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Emergency preparedness capacity and associated factors among health facilities in Somalia: evidence from the 2022–2023 national harmonized health facility assessment and implications for health-system strengthening

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Background: Emergency preparedness is essential for resilient health systems, particularly in fragile and conflict-affected settings where health facilities face recurrent outbreaks, conflicts, natural disasters, and other shocks.

Methods: A cross-sectional secondary analysis was conducted from 10 to 31 August 2026 using data from the 2022–2023 national Harmonized Health Facility Assessment (HHFA) to assess emergency preparedness capacity and associated factors among health facilities across Somalia. Emergency preparedness capacity was measured using a composite binary indicator based on key preparedness mechanisms, including emergency planning, response arrangements, emergency training/drills, and surge staffing strategies. Descriptive statistics and binary logistic regression were used to summarize preparedness indicators and identify associated factors.

Results: Among 1,214 facilities with available emergency preparedness information, 142 (11.7%) met the criteria for emergency preparedness capacity. Major gaps were observed in emergency planning, training and drills, surge staffing strategies, and other preparedness mechanisms. In multivariable analysis, state and facility type remained independently associated with preparedness capacity. Compared with health centers/primary health units/TB centers, hospital, referral, and specialty facilities had higher adjusted odds of preparedness capacity. Compared with Banadir, facilities in Galmudug and Puntland had lower adjusted odds, while Hirshabelle had higher adjusted odds.
Conclusion: Emergency preparedness capacity among health facilities in Somalia remains limited and unevenly distributed. Strengthening preparedness, particularly in primary health care facilities and underserved regions, through planning, workforce training, simulation exercises, supportive supervision, and routine monitoring is essential to improve health-system resilience.

KEYWORDS
emergency preparedness, harmonized health facility assessment, health systems strengthening, health-system resilience, Somalia

Introduction

Health emergencies, including infectious disease outbreaks, conflicts, natural disasters, and climate-related events, continue to challenge health systems worldwide by disrupting essential services and increasing demands for rapid response capacity (1). Health-system resilience requires the ability of health systems to anticipate, absorb, adapt to, and recover from shocks while maintaining essential health services and protecting population health (1, 2). At the facility level, emergency preparedness depends on the availability of core capacities, including preparedness plans, trained personnel, response mechanisms, surge capacity, and effective coordination structures (2, 3).

The Federal Republic of Somalia is situated in the Horn of Africa, bordered by the Indian Ocean to the east, the Gulf of Aden to the north, Djibouti to the northwest, Ethiopia to the west, and Kenya to the southwest (4). Somalia represents one of the world's most fragile health-system environments, affected by decades of conflict, recurrent humanitarian emergencies, climate-related shocks, and population displacement (5–8). These recurrent emergencies place substantial pressure on health facilities to maintain essential health services while responding to outbreaks, conflict-related crises, and climate-related disasters, further challenging emergency preparedness and health-system resilience in Somalia (9).

These challenges are particularly pronounced in fragile and conflict-affected settings, where prolonged insecurity, humanitarian crises, population displacement, and limited health-system resources constrain the ability of health systems to absorb shocks, maintain essential services, and adapt to changing emergency conditions (9, 10).

In such contexts, health facilities frequently face constraints in infrastructure, workforce capacity, emergency planning, and operational readiness, which can undermine their ability to maintain essential health services during crises (9, 10). Strengthening facility-level preparedness has therefore become a critical component of building resilient health systems, particularly in countries exposed to recurrent emergencies and humanitarian shocks (1, 2).

The Harmonized Health Facility Assessment (HHFA) provides a standardized approach for generating facility-level evidence on service availability, readiness, infrastructure, management practices, and health-system capacities (11). The Somalia Harmonized Health Facility Assessment (HHFA) 2022–2023 was implemented using standardized facility assessment methods across public and private health facilities and collected information through facility interviews and observations to assess availability, readiness, and management-related capacities (12).

Previous national assessments in Somalia have generated important evidence on health facility readiness, accreditation, infrastructure-related capacity, and health-system performance using facility-level data (8, 13–15). However, comprehensive evidence describing emergency preparedness capacity and associated facility-level factors remains limited. Existing evidence has not sufficiently examined the extent of preparedness mechanisms across different geographic areas, facility levels, management arrangements, and ownership categories. To address this evidence gap, this study aimed to assess emergency preparedness capacity and identify associated factors among health facilities in Somalia using data from the most recent National Harmonized Health Facility Assessment. Specifically, the study aimed to examine (i) the overall level of emergency preparedness capacity among health facilities; (ii) availability of key preparedness mechanisms, including emergency planning, response arrangements, training, and surge capacity; (iii) variation in preparedness capacity by state, facility type, management arrangement, and ownership; and (iv) facility-level factors associated with emergency preparedness capacity.

Materials and methods

Study design, setting, period and data source

The 2022–2023 Somalia Harmonized Health Facility Assessment (HHFA) covered five Federal Member States—Puntland, Jubaland,

South West State, Hirshabelle, and Galmudug—together with Banadir Region, including the capital city, Mogadishu. Somaliland was the only state not included in the assessment, as it has operated as a self-declared independent entity since 1991.

We conducted a secondary cross-sectional analysis of data collected for the Somalia Harmonized Health Facility Assessment (HHFA) in 2022–2023. The secondary analysis took place from 10 to 31 August 2026, and no new data were collected. The HHFA was implemented by the Federal Ministry of Health and Human Services of Somalia with technical support from the World Health Organization and other partners.

The HHFA was conducted as a national facility-based assessment of operational public and private health facilities across Somalia. The health facility was the unit of analysis. Data were collected through standardized facility assessment instruments, interviews with knowledgeable facility respondents, and direct observation of relevant facility conditions, resources, and preparedness-related capacities, as applicable to the respective HHFA modules (16).

The analytical dataset included 1,215 assessed health facilities. Facilities with missing information for the primary emergency preparedness outcome were excluded from analyses assessing overall preparedness capacity and associated factors. Secondary preparedness indicators were analyzed using available valid observations, with variable-specific denominators applied where questionnaire routing or missing responses resulted in fewer observations. As the HHFA was a national facility-based assessment rather than a probability sample, no formal sample-size calculation or sampling weights were applied.

Study variables and operational definitions

Primary outcome

The primary outcome was facility-level emergency preparedness capacity, defined as a binary composite based on nine HHFA components: (1) a written disaster/facility safety plan, (2) a written fire safety plan, (3) an outbreak emergency response plan, (4) another emergency response plan, (5) natural disaster preparedness, (6) conflict-related preparedness, (7) mass casualty preparedness, (8) emergency training or drills, and (9) a surge staffing strategy. Each available component contributed one point, giving a total score from 0 to 9. Facilities with at least three available components were classified as prepared; those with fewer than three were classified as not prepared. We selected the ≥3 threshold as a pragmatic criterion for requiring preparedness mechanisms in multiple domains rather than relying on only one or two components; this threshold has not been externally validated. All nine components were weighted equally (Supplementary Table S1).

Climate and conflict-related preparedness indicators

Preparedness for climate-related and conflict-associated emergencies was assessed using facility responses related to potential emergency scenarios and response arrangements.

These indicators included preparedness capacity for different emergency situations relevant to Somalia's health-system context, including disasters, outbreaks, conflict-related events, and other major emergencies.

Emergency response and surge capacity indicators

Emergency response capacity was assessed using indicators related to workforce preparedness, emergency training, drills, and mechanisms for adapting service delivery during emergencies.

These indicators included availability of staff preparedness activities, emergency-related training, and facility strategies for responding to increased service demands during crises.

Explanatory variables

The explanatory variables considered in regression analyses were facility characteristics available in the HHFA dataset, including: state, facility type, management arrangement and ownership.

Facility type was categorized according to HHFA classifications, including hospitals/specialty facilities, health centers, primary health units, and private clinics where applicable.

Management arrangement was categorized as government (Ministry of Health), NGO, private for-profit, other, and community management arrangements. Ownership was categorized as government, private for-profit, community, and NGO ownership.

These variables were selected because facility organizational characteristics may influence emergency preparedness capacity and health-system resilience.

Data management and quality assurance

The dataset was reviewed before analysis for completeness, coding consistency, missing values, duplicate records, and internal consistency. Direct facility identifiers and variables not required for the study objectives were excluded from the analytical dataset.

Questionnaire routing was preserved during data preparation, and structurally skipped responses were not recoded as negative responses. Missing values were retained as missing, and no statistical imputation was performed. Analyses were conducted using available valid observations, with variable-specific denominators reported where applicable. The emergency preparedness capacity variable was derived from the HHFA preparedness components using the predefined threshold of ≥3 available components

Data processing and analysis

The secondary data used in this study were obtained from the Somalia HHFA Analysis Platform (https://somalia-platform.netlify.app). The dataset was cleaned and prepared using

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Microsoft Excel version 16 to assess completeness, consistency, and accuracy. Following data quality checks and finalization, the cleaned dataset was imported into statistical software for analysis. Categorical variables were summarized using frequencies and percentages. Emergency preparedness indicators were summarized using valid observations and variable-specific denominators. Facility-level emergency preparedness capacity was described overall and according to facility characteristics, including state, facility type, management arrangement, and ownership.

Binary logistic regression was used to assess facility-level factors associated with emergency preparedness capacity. Bivariable analyses generated crude odds ratios (CORs) with 95% confidence intervals (CIs). Variables with a bivariable p-value <0.25 were considered for inclusion in the multivariable model. Adjusted odds ratios (AORs) with 95% CIs were reported, and a two-sided p-value <0.05 was considered statistically significant. Multicollinearity was assessed using variance inflation factors (VIFs) and tolerance values. Management arrangement was retained as the primary governance variable, while ownership was assessed in a sensitivity analysis because of its conceptual overlap with management arrangement and sparse categories. Model diagnostics and sensitivity-analysis results are presented in (Supplementary Table S2).

Results

Characteristics of health facilities included in the analysis

A total of 1,215 health facilities were available in the analytical dataset and included in the description of facility characteristics. Emergency preparedness indicators and analyses involving the preparedness outcome were restricted to the 1,214 facilities with available emergency preparedness information. Facilities were distributed across the Federal Member States and Banadir Region, with Puntland contributing the largest proportion, followed by South West and Banadir. Most facilities were health centers, followed by primary health units and private clinics, while hospital, referral, and specialty facilities represented a smaller proportion. The majority of facilities were government-managed and government-owned, followed by NGO-managed and private for-profit facilities. Only a small proportion of facilities were managed by community organizations or classified as having 'other' management; NGO-owned facilities were also uncommon. Overall, the assessed facilities were predominantly government-managed, government-owned, and primary healthcare-level facilities (Table 1).

TABLE 1 Characteristics of health facilities included in the analysis.

Variable	Category	Frequency (n)	Percentage (%)
State	Puntland	316	26.0
	South West	270	22.2
	Banadir	205	16.9
	Jubaland	160	13.2
	Galmudug	146	12.0
	Hirshabelle	118	9.7
Facility type	Health center	606	49.9
	Primary health unit	231	19.0
	Private clinic	200	16.5
	District hospital	71	5.8
	Specialty hospital	56	4.6
	TB center	23	1.9
	Regional hospital	16	1.3
	National referral hospital	8	0.7
	State referral hospital	2	0.2
	Hospital	1	0.1
	Mental health hospital	1	0.1
Management arrangement	Government (MoH) management	642	52.8
	NGO management	307	25.3
	Private for-profit management	255	21.0
	Other management	10	0.8
	Community management	1	0.1
Ownership	Government (MoH) ownership	887	73.0
	Private for-profit ownership	251	20.7
	Community ownership	74	6.1
	NGO ownership	3	0.2

Emergency preparedness capacity and related preparedness indicators among health facilities

Among the 1,214 facilities with available emergency preparedness information, only a small proportion met the criteria for emergency preparedness capacity, while the majority were classified as not prepared. Availability of individual preparedness components varied across indicators. Written disaster or facility safety plans were limited, whereas fire safety plans and outbreak emergency response plans were more commonly available. Preparedness for specific emergency scenarios, including natural disasters, conflict-related events, and mass casualty incidents, showed moderate availability. However, emergency training and drills and surge staffing strategies

remained limited. Overall, substantial gaps were observed in facility-level emergency preparedness capacity and supporting preparedness mechanisms across assessed health facilities (Table 2).

Emergency preparedness capacity by state and facility characteristics

Emergency preparedness capacity varied across geographic location and facility characteristics. At the state level, the proportion of facilities classified as prepared was highest in Hirshabelle and Banadir, followed by South West, while lower proportions were observed in Galmudug, Jubaland, and Puntland. Preparedness capacity also varied by facility type, with hospital, referral, and specialty facilities showing higher proportions of prepared facilities compared with primary healthcare facilities, particularly health centers and primary health units.

By management arrangement, private for-profit managed and other-managed facilities showed higher proportions of prepared facilities compared with government- and NGO-managed facilities, although community-managed facilities represented only one facility. Similarly, privately owned facilities showed a higher proportion of preparedness compared with government-owned facilities, whereas community- and NGO-owned facilities had lower proportions of prepared facilities, although these categories included relatively few facilities (Table 3).

Factors associated with emergency preparedness capacity

Management arrangement was retained as the primary governance variable because it reflects facility operational structure. In the primary model, VIFs ranged from 1.03 to 4.77 and tolerance values from 0.210 to 0.974. When management arrangement and ownership were included together in a diagnostic model, the private-for-profit management and ownership terms had VIFs of 36.50 and 34.31, respectively, and tolerance values of 0.027 and 0.029, indicating substantial overlap. Ownership was therefore excluded from the primary model and assessed in a sensitivity analysis. In the alternative model, the maximum VIF was 4.53 and the minimum tolerance was 0.221. Non-government ownership was not significantly associated with preparedness (AOR 1.05; 95% CI 0.58–1.91; $p = 0.864$) (Supplementary Table S2, Panels B and C).

In bivariable analyses, preparedness capacity varied by state, facility type, and management arrangement. Compared with Banadir, crude odds were lower in Galmudug, Jubaland, and Puntland, while hospital, referral, and specialty facilities had higher crude odds than health centers, primary health units, and TB centers. Private for-profit and other/community-managed facilities also had higher crude odds than government-managed facilities. After adjustment, state and facility type remained significantly associated with preparedness capacity. Compared with Banadir, adjusted odds were significantly lower in Galmudug and Puntland and significantly higher in Hirshabelle. No significant adjusted difference was observed for Jubaland or South West. Hospital, referral, and specialty facilities had higher adjusted odds than health centers, primary health units, and TB centers. Other/community management had higher adjusted odds, but this association was not statistically significant (Table 4).

TABLE 2 Emergency preparedness capacity and related preparedness indicators among health facilities.

Indicator	Category	Frequency (*n*)	Percentage (95% CI)
Overall emergency preparedness capacity	Yes	142	11.7% (10.0–13.6%)
	No	1,072	88.3% (86.4–90.0%)
Written disaster/ facility safety plan	Yes	277	22.8% (20.5–25.3%)
	No	937	77.2% (74.7–79.5%)
Written fire safety plan	Yes	124	65.3% (58.3–71.7%)
	No	66	34.7% (28.3–41.7%)
Outbreak emergency response plan	Yes	110	63.6% (56.2–70.4%)
	No	63	36.4% (29.6–43.8%)
Other emergency response plan	Yes	131	44.9% (39.3–50.6%)
	No	161	55.1% (49.4–60.7%)
Natural disaster preparedness	Yes	75	55.6% (47.1–63.7%)
	No	60	44.4% (36.3–52.9%)
Conflict-related preparedness	Yes	60	45.5% (37.2–54.0%)
	No	72	54.5% (46.0–62.8%)
Mass casualty preparedness	Yes	72	55.0% (46.4–63.2%)
	No	59	45.0% (36.8–53.6%)
Emergency training/drills	Yes	233	19.2% (17.1–21.5%)
	No	982	80.8% (78.5–82.9%)
Surge staffing strategy	Yes	388	32.0% (29.4–34.6%)
	No	826	68.0% (65.4–70.6%)

95% confidence intervals were calculated using the Wilson score method. The denominator for each indicator is the number of facilities with a valid response to that item. Denominators vary because the HHFA questionnaire used item-specific routing and skip patterns, so some follow-up items were not applicable or available for all facilities. For example, denominators were 190 for the written fire safety plan, 173 for the outbreak emergency response plan, 292 for other emergency response plans, 135 for natural disaster preparedness, 132 for conflict-related preparedness, and 131 for mass casualty preparedness. Skipped or not-applicable responses were excluded from the item denominator and were not counted as 'No.'.

Discussion

The limited emergency preparedness capacity identified in this study reflects broader challenges faced by health systems in fragile and conflict-affected settings, where recurrent shocks, constrained resources, and weak institutional capacity can limit the ability of health facilities to anticipate, absorb, and respond to emergencies. Health-system resilience in these settings depends on the capacity of health systems to maintain essential services during disruptions while adapting and transforming in response to changing threats (9). Previous evidence from fragile and conflict-affected settings has highlighted persistent challenges related to governance, health workforce capacity, infrastructure,

TABLE 3 Emergency preparedness capacity by state and facility characteristics among health facilities in Somalia.

Characteristic	Total facilities (*n*)	Prepared facilities (*n*)	Prepared (%) (95% CI)
State			
Banadir	205	37	18.0% (13.4–23.9%)
Galmudug	146	8	5.5% (2.8–10.4%)
Hirshabelle	118	28	23.7% (17.0–32.2%)
Jubaland	160	11	6.9% (3.9–11.9%)
Puntland	316	23	7.3% (4.9–10.7%)
South West	269	35	13.0% (9.5–17.6%)
Facility type			
District hospital	71	13	18.3% (11.0–28.8%)
Health center	605	65	10.7% (8.5–13.5%)
Primary health unit	231	5	2.2% (0.9%–5.0%)
Private clinic	200	31	15.5% (11.1–21.2%)
Specialty hospital	56	18	32.1% (21.4–45.2%)
Regional hospital	16	2	12.5% (3.5–36.0%)
National referral hospital	8	3	37.5% (13.7–69.4%)
State referral hospital	2	2	100.0% (34.2–100.0%)
TB center	23	2	8.7% (2.4–26.8%)
Hospital	1	0	0.0% (0.0–79.3%)
Mental health hospital	1	1	100.0% (20.7–100.0%)
Management arrangement			
Government (MoH) management	642	59	9.2% (7.2–11.7%)
NGO management	306	32	10.5% (7.5–14.4%)
Private for-profit management	255	48	18.8% (14.5–24.1%)
Other management	10	3	30.0% (10.8–60.3%)
Community management	1	0	0.0% (0.0–79.3%)
Ownership			
Government (MoH) ownership	886	88	9.9% (8.1–12.1%)
Private for-profit ownership	251	47	18.7% (14.4–24.0%)
Community ownership	74	7	9.5% (4.7–18.3%)
NGO ownership	3	0	0.0% (0.0–56.1%)

Preparedness percentages were calculated among facilities with available emergency preparedness information. Denominators varied across characteristics because of missing variable-specific information. Wilson score 95% confidence intervals are shown. Percentages for categories with fewer than 10 facilities should be interpreted cautiously because they are based on very small numbers.

supplies, and service delivery systems, which collectively influence emergency readiness and resilience (9, 17). The findings from Somalia demonstrate that the availability of health facilities does not necessarily translate into operational preparedness, as only a small proportion of assessed facilities met the criteria for emergency preparedness capacity.

Facility preparedness should be interpreted as readiness to organize and coordinate a response, rather than as evidence that services will function effectively during an actual emergency. A case study of Albania's COVID-19 response describes adaptation through coordination between pre-hospital and in-hospital emergency medical services, with defined roles and integrated care pathways and a broader role for district and regional hospitals as response needs changed (18). This experience highlights the value of linking facility-level plans, trained staff, referral arrangements, and surge capacity to functioning emergency-service networks.

A key finding of this study was the substantial variation in preparedness capacity according to facility type. Hospital, referral, and specialty facilities demonstrated higher preparedness capacity compared with health centers, primary health units, and other lower-level facilities. This pattern is consistent with evidence from low- and middle-income countries showing that higher-level facilities often have greater access to trained personnel, infrastructure, emergency planning mechanisms, and operational resources compared with primary

TABLE 4 Bivariable and multivariable factors associated with emergency preparedness capacity among health facilities in Somalia.

Variable	Category	Not prepared, *n* (%)	Prepared, *n* (%)	COR (95% CI)	AOR (95% CI)	*p*-value
State	Banadir	168 (82.0)	37 (18.0)	1.00 (Ref)	1.00 (Ref)	—
	Galmudug	138 (94.5)	8 (5.5)	0.26 (0.12–0.58)	0.33 (0.14–0.76)	0.009
	Hirshabelle	90 (76.3)	28 (23.7)	1.41 (0.81–2.46)	1.96 (1.05–3.64)	0.034
	Jubaland	149 (93.1)	11 (6.9)	0.34 (0.17–0.68)	0.47 (0.22–1.01)	0.053
	Puntland	293 (92.7)	23 (7.3)	0.36 (0.20–0.62)	0.51 (0.27–0.94)	0.032
	South West	234 (87.0)	35 (13.0)	0.68 (0.41–1.12)	0.99 (0.56–1.76)	0.984
Facility type	Health center/PHU/TB	787 (91.5)	73 (8.5)	1.00 (Ref)	1.00 (Ref)	—
	Hospital/referral/specialty	116 (75.3)	38 (24.7)	3.53 (2.28–5.47)	3.22 (1.87–5.54)	0.000
	Private clinic	169 (84.5)	31 (15.5)	1.98 (1.26–3.11)	1.24 (0.54–2.83)	0.614
Management arrangement	Government (MoH) management	583 (90.8)	59 (9.2)	1.00 (Ref)	1.00 (Ref)	—
	Private for-profit management	207 (81.2)	48 (18.8)	2.29 (1.52–3.46)	1.37 (0.65–2.88)	0.409
	NGO management	274 (89.5)	32 (10.5)	1.15 (0.73–1.82)	0.97 (0.58–1.63)	0.919
	Other/community management	8 (72.7)	3 (27.3)	3.71 (0.96–14.35)	3.61 (0.87–15.02)	0.077

Multivariable logistic regression analysis included 1,214 facilities with complete information on emergency preparedness. For regression analysis, facility types were grouped according to service level (health center/PHU/TB, hospital/referral/specialty, and private clinic), and other and community management arrangements were combined due to small category sizes to improve model stability and avoid unreliable estimates.

healthcare facilities (19, 20). However, concentration of preparedness capacity at higher-level facilities may limit the ability of health systems to provide timely first-contact emergency services, particularly in settings where primary healthcare facilities serve geographically dispersed and vulnerable populations. WHO emphasizes that resilient health systems require preparedness capacities across all levels of care, including strong primary healthcare platforms capable of maintaining essential services during emergencies (10).

The geographic variation observed across Federal Member States and Banadir Region highlights important differences in emergency preparedness capacity within the Somali health system. Facilities in Hirshabelle and Banadir demonstrated higher preparedness proportions, whereas lower preparedness was observed in Galmudug, Jubaland, and Puntland. Similar geographic inequalities in health-system capacity have been reported in fragile settings, where differences in security conditions, humanitarian support, health-system investment, governance arrangements, and availability of skilled health workers influence facility readiness (9, 17). These findings suggest that national emergency preparedness strategies should consider subnational vulnerabilities and prioritize regions and facilities with lower preparedness capacity rather than applying uniform approaches across all geographic areas.

The observed state-level differences support directing preparedness support toward areas with greater identified gaps, while maintaining national coordination. A case study of Tunisia proposed tailoring decentralization pathways to regional conditions alongside common national protocols and oversight. They also noted that decentralization without adequate coordination and control may leave disparities unresolved or worsen them (21). Applied cautiously to Somalia, this suggests aligning state-level preparedness planning and resource allocation with local needs, within nationally agreed standards and monitoring. The present cross-sectional findings identify geographic differences but cannot explain their causes; they should therefore inform prioritization rather than be interpreted as evidence of the effects of decentralization.

The assessment of individual preparedness components demonstrated that emergency preparedness gaps extended beyond the overall composite indicator. Although some components, including fire safety plans and outbreak emergency response plans, were relatively more available, considerable limitations remained in written disaster/facility safety plans, emergency training and drills, and surge staffing strategies. Effective emergency preparedness requires interconnected capacities, including risk assessment, planning, trained personnel, coordination mechanisms, communication systems, and the ability to rapidly expand service delivery during crises (10). Previous studies have shown that health facilities in fragile settings frequently experience difficulties maintaining these capacities because of limited financing, workforce shortages, supply constraints, and competing demands from ongoing humanitarian emergencies (17, 19, 22–24). The observed gaps in Somalia therefore indicate that preparedness strengthening should move beyond establishing individual plans toward developing functional and routinely exercised preparedness systems.

Emergency training and drills represented one of the major preparedness gaps identified in this study. Simulation exercises and regular training are important mechanisms for translating emergency plans into practical response capacity because they allow health workers to test procedures, identify weaknesses, and improve coordination before crises occur (10). Evidence from emergency preparedness research indicates that regular preparedness exercises can improve understanding of emergency procedures, clarify roles and responsibilities, strengthen coordination among response teams, and identify weaknesses in

preparedness plans and response systems (25, 26). Strengthening routine preparedness training and simulation exercises across Somali health facilities may therefore improve operational readiness and contribute to stronger emergency response capacity.

Differences in emergency preparedness capacity were observed across management arrangements in descriptive analyses; however, management arrangement was not independently associated with preparedness capacity after adjustment. In descriptive analyses, private for-profit and other-managed facilities demonstrated higher preparedness proportions compared with government and NGO-managed facilities. Similar findings from fragile health systems suggest that differences between facility management groups may reflect variations in governance structures, resource availability, service models, and operational autonomy rather than management arrangement alone (19). Nevertheless, because government-managed facilities represent the largest component of Somalia's health facility network, strengthening preparedness within Ministry of Health facilities remains essential for improving national emergency readiness.

The multivariable analysis identified state and facility type as significant factors associated with emergency preparedness capacity, while management arrangement showed no statistically significant association after adjustment. Facilities in Galmudug and Puntland had significantly lower adjusted odds of preparedness compared with Banadir, whereas Hirshabelle had higher adjusted odds. Hospital, referral, and specialty facilities remained significantly more likely to have preparedness capacity compared with lower-level facilities. These findings are consistent with evidence that emergency preparedness is shaped by broader health-system factors, including governance, infrastructure, workforce distribution, and availability of operational resources (9, 19). The findings reinforce the need for targeted interventions addressing both structural and organizational barriers that influence preparedness across different facility levels and geographic contexts.

Implications for health system strengthening

The findings highlight the need to integrate emergency preparedness into routine health-system strengthening in Somalia rather than treating it as a crisis-specific activity. Resilient health systems require coordinated capacities for prevention, preparedness, response, and recovery, including effective planning, governance, workforce capacity, infrastructure, logistics, and monitoring systems.

The low level of preparedness capacity observed across facilities indicates the need to strengthen readiness at all levels of care, particularly primary healthcare facilities, which demonstrated lower preparedness compared with hospital and referral-level facilities. Priority actions should include strengthening emergency plans, referral pathways, healthcare worker training, simulation exercises, and surge capacity mechanisms to support continuity of essential services during emergencies.

Geographic variation in preparedness capacity highlights the importance of risk-informed and context-specific approaches. Regions with lower preparedness require targeted investments in infrastructure, workforce development, emergency supplies, and supportive supervision. Establishing routine preparedness monitoring indicators within health information systems could support continuous assessment of readiness and guide resource allocation.

Given that most facilities are government-managed, strengthening preparedness within Ministry of Health facilities will be central to improving national readiness. This requires clear accountability mechanisms, integration of preparedness standards into facility management processes, and stronger coordination between federal and state authorities, implementing partners, and emergency response actors.

Strengths and limitations

This study has several strengths. First, it used data from the national 2022–2023 Somalia Harmonized Health Facility Assessment, providing comprehensive facility-level evidence on emergency preparedness capacity across public and private health facilities. Second, the standardized HHFA methodology enabled assessment of multiple preparedness domains, including emergency planning, response mechanisms, training, and surge capacity. Third, the study examined facility-level factors associated with preparedness capacity, generating evidence to support targeted health-system strengthening interventions.

However, several limitations should be considered. The cross-sectional design limits causal interpretation of associations between facility characteristics and preparedness capacity. The facility-level analysis does not directly measure population access, quality of emergency response, or outcomes during actual crises. Additionally, some preparedness indicators were based on reported availability and may not reflect functional implementation or routine testing of preparedness mechanisms. The HHFA also does not capture broader contextual factors, such as community preparedness, governance dynamics, partner support, and previous emergency response experiences. The composite also assigned equal weight to all nine components, although their relative importance and functionality may differ. It counted the reported availability of each component without accounting for its quality or effectiveness, and the ≥ 3 cutoff may classify facilities with different combinations of components as equally prepared. The threshold was pragmatic and not externally validated; results may differ with alternative scoring weights or cutoffs.

Conclusion

This study provides national-level evidence of substantial gaps in emergency preparedness capacity among health facilities in Somalia. Although preparedness mechanisms were assessed across a large and diverse sample of facilities, only a limited proportion met the criteria for preparedness capacity, with important gaps in emergency planning, training and drills, and surge staffing arrangements. Preparedness capacity varied by facility type and geographic location, with lower readiness observed among primary healthcare facilities compared with

hospital and referral-level facilities. Strengthening emergency preparedness requires a system-wide approach focused on standardized preparedness planning, workforce training, simulation exercises, surge capacity mechanisms, supportive supervision, and context-specific resource allocation. These investments are essential to enhance the ability of health facilities to maintain essential services during emergencies and build a more resilient Somali health system capable of anticipating and responding to future shocks.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary Material, further inquiries can be directed to the corresponding author.

The secondary data analyzed in this study are available through the Somalia HHFA Analysis Platform (https://somalia-platform.netlify.app)

Ethics statement

The studies involving humans were approved by Research Ethics Committee (REC) of Al Hayat Medical University. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required from the participants or the participants' legal guardians/next of kin in accordance with the national legislation and institutional requirements.

Author contributions

AbA: Conceptualization, Formal analysis, Writing – original draft. NO: Formal analysis, Writing – original draft. OM: Data curation, Formal analysis, Writing – review & editing. MI: Methodology, Writing – review & editing. AJ: Data curation, Methodology, Writing – original draft. AwM: Writing – review & editing. IA: Writing – review & editing. AbdirM: Writing – review & editing. MM: Writing – review & editing. AK: Writing – review & editing. MA: Writing – review & editing. AbdikA: Writing – review & editing.

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Conflict of interest

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The author(s) declared that generative AI was used in the creation of this manuscript. Generative AI tools were used only for language editing and improving manuscript clarity. All scientific content, analyses, interpretations, and conclusions were developed and verified by the authors.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/frhs.2026.1995502/full#supplementary-material

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