

Beyond Shock Exposure: Food Insecurity, Erosive Coping and Protection Gaps in Somalia: Evidence from SIHBS 2022

Ahmed Hussein Ismail

eid.hussein02@gmail.com

University of Hargeisa

Research Article

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Abstract

In fragile and climate-exposed settings, household shock exposure alone does not reveal which families become food insecure, use erosive coping strategies or remain outside formal support systems. This study examined these linked dimensions in Somalia using nationally representative data from the Somalia Integrated Household Budget Survey 2022. Survey-weighted descriptive analysis and logistic regression were used to estimate the prevalence and correlates of household-reported climate-livelihood shocks, moderate/severe food insecurity, erosive coping, formal support receipt and protection gaps. Climate-livelihood shocks affected 70.8% of households, while 42.8% experienced moderate/severe food insecurity and 18.3% reported erosive coping. Formal support reached only 4.1% of households, and 17.1% met the protection-gap definition of shock exposure, no formal support and erosive coping. In adjusted models, shock exposure was associated with higher odds of moderate/severe food insecurity (adjusted odds ratio 1.91, 95% confidence interval 1.63–2.25) and erosive coping (14.62, 9.37–22.80). Drought-related livestock loss was a consistent marker of protection gaps among shock-exposed households. Nomadic and livestock-owning households carried the highest descriptive burdens. The findings show that sustainable resilience planning in Somalia requires moving beyond shock counts toward integrated targeting that links food insecurity, coping pressure and support exclusion. SIHBS-style household surveys can complement early-warning systems by identifying households absorbing livelihood losses without formal protection.

1 Introduction

In climate-exposed and fragile settings, counting shocks is not enough for sustainable targeting. A household can experience a drought, flood, food-price shock or livestock loss without immediately appearing in a severe food-insecurity category; another can maintain short-term food consumption only by selling assets, reducing essential expenditure or withdrawing children from normal activities. A third may be exposed to the same shocks but receive no formal assistance. These differences matter because sustainability policy is concerned not only with who is affected today, but with who is being pushed into future vulnerability through repeated asset erosion and exclusion from support.

Somalia is one of the clearest settings where this problem can be studied. Household welfare is repeatedly shaped by rainfall deficits, flooding, displacement, conflict, livestock losses, market disruption and food-price pressure. The Somalia Integrated Household Budget Survey (SIHBS) 2022 provides a rare national household dataset linking food-insecurity experiences, shocks, coping responses, support receipt, poverty, displacement and livelihood information [1, 2]. It therefore allows household-level analysis of a pathway that is often addressed through separate data systems: exposure to climate-livelihood shocks, food-access stress, erosive coping and formal protection gaps.

Recent evidence has documented the severity of acute food insecurity in Somalia and the compound nature of climate, conflict and market risks [3–6]. Pastoral and agro-pastoral households are especially exposed because livestock are both productive assets and buffers against crisis; drought-related herd

losses can reduce food access, milk availability, income, savings, creditworthiness and recovery capacity at the same time [7, 8]. Asset-based poverty and resilience theory suggests that repeated shocks can push households into poverty traps when coping requires the liquidation of productive assets or human-capital investments [9–11].

Coping behaviour is therefore analytically important. Food-security tools distinguish short-term consumption coping from livelihood or asset-depleting responses because the latter may protect immediate survival while weakening future resilience [12]. Experience-based food-access measures similarly capture a gradient from anxiety and dietary compromise to hunger and severe deprivation [13–15]. For sustainability analysis, these concepts should not be collapsed into a single score without interpretation. Food insecurity, coping, support receipt and protection gaps represent linked but distinct stages of vulnerability.

The policy relevance is increasing as shock-responsive social protection, anticipatory action and climate finance debates shift from national commitments toward delivery mechanisms that reach vulnerable households [16–20]. Somalia's Baxnaano programme and related safety-net investments show a policy transition from protracted relief toward state-led shock-responsive systems, but coverage, targeting and delivery capacity remain major concerns [16–19]. At the same time, loss-and-damage discussions stress that residual climate impacts are most damaging when households have limited ability to absorb losses without long-term harm [20–24].

This study contributes to Discover Sustainability's broad agenda by linking sustainable food security, resilience, inequality and climate adaptation. It does not claim to measure physical climate hazards, humanitarian adequacy or climate-finance flows directly. Instead, it uses nationally representative household survey data to identify how reported climate-livelihood shocks are associated with food insecurity, erosive coping and exclusion from formal support. This framing aligns particularly with SDG 1 on social protection and poverty reduction, SDG 2 on food security, SDG 10 on reduced inequalities and SDG 13 on climate resilience.

The study had four objectives: (1) to estimate the survey-weighted prevalence of climate-livelihood shock exposure, food insecurity, erosive coping and formal support receipt; (2) to describe how these burdens vary across residence, livelihood, displacement, headship and region; (3) to construct and analyse household protection-gap indicators among shock-exposed households; and (4) to discuss implications for shock-responsive social protection and sustainable resilience targeting in Somalia.

2 Conceptual framing

The study uses a shock-coping-protection pathway rather than a simple determinants model. The first element is household-reported climate-livelihood shock exposure, defined from the SIHBS shock module to include environmental, livelihood and food-price disruptions. The second is food-access stress, captured through eight experience-based food-insecurity items. The third is erosive coping, defined as behaviour that may protect short-term survival but weaken productive assets, essential expenditure or

human capital. The fourth is formal support receipt and its absence among households already exposed to shocks and coping pressure.

This pathway is intentionally cautious. A cross-sectional household survey cannot prove temporal sequence or causality. However, separating food insecurity, coping and support receipt prevents a common interpretation problem: coping is not simply an ordinary household characteristic; it is itself a stress response. The protection-gap concept used here identifies households that reported climate-livelihood shock exposure, reported erosive coping and did not report formal support. A stricter severe protection gap additionally requires no formal or informal support and current moderate/severe food insecurity. Figure 1 summarises the framework.

Note

The framework separates food insecurity, erosive coping, formal support and protection gaps to avoid treating coping as a simple causal driver.

3 Methods

3.1 Study design and data source

This study used cross-sectional secondary data from SIHBS 2022, implemented by the Somalia National Bureau of Statistics. SIHBS is a multi-module household budget survey covering household characteristics, consumption, food security, shocks, assets, livestock, land and livelihood-related information [1, 2]. The analytical workflow used the household file, household member file, consumption aggregate file, shock file, asset file and livestock ownership file. Results were reported with survey weights where available.

The analytical dataset was anchored on the SIHBS household file, which contained 7,212 household records. All 7,212 households were retained in the main descriptive dataset. Consumption and poverty data matched 7,152 households; the shock module contained records for all households, including blank shock rows for households reporting no shock; and the livestock ownership module contained records for 2,523 livestock-owning households. Regression models used available observations with valid outcome, exposure, weight and covariate information.

3.2 Study setting

Somalia is a drought- and flood-prone country in the Horn of Africa with pastoral, agro-pastoral, riverine, rural, urban and internally displaced populations. Household food security is shaped by rainfall variability, livestock and crop production, market access, conflict, displacement, remittances, social support and humanitarian assistance [3, 4, 7, 8]. This setting is appropriate for examining how household-reported climate-livelihood shocks are linked to erosive coping, support gaps and food insecurity.

3.3 Outcome variables

The main food-security outcome was moderate/severe household food insecurity. SIHBS includes eight experience-based food-access items capturing worry about food, inability to eat healthy or nutritious foods, limited food variety, skipped meals, eating less than needed, running out of food, hunger without eating and going a whole day without eating. Each item was recoded as binary and summed to create a 0–8 household food-insecurity score. Severity was classified as none (0), mild (1–3), moderate (4–6) and severe (7–8). The moderate/severe threshold of 4–8 was applied pragmatically to represent endorsement of at least half of the available food-insecurity experiences; it was not derived from a separate psychometric validation against the Food Insecurity Experience Scale or Household Food Insecurity Access Scale [13–15].

Erosive coping was defined as a binary indicator for any response involving asset depletion, child-disruptive strategies, reduction in food consumption or reduction in essential non-food expenditure. The definition follows the logic of coping and livelihood-coping literature, which treats such behaviours as stress responses rather than stable household characteristics [12, 25]. Formal support indicated receipt of government, non-governmental organization or international-organization assistance. Informal support indicated help from family, friends, community or religious institutions.

3.4 Exposure and protection-gap indicators

The primary exposure was household-reported climate-livelihood shock exposure, derived from the SIHBS shock module. Households were coded as exposed if they reported at least one shock consistent with climate, environmental, livelihood or food-price disruption, including drought or severe water shortage, flood, crop pest or disease, livestock death, food-price shocks and related livelihood disruptions. Food-price shocks were included because Somalia's food systems link rainfall variability, livestock mortality, market supply, household purchasing power and staple-food access [3, 4, 26].

A household protection gap was defined as climate-livelihood shock exposure combined with no formal support and use of erosive coping. A severe protection gap was defined as climate-livelihood shock exposure, no formal or informal support, erosive coping and moderate/severe food insecurity. These indicators identify households that appear to absorb shock-related losses without adequate formal protection. They do not measure the timing, adequacy, duration or monetary value of assistance, and they do not measure climate-finance transfers directly.

3.5 Covariates and statistical analysis

Covariates included sex of household head, poverty status, internally displaced person (IDP) status, residence type (nomadic, rural, urban), region, livestock ownership, drought-related livestock loss, household size and whether the household head ever attended school. These variables were selected because previous evidence identifies livelihood assets, education, displacement, region, residence and poverty as important correlates of food security and adaptive capacity in Somalia and comparable fragile settings [27–31].

The analysis proceeded in four steps. First, survey-weighted descriptive statistics estimated the prevalence of food insecurity, shock exposure, erosive coping, formal support, informal support and protection gaps. Second, subgroup summaries compared burdens across residence type, poverty status, IDP status, household-head sex, livestock ownership and region. Third, weighted logistic regression estimated the association between climate-livelihood shock exposure and moderate/severe food insecurity, adjusting for the covariates described above. Fourth, among shock-exposed households, separate weighted logistic models examined correlates of formal support, protection gaps and severe protection gaps. All models are interpreted as associational because the data are cross-sectional. The study followed STROBE reporting principles for observational research [32].

3.6 Ethical considerations

This study used anonymized secondary household survey data. The author did not collect primary data, did not access identifiable respondent information and did not redistribute raw SIHBS microdata. All results are reported in aggregate form. No additional ethics approval was required for this secondary analysis of anonymized public-use data, subject to the data-access conditions of the Somalia National Bureau of Statistics.

4 Results

4.1 Overall burden of shocks, food insecurity, coping and support gaps

The core pattern was a large imbalance between shock exposure and formal support coverage. Climate-livelihood shocks affected 70.8% of households, while 42.8% experienced moderate/severe food insecurity and 29.0% experienced severe food insecurity. Erosive coping was reported by 18.3% of households. Formal support reached only 4.1%, while informal support reached 7.8%. A household protection gap affected 17.1% of households, and a severe protection gap affected 9.0%. This pattern indicates that many households reported shock exposure but only a small fraction reported formal assistance, leaving a substantial group to manage losses through coping responses that may weaken longer-term resilience (Table 1; Fig. 2).

Table 1
Weighted prevalence of key household indicators

Indicator	Estimate (%)	95% CI
Moderate/severe food insecurity	42.8	41.3–44.2
Climate-livelihood shock exposure	70.8	69.5–72.2
Erosive coping	18.3	17.2–19.4
Formal support	4.1	3.6–4.7
Informal support	7.8	7.0–8.6
Protection gap with erosive coping	17.1	16.0–18.2
Severe protection gap	9.0	8.2–9.8

Note

Bars show weighted percentages from the final SIHBS analytical dataset.

Figure 2 Overall household burden and support coverage

Note

Bars show weighted percentages from the final SIHBS analytical dataset.

4.2 Inequality profile by residence, livelihood, displacement and headship

Residence type showed the strongest descriptive gradient. Nomadic households had the highest prevalence of moderate/severe food insecurity, shock exposure, erosive coping and severe protection gaps. Livestock-owning households also carried a substantially higher burden than households without livestock, especially for shock exposure and protection gaps. IDP households had higher descriptive levels of food insecurity and severe protection gaps than non-IDP households, and female-headed households showed slightly higher descriptive burdens; however, these differences were not consistently independent in adjusted models. The descriptive pattern suggests that the strongest inequality signal in this dataset lies in the combination of residence, livelihood dependence, livestock exposure and regional context rather than household-head sex alone (Table 2; Fig. 3).

Table 2
Weighted inequality profile of household burden by selected groups

Group	Food insecurity (%)	Shock (%)	Erosive coping (%)	Protection gap (%)	Severe gap (%)
Residence: Nomadic	59.7	94.8	26.8	25.0	13.3
Residence: Rural	46.6	77.2	19.5	18.5	10.9
Residence: Urban	37.8	63.3	16.0	14.9	7.4
Livestock: No livestock	37.7	62.7	15.7	14.5	7.5
Livestock: Owns livestock	53.3	87.7	23.8	22.4	12.2
Displacement: Non-IDP	41.9	70.5	18.2	17.0	8.7
Displacement: IDP	49.5	73.0	19.0	17.6	11.2
Headship: Male-headed	42.5	73.1	17.6	16.5	8.2
Headship: Female-headed	43.1	68.7	18.9	17.6	9.7

Note

Estimates are weighted percentages from the final survey-weighted SIHBS analysis.

4.3 Regional burden and targeting relevance

Regional estimates showed important geographic heterogeneity. The highest weighted prevalence of moderate/severe food insecurity was observed in Bay, Lower Juba, Bakool, Mudug and Gedo. Climate-livelihood shock exposure was highest in Bay, Bakool, Gedo, Lower Juba and Sool. Severe protection gaps were concentrated in Gedo, Lower Juba, Bay, Bakool and Banadir. The concentration across southern agropastoral and riverine regions, combined with the presence of Banadir among the highest severe protection-gap regions, points to both livelihood-related and urban/displacement-related vulnerability (Table 3; Fig. 4).

Table 3
Regions with highest weighted burden by selected indicators

Indicator	Region	Estimate (%)
Food insecurity	Bay	72.3
Food insecurity	Lower Juba	70.0
Food insecurity	Bakool	66.4
Food insecurity	Mudug	64.6
Food insecurity	Gedo	54.9
Climate-livelihood shock	Bay	97.5
Climate-livelihood shock	Bakool	96.3
Climate-livelihood shock	Gedo	96.2
Climate-livelihood shock	Lower Juba	84.1
Climate-livelihood shock	Sool	82.6
Severe protection gap	Gedo	26.5
Severe protection gap	Lower Juba	21.8
Severe protection gap	Bay	21.0
Severe protection gap	Bakool	11.8
Severe protection gap	Banadir	11.6

Note

Severe protection gap combines shock exposure, no formal or informal support, erosive coping and moderate/severe food insecurity.

4.4 Adjusted associations

Households exposed to climate-livelihood shocks had 1.91 times the adjusted odds of moderate/severe food insecurity (95% confidence interval 1.63–2.25, $p < 0.001$), after adjustment for residence, education, poverty, displacement, livestock ownership, household size and region. Urban residence and household-head schooling were independently protective. Poverty status was not consistently associated with food insecurity after adjustment, suggesting that shock exposure, residence, education and regional context contribute to food-insecurity risk beyond poverty status alone. In the erosive coping model, shock exposure was strongly associated with erosive coping (adjusted odds ratio 14.62, 95% confidence interval 9.37–22.80). Among shock-exposed households, drought-related livestock loss was associated

with higher odds of protection gaps and severe protection gaps, while household-head schooling was protective against severe protection gaps (Table 4; Fig. 5).

Table 4
Key adjusted associations from survey-weighted logistic regression models

Outcome model	Predictor	AOR (95% CI)	p-value
Food insecurity	Climate-livelihood shock	1.91 (1.63–2.25)	< 0.001
Food insecurity	Urban residence	0.56 (0.44–0.73)	< 0.001
Food insecurity	Head ever attended school	0.45 (0.38–0.52)	< 0.001
Food insecurity	Drought-related livestock loss	1.24 (0.97–1.59)	0.083
Food insecurity	Female-headed household	0.95 (0.82–1.09)	0.452
Food insecurity	Poor household	1.09 (0.95–1.26)	0.228
Erosive coping	Climate-livelihood shock	14.62 (9.37–22.80)	< 0.001
Erosive coping	Urban residence	0.69 (0.52–0.93)	0.016
Erosive coping	Drought-related livestock loss	1.51 (1.13–2.03)	0.006
Erosive coping	Female-headed household	1.16 (0.97–1.38)	0.112
Formal support among shock-exposed	Poor household	1.45 (1.04–2.01)	0.027
Formal support among shock-exposed	Household size	0.91 (0.86–0.97)	0.002
Formal support among shock-exposed	Head ever attended school	0.58 (0.40–0.83)	0.003
Formal support among shock-exposed	Female-headed household	0.83 (0.61–1.12)	0.226
Formal support among shock-exposed	IDP household	0.81 (0.48–1.37)	0.434
Protection gap among shock-exposed	Urban residence	0.71 (0.52–0.96)	0.026
Protection gap among shock-exposed	Drought-related livestock loss	1.46 (1.08–1.97)	0.014
Protection gap among shock-exposed	Female-headed household	1.14 (0.95–1.38)	0.155
Protection gap among shock-exposed	Poor household	0.88 (0.73–1.04)	0.139
Severe protection gap among shock-exposed	Drought-related livestock loss	1.55 (1.04–2.30)	0.032
Severe protection gap among shock-exposed	Head ever attended school	0.67 (0.51–0.87)	0.002

Outcome model	Predictor	AOR (95% CI)	p-value
Severe protection gap among shock-exposed	Female-headed household	1.12 (0.88–1.41)	0.359
Severe protection gap among shock-exposed	Poor household	0.86 (0.69–1.08)	0.194

Note

Odds ratios are shown on a log scale. Confidence intervals are 95% CIs.

The regional fixed effects in the food-insecurity model were substantial. Several regions showed significantly higher adjusted odds of food insecurity compared with the reference region, indicating that household-level shocks and characteristics do not fully explain spatial heterogeneity. This pattern may reflect market access, conflict, livelihood systems, assistance patterns, agroecological conditions and service constraints. The regional pattern reinforces the value of combining household-level targeting indicators with area-based early-warning and IPC evidence.

5 Discussion

5.1 Principal findings and contribution

This study supports the proposed shock-coping-protection pathway. Three findings are central. First, household-reported climate-livelihood shocks were widespread. Second, shock exposure was strongly associated with both moderate/severe food insecurity and erosive coping. Third, formal support coverage was very low relative to the scale of reported shock exposure. Together, these findings move the interpretation beyond a conventional determinants model. Food insecurity in Somalia reflects material deprivation, but it also reflects how households absorb repeated shocks when formal protection is absent, delayed or insufficient.

The paper's main contribution is therefore not another list of food-insecurity correlates. Its contribution is a measurable household pathway linking shock exposure, coping pressure, support exclusion and food-access deprivation. The protection-gap indicator is a practical targeting measure: it identifies households that reported a climate-livelihood shock, did not report formal support and used erosive coping. This is relevant for sustainable resilience planning because households that protect short-term survival through erosive coping may be pushed into deeper future vulnerability.

5.2 Shocks, coping and food-security resilience

The association between shock exposure and food insecurity is consistent with evidence that Somalia's food system is exposed to interacting climate, conflict, price and displacement pressures [3, 4, 26, 33]. Household-level results from SIHBS show the same pattern from a different empirical angle: households

reporting climate-livelihood shocks had markedly higher odds of moderate/severe food insecurity. This supports the argument that food insecurity in Somalia cannot be reduced to poverty alone; it is also shaped by repeated disruptions to production, purchasing power, labour, livestock assets and market access.

Erosive coping should be interpreted as a warning signal rather than a simple explanatory variable. CSI and livelihood-coping literature distinguish reversible consumption adjustments from responses that deplete assets, reduce essential expenditure or disrupt children's activities [12, 25]. The strong association between shock exposure and erosive coping indicates that many households manage shocks through strategies that may protect immediate consumption while weakening future resilience. This is the sustainability problem at the center of the paper: coping can keep a household alive today while reducing its ability to recover tomorrow.

5.3 Nomadic and livestock-dependent households

Nomadic and livestock-owning households carried the highest descriptive burdens. This is expected in a setting where pastoral livelihoods depend on rainfall-sensitive pasture, water, milk production, herd reproduction, livestock prices and market access. Drought-related livestock loss was a consistent correlate of protection gaps, reinforcing its value as a targeting marker for livelihood protection and adaptive social protection. A key policy implication is that food assistance after consumption deterioration is not enough; programmes also need to protect productive assets before distress sales, herd losses or child-disruptive coping become difficult to reverse.

5.4 Formal support and sustainable targeting

Low formal support coverage is the paper's most important policy signal. Although poor households had higher adjusted odds of receiving formal support among shock-exposed households, overall coverage remained limited. Somalia's safety-net investments demonstrate progress toward state-led shock-responsive systems, but the findings suggest that coverage and targeting gaps remain substantial at household level [16–19].

The protection-gap indicator can complement IPC and humanitarian caseload analysis. IPC and early-warning systems identify area-level severity and projected needs, while SIHBS-style surveys can identify which household categories are absorbing losses without formal support. Used together, these information systems can strengthen targeting by linking area-based warning with household-level evidence on coping pressure, support receipt and livelihood loss.

5.5 Climate finance, loss and damage and SDG relevance

The study does not claim that SIHBS measures climate-finance flows, loss-and-damage payments or programme adequacy. Its more cautious contribution is to show how household survey data can reveal micro-level protection gaps that are relevant to adaptation finance, anticipatory action and shock-responsive social protection. This matters because loss-and-damage debates increasingly ask how vulnerable communities absorb residual impacts when adaptation and coping are insufficient [20–24]. In

Somalia, household protection-gap indicators can help translate national climate and resilience commitments into measurable targeting evidence. The results are particularly relevant to SDG 1, SDG 2, SDG 10 and SDG 13 because they connect social protection, food security, inequality and climate-resilience planning without treating any single SDG as a stand-alone solution.

5.6 Gender, poverty and displacement: cautious interpretation

Female-headed, poor and IDP households showed some descriptive differences, but adjusted models did not consistently identify female headship, poverty or IDP status as independent correlates across all outcomes. This should not be read as evidence that gender, poverty and displacement do not matter. Rather, their effects may be mediated or confounded by residence, region, livelihood type, shock exposure, assistance patterns and unmeasured intra-household dynamics. The available SIHBS household-level data cannot fully capture women's agency, care burdens, individual food allocation, financial access or local institutional exclusion. These remain important policy concerns and should be studied with individual-level and qualitative data alongside household survey analysis.

5.7 Policy implications

The findings suggest five practical implications. First, shock-responsive food-security programmes should include climate-livelihood shock exposure and drought-related livestock loss as targeting criteria. Second, nomadic, rural and livestock-dependent households should be considered for livelihood protection as well as food assistance, because their vulnerability is linked to both consumption stress and asset erosion. Third, formal support coverage among shock-exposed households should be monitored as a routine indicator of adaptive social protection performance. Fourth, early-warning systems should track erosive coping, not only food consumption, because asset depletion, expenditure compression and child-disruptive responses signal future vulnerability. Fifth, household budget surveys should be integrated into resilience and climate-loss monitoring systems as a source of micro-level evidence on who absorbs losses without formal support. These implications do not replace IPC or humanitarian assessments; they show how household surveys can add targeting variables to existing systems.

6 Strengths and limitations

The study has several strengths. It uses a recent national household budget survey with modules on food insecurity, shocks, coping responses, consumption, poverty, displacement, livestock and household characteristics. It distinguishes food insecurity, erosive coping, support receipt and protection gaps instead of collapsing them into a single vulnerability index. It also links empirical household analysis to practical debates on shock-responsive social protection and sustainable resilience targeting.

Several limitations should be noted. The cross-sectional design cannot establish causality or temporal sequencing. Self-reported shock exposure and coping responses may be affected by recall bias and

social desirability. The 2022 survey year reflects a specific climate, conflict and price context and may not capture longer-term trends. The food-insecurity score was constructed from available SIHBS items and was not independently validated as a FIES or HFIAS equivalent, although the items are conceptually aligned with established experience-based food-access measures. The protection-gap indicator is a proxy and does not measure the timing, adequacy, duration or value of assistance. The binary formal support variable may understate gaps where support was minimal, delayed or one-off. Household-level variables cannot capture individual-level agency, intra-household food allocation, care burdens or local institutional dynamics. Finally, although survey weights were used, the analysis does not claim to reproduce the full official design-based procedures used by national statistical agencies for official indicators.

7 Conclusion

This study provides nationally representative evidence that household-reported climate-livelihood shocks are pervasive in Somalia and are strongly associated with food insecurity and erosive coping. Formal support coverage remains critically limited, leaving a substantial share of shock-exposed households to absorb losses through responses that may protect short-term survival while eroding longer-term resilience. Nomadic and livestock-owning households, particularly those experiencing drought-related livestock loss, carry the highest combined descriptive burdens.

The paper's principal contribution is a household shock-coping-protection pathway that treats food insecurity, coping responses, support receipt and protection gaps as analytically distinct but connected outcomes. Its key empirical contribution is to make this pathway visible using SIHBS 2022 and to propose a practical protection-gap indicator that poverty headcount measures alone cannot supply. For policy, the findings suggest that reducing food insecurity in Somalia requires moving beyond income-poverty targeting toward systems that identify households exposed to shocks, verify whether formal support reaches them and intervene before erosive coping erodes productive assets and human capital.

Abbreviations

AOR
adjusted odds ratio
CI
confidence interval
FIES
Food Insecurity Experience Scale
HFIAS
Household Food Insecurity Access Scale
IDP
internally displaced person
IPC

Integrated Food Security Phase Classification

NGO

non-governmental organization

SDG

Sustainable Development Goal

SIHBS

Somalia Integrated Household Budget Survey

SNBS

Somalia National Bureau of Statistics

STROBE

Strengthening the Reporting of Observational Studies in Epidemiology.

Declarations

Clinical trial number: not applicable.

Ethics approval and consent to participate

This study used anonymized secondary data from the Somalia Integrated Household Budget Survey 2022. The author did not collect primary data from human participants and did not access identifiable respondent information. The original survey was implemented by the Somalia National Bureau of Statistics under its applicable data-governance procedures. No additional ethics approval was required for this secondary analysis of anonymized data.

Consent for publication

Not applicable. The manuscript does not contain identifiable individual-level information, images or case details.

Availability of data and materials

The SIHBS 2022 microdata that support this analysis are available from the Somalia National Bureau of Statistics National Data Archive subject to its data-access and data-use conditions. The author is not permitted to redistribute the raw microdata. Aggregated non-identifiable outputs and code templates can be made available by the author on reasonable request, subject to the original data-use agreement.

Competing interests

The author declares that he has no competing interests.

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Authors' contributions

Ahmed Hussein Ismail conceptualized the study, designed the analytical framework, conducted the analysis, interpreted the results, prepared the figures and tables, and wrote and revised the manuscript.

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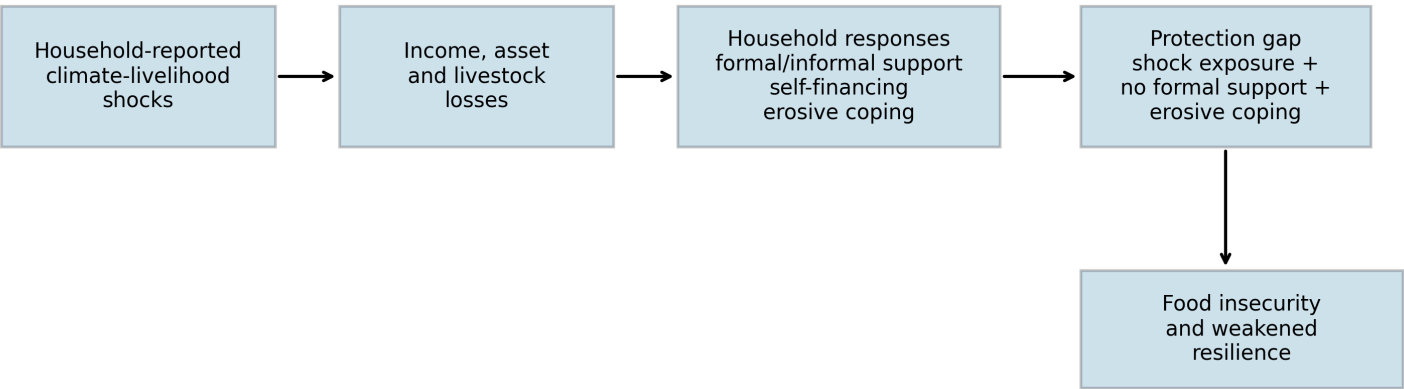
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Figures



Policy interpretation: shock-responsive social protection, anticipatory action, and household-level targeting

Figure 1

Conceptual framework for the household shock-coping-protection pathway

Note. The framework separates food insecurity, erosive coping, formal support and protection gaps to avoid treating coping as a simple causal driver.

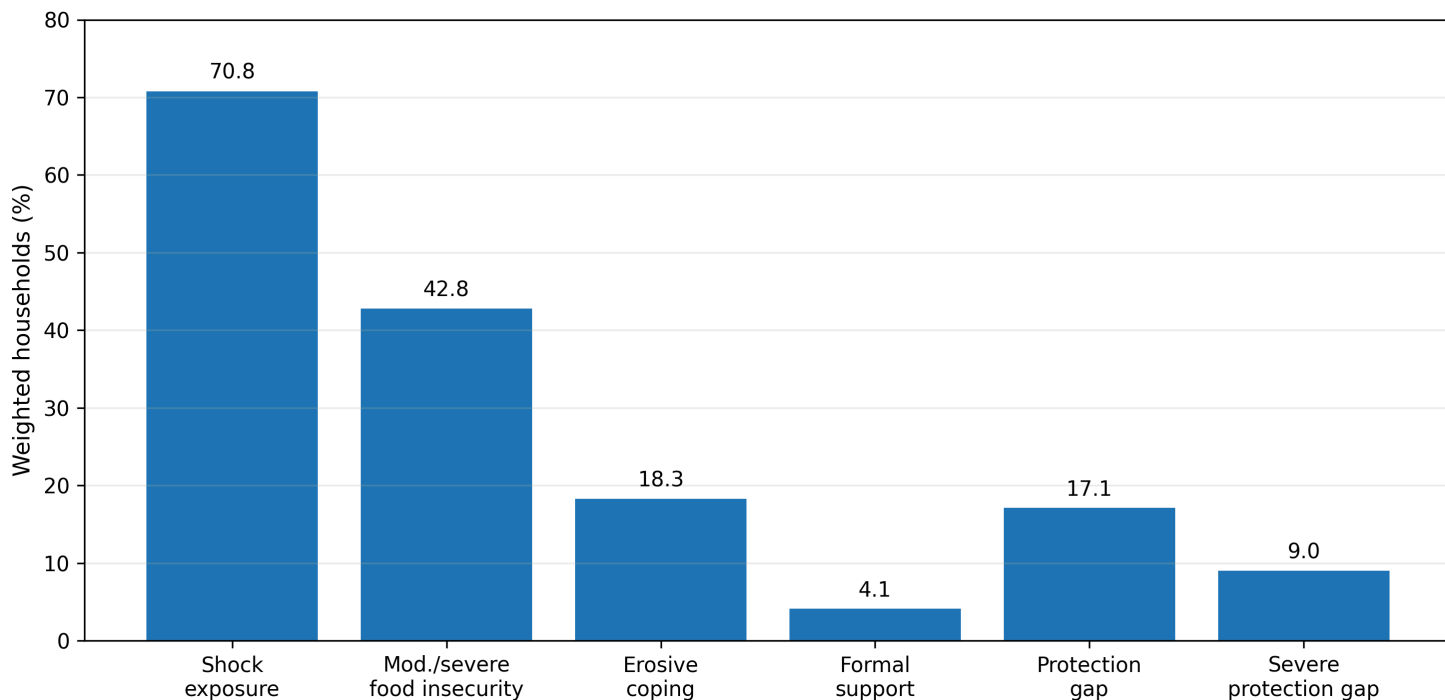


Figure 2

Overall household burden and support coverage

Note. Bars show weighted percentages from the final SIHBS analytical dataset.

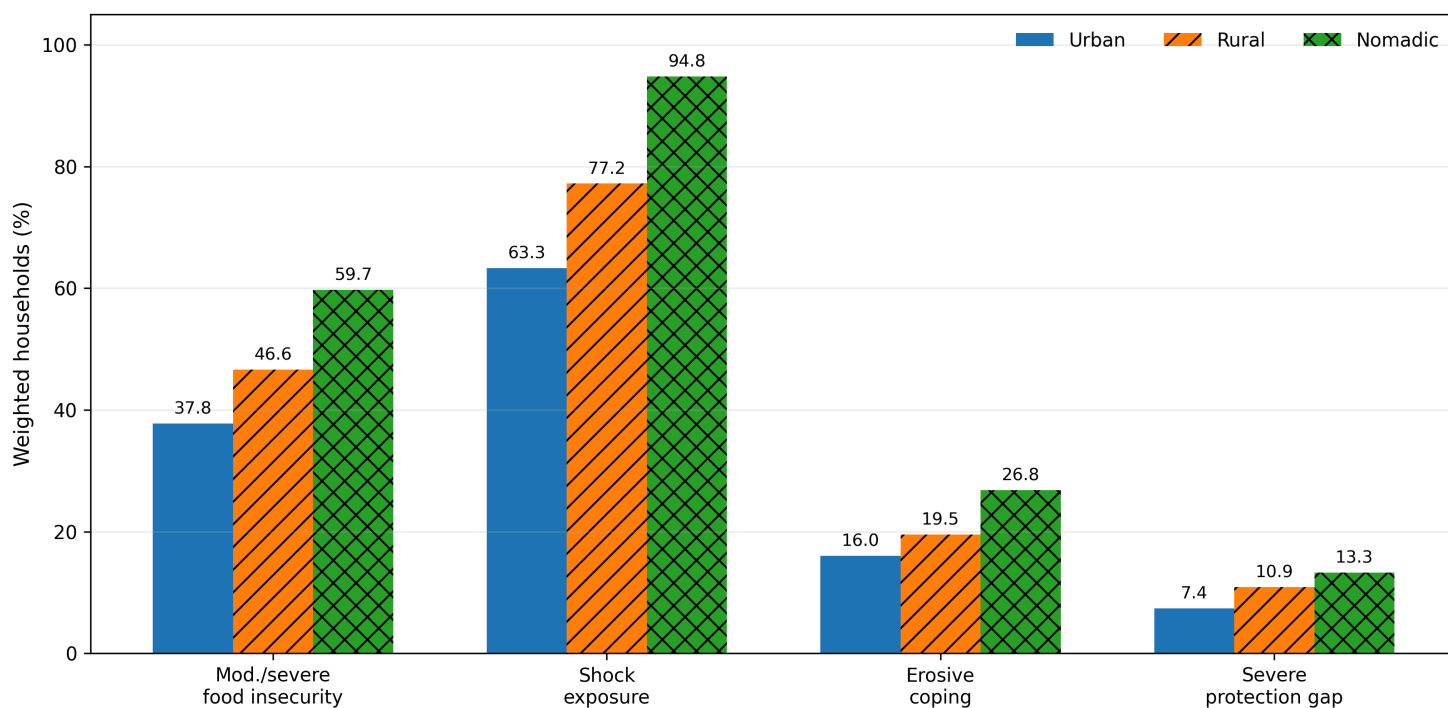


Figure 3

Residence gradients in food insecurity, shock exposure, erosive coping and severe protection gaps

Note. Estimates are weighted percentages from the final survey-weighted SIHBS analysis.

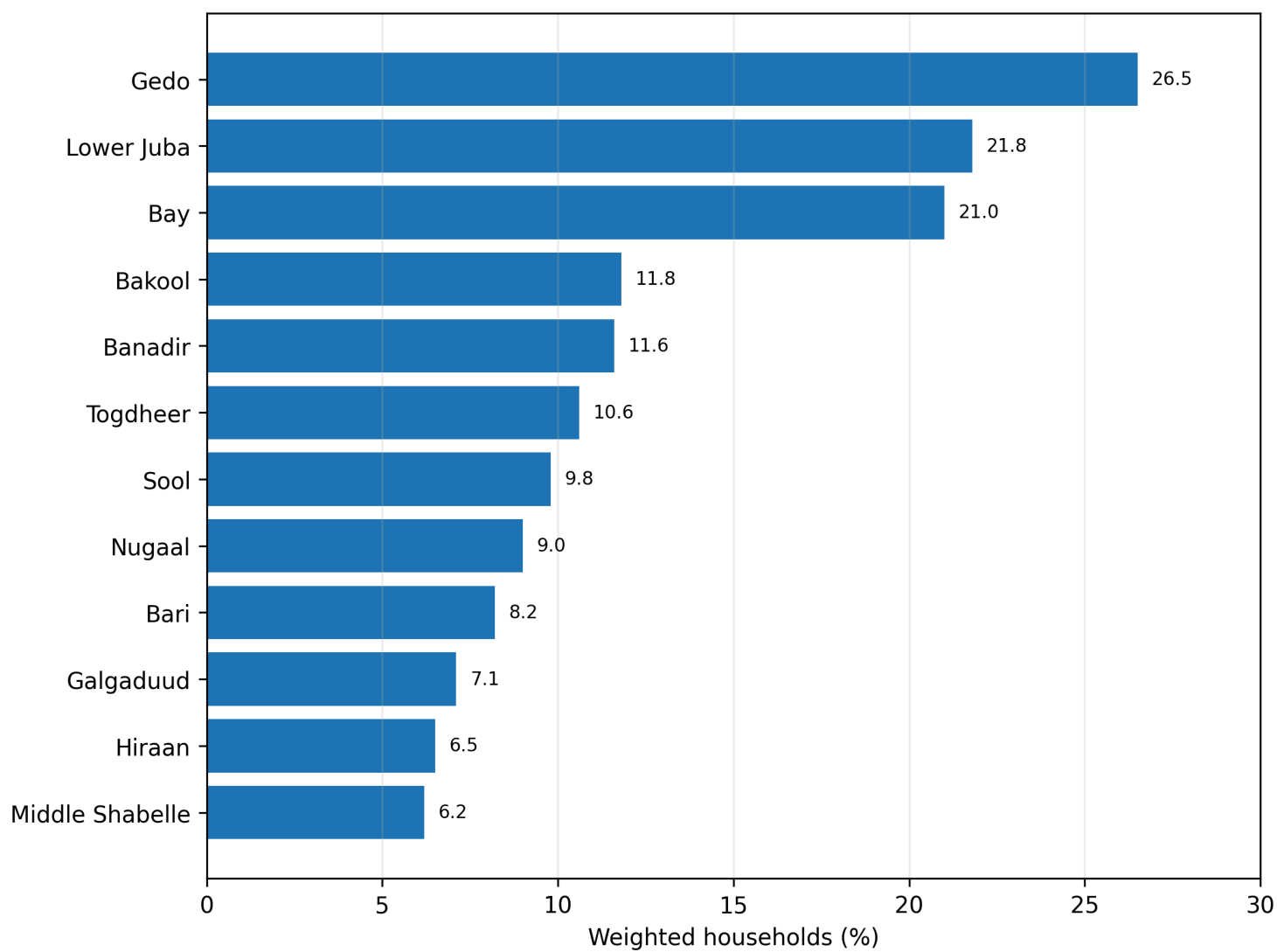


Figure 4
Regions with the highest severe household protection gaps

Note. Severe protection gap combines shock exposure, no formal or informal support, erosive coping and moderate/severe food insecurity.

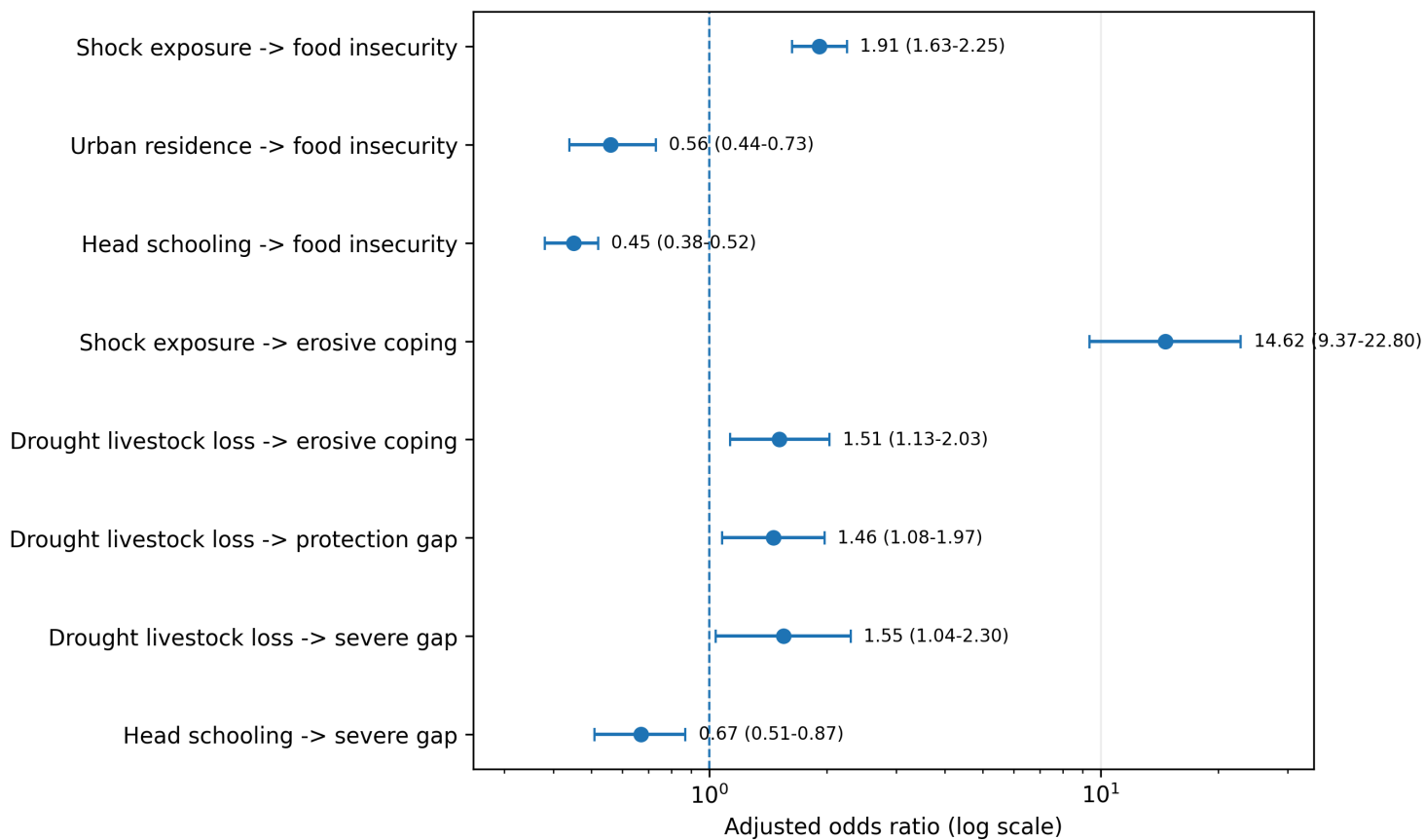


Figure 5

Selected adjusted odds ratios from final survey-weighted logistic regression models

Note. Odds ratios are shown on a log scale. Confidence intervals are 95% CIs.