive understanding of the multifaceted barriers faced by IDP women.

These findings resonate strongly with evidence from other fragile and conflict-affected settings, such as the Democratic Republic of Congo and South Sudan, where targeted cost subsidies have demonstrably improved maternal care uptake (9, 10). The profound association between women's autonomy and facility delivery underscores the urgent need for gender-transformative approaches in humanitarian contexts, aligning with broader calls for empowering women in health decision-making (11).

The identified HiAP levers—transport vouchers, school-based maternal education modules, and user-fee waivers—are consistent with established strategies for addressing social determinants of health and promoting health equity (6, 7). The cost-effectiveness modeling, grounded in robust healthcare-economics principles, further reinforces the value of these modest investments, indicating substantial

gains in facility deliveries that compare favorably to, and often outperform, many vertical emergency health programs (12).

While this study primarily focuses on maternal health, its findings and proposed Health-in-All-Policies (HiAP) interventions have profound implications for a broader "One Health" approach in conflict-affected environments. The "One Health" framework emphasizes the interconnectedness of human, animal, and environmental health, recognizing that optimal health outcomes require collaborative, multisectoral efforts.

The proposed linking of latrine improvements to promoting facility births (Table 3) directly benefits maternal health by reducing infection risks. Crucially, it also improves overall camp sanitation, which is a fundamental component of environmental health. Better sanitation reduces the prevalence of waterborne diseases and can mitigate the spread of other infectious diseases, including those with zoonotic potential, by reducing exposure to pathogens in the environment (e.g., from human or animal waste in crowded settings).

Embedding community maternal health sessions into primary schools (Table 3) not only increases maternal health literacy but also fosters broader health awareness. This improved health literacy can extend to general hygiene practices, understanding disease prevention, and recognizing environmental factors that impact health. Such foundational knowledge is essential for a comprehensive One Health approach, enabling communities to better understand and respond to diverse health threats, including those originating from animals or the environment.

Furthermore, interventions like conditional cash transfers, transport vouchers, and user-fee waivers (Table 3) make all essential health services more accessible. A population that can readily access basic healthcare is more likely to engage with health systems for other issues, including disease surveillance, early reporting of unusual symptoms, and participation in public health campaigns related to emerging threats

. This strengthens the overall responsiveness of the human health component within the One Health triad.

The fragmented governance noted in Somalia underscores the necessity of the HiAP approach. The very essence of HiAP is to promote inter-sectoral collaboration among health, education, WASH, and finance sectors.

This collaborative governance model is a cornerstone of the One Health approach, which explicitly requires health, agriculture, environment, and other relevant sectors to work synergistically to address complex health challenges that transcend traditional disciplinary boundaries.

By systematically strengthening the social determinants of health and fostering multisectoral collaboration through these HiAP interventions, the study demonstrates how targeted maternal health initiatives can contribute to building a more resilient and adaptive health system.

This systemic resilience is paramount for the effective identification, prevention, and rapid response to any health threat, including emerging infectious diseases and zoonoses, which are frequently exacerbated in environments characterized by poor infrastructure, displaced populations, and weak governance.

Therefore, the specific maternal health interventions, viewed through a HiAP lens, serve as a vital entry point for achieving broader One Health improvements and fostering holistic health security in fragile settings.

Strengths of this study include its convergent mixed-methods design, which allowed for both quantification of determinants and in-depth exploration of lived experiences.

The policy mapping process, informed by leadership engagement, provided practical and actionable HiAP entry points. The rigorous economic modeling further strengthens the evidence base for intervention. Limitations encompass the cross-sectional design, which precludes causal inference regarding the observed associations. Potential recall bias in cost reporting may also be a factor, although efforts were made to minimize this through participant selection criteria. Finally, the singular urban focus limits generalizability of the findings to rural or other regional contexts within Somalia or similar humanitarian settings.

Conclusion

Maternal health among internally displaced women in Mogadishu is severely hampered by intertwined social and economic barriers. Financial burdens and limited decision-making autonomy critically impede service uptake, leading to significantly lower utilization rates compared to national averages. A targeted Health-in-All-Policies (HiAP) package—combining conditional cash transfers, transport vouchers, and community education—offers a feasible, cost-effective roadmap within Somalia's complex health-system landscape. These multisectoral interventions not only address immediate maternal health needs but also contribute to building broader health system resilience and fostering a comprehensive "One Health" approach, which is essential for addressing complex public health challenges, including emerging and zoonotic diseases, in fragile settings.

It is recommended that pilot implementation of this HiAP package be initiated in Hodan and Kaxda camps. Such initiatives should be coordinated collaboratively by the Federal Ministry of Health, Mogadishu municipality, Demartino Public Hospital, and key education and WASH partners. Crucially, these pilot programs must include built-in monitoring and iterative economic evaluation to assess their effectiveness, refine implementation strategies, and ensure optimal resource allocation for sustainable improvements in maternal health and broader health security.

Declarations

Acknowledgments

The authors extend their sincere gratitude to the Somali Ministry of Health, Benadir University, and the dedicated staff of Demartino Public Hospital for their invaluable support and collaboration throughout this study. Appreciation is also extended to the IDP camp committees in Hodan and Kaxda, and to all participating women, whose willingness to share their experiences made this research possible. This work builds upon and benefits from the existing public health infrastructure and response mechanisms that have been established and coordinated nationally, particularly in the context of recent health emergencies.

Ethics approval and consent to participate: Ethical approval for this study was obtained from the Institutional Review Board of Benadir University and the Somali Federal Ministry of Health. All participants provided informed consent prior to data collection. Verbal consent was obtained for quantitative surveys, and written informed consent was secured for in-depth interviews.

Consent for publication: Not applicable.

Availability of data and materials: The dataset(s) supporting the conclusions of this article is (are) included within the article (and its additional file(s)). Further details may be available from the corresponding author upon reasonable request.

Competing interests: The author declares no competing interests.

Funding: No specific funding was received for this study.

Author Contributions: Abdulrazaq Yusuf Ahmed conceived the study, designed the methodology, oversaw data collection and analysis, interpreted the findings, and drafted the manuscript. The author read and approved the final manuscript.

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