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IMPACTS OF DROUGHT AND INCOME SHOCKS ON SEVERE HUNGER IN SOMALIA DURING COVID-19: A POTENTIAL OUTCOME APPROACH USING POISSON REGRESSION

Abstract. Household economic activities in Somalia are deeply affected by periodic droughts and other environmental hazards like flooding and cyclones. The impacts of these shocks are reinforced by households' exposure to other shocks, and their collective impacts are easily felt on households' nutrition. This study therefore analysed the impacts of drought and other welfare shocks on severe food insecurity in Somalia. The data were the second wave of the High Frequency Telephone Survey of displaced people, comprising 2505 households. The Poisson regression model was estimated with potential outcome framework to compute the average treatment effect (ATE) and average treatment effect on the treated (ATET). The result showed exposure to covariate and idiosyncratic shocks, with drought (87.36%), food price increases (79.84%), and reduced humanitarian assistance (62.68%) being the most prevalent. Spatial patterns reveal significantly higher drought exposure in central and southern states. Severe food insecurity remains widespread, with many households reporting episodes of food exhaustion, sleeping hungry, or going a whole day without food. Regression results show that unemployment benefits, job search, reduced income, separation, unsafe living conditions, returnee status, and residence in Puntland or Somaliland significantly increase expected hunger severity, whereas urban residence and engagement in income activities reduce it. Several shocks, including non-farm business closure, theft/looting, increased input and food prices, illness or death of income earners, drought, locust invasion, and cyclone/storm events substantially worsen food insecurity. While some shocks show insignificant average treatment effects (ATE), their treatment-on-the-treated effects (ATET) are significant, demonstrating disproportionate impacts on already-vulnerable subpopulations. The findings underscore the urgent need for strengthened shock-responsive social protection, livelihood support, and targeted humanitarian interventions in fragile settings.

Keywords: *Income Shocks, Drought, ATE, ATET, Severe Hunger, Somalia*.

JEL Classifications: D; D1; D11; D12.

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Introduction. Somalia remains one of the hotspots of global hunger and malnutrition (Jamil et al., 2025). Amplified by recurring conflicts and environmental hazards, the country epitomizes an intersection of protracted economic fragility and political instability (Nor, 2025). Precisely, the past three decades had witnessed recurring droughts, protracted conflicts, and economic fragility that have substantially undermined people's economic activities (Ahmed et al, 2024). Therefore, the magnitude of internal displacement among Somalian households is enormous, with United Nations High Commission for Refugees (UNHCR) putting the statistic at 4.1 million in 2024[1]. It has been further noted that 5.2 million people from Somalia are currently seeking asylum abroad. The economic burdens of human displacements in Somalia are substantial, and are further compounded by loss of livelihoods, disrupted remittances, and rising inflation. Consequently, many households rely on humanitarian assistance for which US$157.1 million would be required in 2025[2].

1 Somalia country operations. United Nations High Commissioner for Refugees. URL: https://www.unhcr.org/where-we-work/countries/somalia (дата звернення: 12.09.2025).

2 Ibid.

Furthermore, households' economic activities in Somalia are deeply affected by recurring droughts and other environmental hazards like flooding and cyclones (Thalheimer et al., 2023). The impacts of these shocks are reinforced by households' exposure to other shocks such as death of livestock, livestock and crop price fluctuations, market disruptions, commodity price increase, illness and death of households' members. The socio-economic impacts of cyclical droughts are more pronounced in Somalia due to the dominance of agriculture as the major source of livelihood for many households. Therefore, disruptions to this sector place the country at a serious economic risk, given that the sector contributes about 65% of the annual Gross Domestic Product (GDP)[1]. Similarly, high frequency of drought, which can sometimes be in every two to three years, and often lasting for consecutive two or three years, presents some significant impacts on farming households, thereby eroding their economic resilience and adaptive capacity (Ali et al., 2025).

Over the past four decades, the historical drought of 2021-2023 remains the longest and the most severe environmental hazard ever witnessed in Somalia[2]. In 2023, climatic shocks promoted displacement of 2.3 million people in Somalia[3]. At the same time, many households faced some income shocks which compromise their ability to cope with environmental stressors. These welfare impacts are further amplified by the global COVID-19 pandemic, which compelled some operational restrictions in business conducts since 2020. It is therefore alarming that while many African countries were bracing for economic reforms to facilitate business recovery after the general COVID-19 pandemic induced economic contraction of 2020, Somali government had a series of environmental tragedies that exceeded the duration and severity of previous droughts (United Nations Office for Disaster Risk Reduction (UNDRR), 2024[4]; Dirie et al., 2024; Abdullahi et al., 2024; Odongo et al., 2025).

Moreover, a cursory evaluation of the socio-economic intersections of drought and COVID-19 in Somalia reveals an interwoven complication of humanitarian crisis, exacerbating existing vulnerabilities and overwhelming the country's fragile economic and political systems (Abdullahi et al., 2024; Odongo et al., 2025). Therefore, although COVID-19 placed significant pressure on Somalia's fragile healthcare system, the economic burdens doubled in 2022 due to some overlapping impacts of drought, flooding, locust infestations, and other market and non-market-related income shocks that affected income earning capacities and food security[5] [6] [7]. The impacts of droughts on farming and rural households in Somalia are always tremendous. Drought-related mortality among livestock had been estimated at 3 million[8]. In addition, it was found that 64% and 50% of farmers in host communities and internally displaced persons (IDPs) respectively abandoned farming due to drought (Mugera and Yoshimura, 2023).

Food insecurity is one of the most feasible manifestations of the impacts of droughts. In 2020, there was a drastic degeneration of food insecurity due to rapid increase in the number of people needing humanitarian assistance and decline in international support. About 4 million people were acutely food insecure in 2022[9]. Therefore, in 2022, excess death was estimated at 43,000 people with half of these being children under the age of five[10]. It was further highlighted that excess death in the first half of 2023 could be between 18,100 and 34,200

1 Somalia Economic Outlook: 2nd Edition – Last Update. Ministry of Planning, Investment and Economic Development (Somalia). 2025, May. URL: https://mop.gov.so/wp-content/uploads/PDF/SOMALIA%20ECONOMIC%20OUTLOOK%202nd%20Edition%20Last%20Update.pdf (дата звернення: 12.09.2025).

2 Somalia Economic Update November 2023: Integrating Climate Change with Somalia's Development: The Case for Water. Knowledge for Policy. European Commission, 2023, December 5. URL: https://knowledge4policy.ec.europa.eu/publication/somalia-economic-update-november-2023-integrating-climate-change-somalia%E2%80%99s-development_en (дата звернення: 12.09.2025).

3 Somalia Food Insecurity Crisis. CARE, 2024. URL: https://www.care.org/our-work/disaster-response/emergencies/somalia-food-insecurity-crisis/ (дата звернення: 12.09.2025).

4 Horn of Africa floods and drought, 2020–2023 – Forensic analysis. United Nations Office for Disaster Risk Reduction (UNDRR), 2024. URL: https://www.undrr.org/resource/horn-africa-floods-and-drought-2020-2023-forensic-analysis (дата звернення: 12.09.2025).

5 Horn of Africa drought: Regional Humanitarian Overview & Call to Action. FAO, 2022. URL: https://www.fao.org/3/cc7900en/online/impact-of-disasters-on-agriculture-and-food-2023/desert-locusts-in-the-horn-of-africa.html (дата звернення: 12.09.2025).

6 Horn of Africa Drought Response, January 2022 - June 2023. NRC, 2022. URL: https://www.nrc.no/resources/reports/nrc-horn-of-africa-drought-response (дата звернення: 12.09.2025).

7 Famine risk rises in Somalia as rains fail, food prices soar, U.N. says. Reuters, 2022. URL: https://www.reuters.com/world/africa/famine-risk-rises-somalia-rains-fail-food-prices-soar-un-2022-06-06/ (дата звернення: 12.09.2025).

8 Ibid.

9 Somalia Food Insecurity Crisis. CARE, 2024. URL: https://www.care.org/our-work/disaster-response/emergencies/somalia-food-insecurity-crisis/ (дата звернення: 12.09.2025).

10 Somalia Food Insecurity Crisis. CARE, 2024. URL: https://www.care.org/our-work/disaster-response/emergencies/somalia-food-insecurity-crisis/ (дата звернення: 12.09.2025).

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people if adequate interventions to manage these environmental crises and associated income shocks fail to make the expected impacts.

Given the inherent fragility of the Somalian economy, external shocks like drought can stimulate other income shocks, thereby compounding the overall welfare impacts. Although previous studies have descriptively explored welfare losses associated with droughts, focusing on income and livelihood losses, inadequate food access and nutritional imbalances (Ahmed & Ali, 2024; Said & Bashir, 2023 and Abdi et al., 2024), less is empirically known on the causal impacts of different income shocks on severe hunger. Therefore, empirical application of the potential outcome framework in causal inference, especially with focus on environmental hazard and other income shocks in fragile and conflict-affected settings is missing. In addition, while some previous studies have acknowledged the role of economic disruptions in shaping household welfare during crises (IFPRI, 2022; Haushofer & Shapiro, 2016), little research has modelled severe hunger using count data, despite its econometric and policy relevance.

This paper analysed the impacts of drought and other income shocks on severe hunger among households in Somalia during the COVID-19 pandemic. The object of the study is households' welfare proxied as hunger severity. The subject of the study relates to the causal relationship of drought exposure and income shocks on severe hunger. The objectives of the study are to describe exposure to drought and income shocks among Somalian households, examine the prevalence and intensity of severe hunger, and determine the impacts of drought and other income shocks on severe hunger, using a potential-outcomes treatment effects analytical framework within a Poisson regression.

Literature Review. There are several empirical studies on the impacts of drought and income shocks on households' welfare within the context of economic fragility. Development economists perceive income shocks as unexpected exogenous events that promote economic volatility through their direct impacts on households' incomes (Merrill, 2021; Saccone and Vallino, 2025). These shocks impact households' welfare from their non-anticipation nature and explicit association with households' income generating activities (Colarieti et al., 2024; Boansi et al., 2021). The literature has identified some arrays of income shocks, comprising climate-related events such as droughts and floods, health shocks (illness or death of income earners), market disruptions (price volatility, loss of employment), and some other forms of macroeconomic disturbances (Krueger et al., 2023; Colarieti et al., 2024). Within a framework of economic fragility that is being promoted by systemic conflicts, income shocks are the primary culprits of economic vulnerability (Oyadeyi et al., 2024).

Although the literature has often distinguished between idiosyncratic shocks that affect individual households and covariate shocks that affect an entire community, region or country, policy makers have shown keen interests in impacts with focus on different welfare indicators (Oyadeyi et al., 2024). Specifically, studies have explored the poverty and food security impacts of such shocks. Therefore, using the lens of food security − which has been defined as a situation in which "*all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life*" [World Health Organization (WHO), 2021] − researchers have explored the impacts of income shocks on the food accessibility pillar with focus on the economic deprivations suffered by shock-affected households through a reduction in incomes. In some other agro-pastoral settings, drought and exposure to other income shocks are closely associated with livelihood disruption. For instance, covariate shocks like drought or health pandemic such as COVID-19 or Ebola, will translate into some systemic welfare losses through reduction in households' incomes (Fleming-Muñoz et al., 2023).

It should be further emphasized that there are several studies on the impacts of income shocks on households' nutrition, expenditures and poverty. In Somalia, Ahmed and Ali (2024), Oberg et al. (2021) and Thalheimer et al. (2023) found that recurrent and prolonged droughts critically undermined food security through reduction in agricultural production. It was further emphasized that disruption to households' livelihood has disproportionately affected farming households. Said et al. (2023) also submitted that climate change is one of the significant contributors to hunger in Somalia. Omar et al. (2022) further submitted that drought in Somalia is a pervasive natural hazard with significant impacts on arid and semi-arid regions where agriculture is primarily rain-fed. Other studies with similar focus and findings are Ahmed et al. (2024) and Abdi et al. (2024).

ISSN 2524-2547 *Соціальна економіка / Social Economics*. 2025. Випуск/Issue 72

A systematic review by Damei (2023) also found that interactions of climatic shocks with structural vulnerabilities in the form of conflict, market disruptions, and displacement has primarily constrained food security in Somalia, thereby promoting reliance on humanitarian assistances. Oberg et al. (2021) found that in Somalia, the welfare of children and entire households is significantly affected by drought through increase in food insecurity, malnutrition, displacement, and progressive strain of the family support systems. The welfare implications of drought are further complicated by pre-existing conflicts and poverty. Abdi et al. (2024) also found that drought reduced the resilience and productivity of major crops in Somalia, thereby undermining food availability and food security among rural populations.

MatsuuraKannari et al. (2023) found that in rural Bangladesh, weather shocks motivated livelihood diversification which promoted per capita food expenditure. Uneven distribution of the benefits of diversification was found which promoted inconsistency in its effects on dietary diversity. Focusing on other forms of income shocks, Hassan and Abdulle (2025) used macro data and found that unemployment significantly worsens food insecurity in Somalia both in the short run and long run. Oyekale and Molelekoa (2025) examined how income shocks during the COVID19 pandemic affected food insecurity among rural households in conflictaffected states of Northern Nigeria. It was found that while many households faced significant income disruptions that worsened food insecurity, access to social protection assistance promoted reduction in severe food insecurity.

These reviews have highlighted researchers' interests in analysing food insecurity in the contexts of conflict and environmental hazards. However, a major gap exists in the failure of most of these studies to integrate some contemporary econometric procedures, focusing on potential outcome framework in estimating the direct impacts of income shocks on severe hunger. This study seeks to fill this gap given its significant policy relevance.

Research Methodology.

Data and Sampling

The data for this study were collected by the World Bank in collaboration with the United Nations High Commissioner for Refugees (UNHCR) and the National Bureau of Statistics (NBS) in Somalia. The data were collected with stratified sampling with focus on internally displaced persons (IDPs) in camps, IDPs outside camps, refugees, refugee returnees and host communities. The targeted sample size was 2,500 households, 500 from each group (World Bank, 2021-2022). Respondents provided informed consent before being interviewed. The second round of the survey, which this study used covered issues on drought with 2502 households successfully interviewed (World Bank, 2021-2022). Some limitations were identified with the data. These include reliance on phone ownership when compiling the sampling frame for some strata, non-response of some households, and a high likelihood of biasedness due to utilization of UNHCR registers in drawing the sampling frame for refugees, refugee returnees, and IDPs in camps.

Specification of the Poisson Regression Treatment Effects Models

The Poisson regression model was estimated for data analysis. This was informed by the count nature of the dependent variable which was generated from three severe food insecurity questions: in the past 30 days run out of food with nothing to eat, go sleep at night hungry, and stayed whole day without food. The responses were classified into four with the following coding formats - no = 0, yes (rarely) = 1, yes (sometimes) = 2, and yes (often) = 3). The responses for each respondent was summed as the indicator of severe food insecurity which ranges between 0 and 9. This general Poisson model can be specified as:

$$Y_i=\frac{e^{-\mu_i}\mu_i^{y}}{y!} \quad (1)$$

However, the estimated model can be stated as:

$$log\ \mu_i=a+\mathbf{X}_i'\beta+u_i. \quad (2)$$

where: comprises the explanatory variables $u_i \sim N(0, \sigma_u^2)$, is the error term behaviour denoting mean of zero and constant variance, a denotes the constant term and β are the estimated parameters. The included explanatory variables are as defined below: residence (camp is the reference and coded as nomad = 1, 0 otherwise, rural = 1, 0 otherwise, urban = 1, 0 otherwise), head age (years), household size, gender (male is the reference and coded as female = 1, 0 otherwise and both = 1, 0 otherwise), marital status (married is the reference) coded as separated = 1, 0 otherwise, divorced = 1, 0 otherwise, widow/ widower = 1, 0 otherwise, single = 1, 0 otherwise

ISSN 2524-2547 *Соціальна економіка / Social Economics.* 2025. Випуск/Issue 72

and others = 1, 0 otherwise), household member sick (yes = 1, 0 otherwise), income activities (yes = 1, 0 otherwise), looked for new job (yes = 1, 0 otherwise), income sources from family farming (yes = 1, 0 otherwise), livestock, or fishing (yes = 1, 0 otherwise), non-farm family business (yes = 1, 0 otherwise), wage employment (yes = 1, 0 otherwise), unemployment benefits (yes = 1, 0 otherwise), assistance from family within the country (yes = 1, 0 otherwise), assistance from non-family individuals (yes = 1, 0 otherwise), properties, investments or savings (yes = 1, 0 otherwise), pension (yes = 1, 0 otherwise), assistance from government (yes = 1, 0 otherwise), assistance from NGOs (yes = 1, 0 otherwise), income change (increased is the reference coded as stayed the same (yes = 1, 0 otherwise), reduced (yes = 1, 0 otherwise), and not received (yes = 1, 0 otherwise), population group (host community is the reference) coded as IDP in camp (yes = 1, 0 otherwise), IDP out of camp (yes = 1, 0 otherwise), refugee (yes = 1, 0 otherwise), returnee (yes = 1, 0 otherwise), state (Banadir is the reference) coded as Galmudug (yes = 1, 0 otherwise), Hirshabelle (yes = 1, 0 otherwise), Jubaland (yes = 1, 0 otherwise), Puntland (yes = 1, 0 otherwise), Somaliland (yes = 1, 0 otherwise), and South West State (yes = 1, 0 otherwise), impact of COVID with lost all work-related sources of income as the reference coded as work but make less (yes = 1, 0 otherwise), no impacts (yes = 1, 0 otherwise), better off (yes = 1, 0 otherwise), home safety: yes feel safe is the reference coded as yes but not always (yes = 1, 0 otherwise), no, I don't feel safe (yes = 1, 0 otherwise), safe street with yes feel safe as the reference coded as yes but not always (yes = 1, 0 otherwise), no, I don't feel safe (yes = 1, 0 otherwise) and income shocks with job loss (yes = 1, 0 otherwise), closure of non-farm business (yes = 1, 0 otherwise), theft or looting (yes = 1, 0 otherwise), farming disruption (yes = 1, 0 otherwise), input price increase (farm or business) (yes = 1, 0 otherwise), output price fall (yes = 1, 0 otherwise), non-availability of inputs (farm or business) (yes = 1, 0 otherwise), reduction of outputs (yes = 1, 0 otherwise), food price increase (yes = 1, 0 otherwise), illness, injury or death of household members (yes = 1, 0 otherwise), difficulties accessing markets (yes = 1, 0 otherwise), reduction of humanitarian assistances (yes = 1, 0 otherwise), cyclone or tropical storms (yes = 1, 0 otherwise), drought (yes = 1, 0 otherwise), locust invasion, and conflict/community violence (yes = 1, 0 otherwise).

The variables were examined for multicollinearity using the variance inflation factor (VIF).

The potential outcomes framework for ATE and ATET

This framework provides the conceptual basis for estimating causal effects when treatment is not randomly assigned. For each unit *i*, two potential outcomes exist which are : the outcome if the unit receives the treatment and : the outcome if the unit does not receive the treatment. Therefore, since only one of these is observed for each unit, there is the fundamental

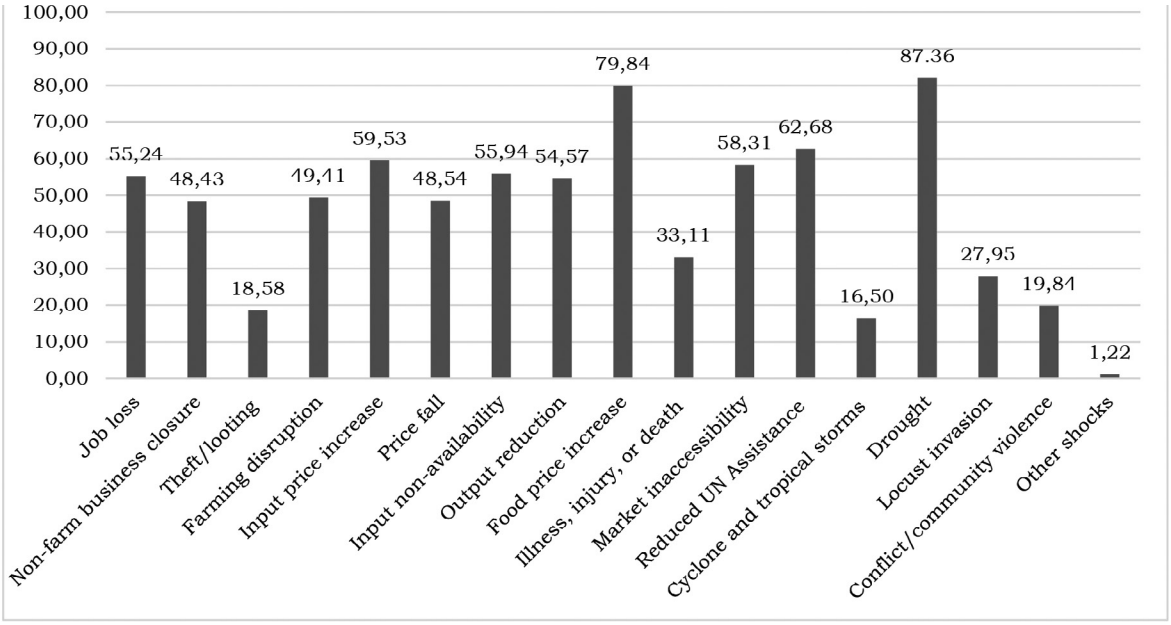

Fig. 1. Somalis exposure to different form of income shocks

Source: compiled by the author based on Data from the World Bank, 2021-2022 (https://data.worldbank.org/)

problem of causal inference. Therefore, estimation of the causal effects requires the use of the conditional independence assumption (CIA) or unconfoundedness, which states that, conditional on observed covariates , treatment assignment is independent of the potential outcomes. Therefore, the following parameters can be computed.

Average Treatment Effect (ATE)

ATE measures the expected effect of the treatment on the entire population:

$$ATE=E[Y(1)-Y(0)]. \quad (3)$$

Under the potential outcomes setup and conditional independence:

$$ATE=E_X\,[\mathrm{E}(Y|D=1,X)-E(Y|D=0,X)]. \quad (4)$$

The ATE thus reflects how the outcome would change if everyone received the treatment compared to if no one did.

Average Treatment Effect on the Treated (ATET): This estimates the effect of the treatment only for those who actually received it.

$$ATET=E[Y(1)-Y(0)\,|\,D=1]. \quad (5)$$

When observed data are used and following the CIA assumption:

$$ATET=E[Y|D=1]-E_X\,[E(Y|D=0,X)\,|\,D=1]. \quad (6)$$

Main Results.

Income shock exposure

Figure 1 shows the distribution of the different forms of income shocks that households got exposed to. It reveals that 87.36% indicated drought, which also has the highest percentage. This shows that the 2022 drought affected many households in Somalia (Harris, 2023). The Figure further reveals that food price increase affected 79.84% of the households. This emphasizes the submission of Adem et al. (2025) and Mayhew et al. (2023) who indicated food price increase as one of the consequences of drought. Furthermore, 62.68% indicated reduction in humanitarian assistances as one of the major shocks they faced during the drought. This emphasizes the fact that the drought occurred at a time when the global communities were recovering from the economic devastating impacts of the COVID-19 pandemic. Therefore, the global challenges of sustaining human welfare, sequel to several socio-economic impacts of COVID-19 resulted in escalation in humanitarian and social protection budgets (Devereux, 2021). In addition, significant number of the respondents lost their jobs (55.24%), faced increase in the prices of input prices (59.53%), could not procure needed inputs (55.94%), recorded reduction in output (54.57%), and unable to access markets (58.31%). Reduction in price of commodities being sold was reported by 48.54% of the respondents, while theft/looting of properties (18.58%), conflicts/community violent (19.84%) and tropical cyclone/storms (16.50%) were the least reported shocks.

Figure 2 shows the proportions of households who experienced drought across their states of residence and population groups. The results showed significant spatial differences with more than 90% exposure rates in Banadir,

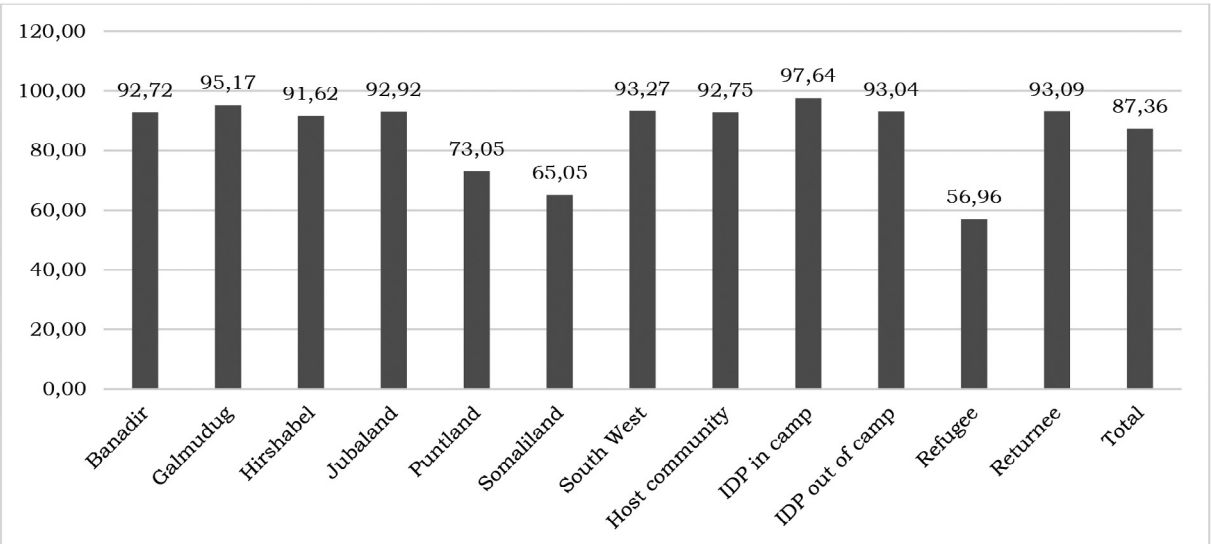

Fig. 2. Exposure to drought across states and population groups in Somalia

Source: compiled by the author based on Data from the World Bank, 2021-2022 (https://data.worldbank.org/)

ISSN 2524-2547 *Соціальна економіка / Social Economics.* 2025. Випуск/Issue 72

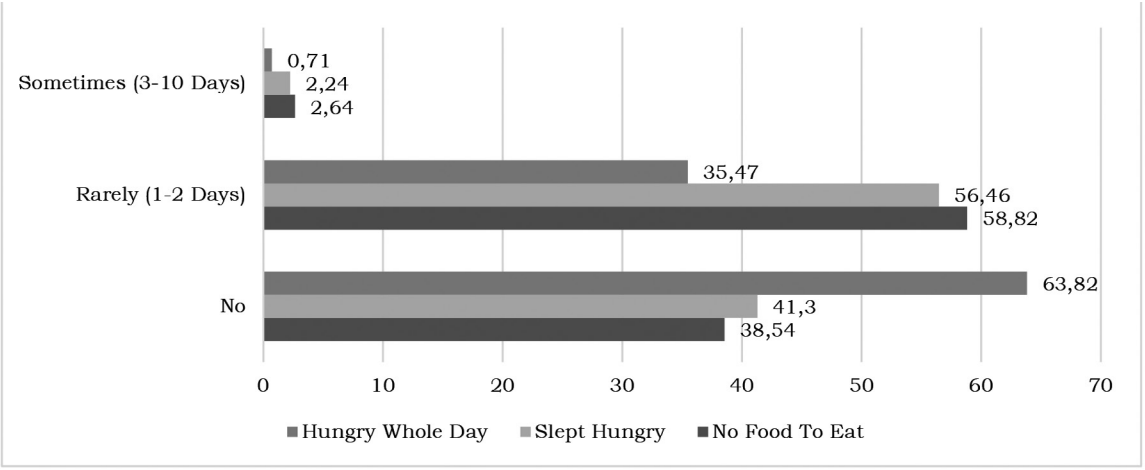

Fig. 3. Distribution of households' experience of severe hunger

Source: compiled by the author based on Data from the World Bank, 2021-2022 (https://data.worldbank.org/)

Galmudug, Hirshabel and Jubaland. However, Puntland (73.05%) and Somaliland (65.05%) had the lowest rates of exposure. These results are properly aligned with the fact that the central and southern regions of Somalia are notably the hot spots of drought and associated economic problems (Musei et al., 2021; Muse et al., 2023). In addition, although also known for its high drought vulnerability (Omar et al., 2024), low exposure of households from Somaliland could be attributed to existence of water infrastructure, enhanced mobility of pastoralists and utilization of early-warning mechanisms.

The Figure also shows that based on population group, refugees had the least exposure to drought at 56.96%. Specifically, most of the IDP in camp, IDP out of camp, host community members and returnees experienced drought in the past six months. There are different contextual issues with relevance to the impacts of drought on households with different residential status in Somalia. Specifically, it had been shown that drought disproportionately affects internally displaced people, returnees and the host communities, while urban/peri-urban refugees often present lower exposure (Mugera & Yoshimura, 2023; World Bank - UNHCR Joint Data Center on Forced Displacement, 2024[1]; International Organization for Migration (IOM), 2023[2]).

Hunger Severity Distribution

The results in Figure 3 show the distribution of severe food insecurity focusing on three indicators in the Food Insecurity Experience Survey (FIES), which are households having no food in the dwelling, household members sleeping hungry, and household members going a whole day and night without eating. These indicators reflect severe incidences of food insecurity among Somalian households during the drought. The results revealed that 38.5% of the households had no experience food exhaustion, while 58.8% rarely experienced it. This indicates that majority of the households had in one time or the other experienced complete depletion of food. The gravity of this experience in the context of drought and human displacement perfectly underscores growing financial stress (Mayhew et al., 2023; Hussein et al., 2025). In addition, depletion of food stock reflects inherent supply instability that is associated with disruption of human livelihoods by drought and reduction in households' purchasing power (Food and Agriculture Organization of the United Nations (FAO), 2025[3]; Mugera & Yoshimura, 2023; World Bank - UNHCR Joint Data Center on Forced Displacement, 2024[4]).

1 Livelihoods Lost: Displacement and drought in Somalia — Somalia Displacement Report. World Bank–UNHCR Joint Data Center on Forced Displacement, 2024. URL: https://www.jointdatacenter.org/wp-content/uploads/2024/11/Somalia-displacement-report_FINAL.pdf (дата звернення: 12.09.2025).

2 IOM Progress Report 2023. International Organization for Migration (IOM), 2023. URL: https://dtm.iom.int/sites/g/files/tmzbdl1461/files/progress/PROGRESS%20REPORT%202023.pdf (дата звернення: 12.09.2025).

3 Somalia: Drought, conflict and high food prices risk pushing 4.4 million people into hunger, the Federal Government of Somalia and UN warn. Food and Agriculture Organization of the United Nations (FAO), 2025, February 26. URL: https://www.fao.org/newsroom/detail/somalia--drought--conflict-and-high-food-prices-risk-pushing-4.4-million-people-into-hunger--the-federal-government-of-somalia-and-un-warn/ (дата звернення: 12.09.2025).

4 Livelihoods Lost: Displacement and drought in

It should be further noted that 41.30% of the households indicated never to have experienced sleeping hungry, while 56.50% experienced it rarely. Based on spending an entire day and night without eating, 63.80% never experienced this, while 35.50% rarely experienced it. It should be emphasized that despite that majority of the households did not experience these severe levels of food insecurity, occasionally having such problem indicate a detestable food problem. These findings underscore the depth of food problems that is often associated with drought and other environmental hazards (Ahmed et al., 2024).

Determinants of Severe Food Insecurity

Table 1 shows the results of Poisson regression analysis. It reveals that the Likelihood ratio Chi-Square statistics is statistically significant ($p<0.01$). This implies that the model produced a good fit. The model was also tested for overdispersion using the *estat gof* command in STATA 17. The results of the Pearson chi-square statistic and Deviance chi-square statistic both confirm that over-dispersion was not a problem ($p>0.10$). The computed variance inflation factor (VIF) further reveals that multicollinearity was not a problem among the included explanatory variables.

The results in Table 1 showed that among the included income sources as explanatory variables, only the parameter of unemployment benefits showed statistical significance ($p<0.05$). This indicate that expected hunger severity was higher among those who received unemployment benefits. In addition, the parameter of looked for new job also shows statistical significance ($p<0.10$) with positive sign. This implies that those who were looking for new jobs had a higher expected hunger severity. These findings reflect the inherent vulnerability of recipients of unemployment benefits and those in search of new jobs. Specifically, in absence of functioning insurance, the finding is a pointer to the tendency of unemployment in promoting poverty and food insecurity in Somalia. In some similar findings, households who reported reduction in income had higher expected hunger severity ($p<0.05$), while those who engaged in some economic activities had lower expected hunger severity ($p<0.01$). These findings are in alignment with some previous studies that buttressed the role of employment as one of the major socioeconomic drivers of poverty alleviation and food security in Somalia (Abdi et al., 2025).

Based on some demographic variables, the results showed that compared to those who were married, households with separated heads had higher expected hunger severity ($p<0.05$). Precisely, separation constitutes disruption of livelihood activities with ultimate impacts on the flow of financial resources. Therefore, in absence of sufficient savings and in the contexts of drought, separated individuals may face significant financial hardship without eligibility to claim any social benefits. This is in alignment with findings by several authors such as Zhao et al., 2024; Mengistu and Kassie (2022) and Dallmann et al. (2023). However, contrary to expectation, the parameters of divorced is with negative sign and statistically significant ($p<0.10$). This shows that divorced household heads had lower expected hunger severity, compared with their married counterparts. This finding shows that divorced household heads may have undergone full readjustment of their livelihoods with possibility of establishing some new support systems, secured independent income sources, or stabilized housing and living arrangements.

The results in Table 1 show that compared to those in camps, urban residents had lower expected hunger severity ($p<0.10$). This reflects presence of better economic opportunities in urban areas. More importantly, urban residents are often equipped with skills required for gainful employment in the formal and informal sectors. This finding agrees with those of Abdi et al. (2022) and Lin et al. (2022) who found urban residents to have better food security than their rural counterparts. It also agrees with those Hussein (2021), who linked better food security of urban residents in Somalia to remittances and better markets access. The results also reveal that households who were returnees had higher expected hunger severity, when compared with host community households. In a related finding, Osman (2023) submitted that displacement of rural households to urban areas shifts poverty vulnerability to urban areas, with IDP are often food insecure while urban households are often better food secured.

In addition, compared to those from Banadir, households from Puntland and

Somalia — Somalia Displacement Report. World Bank–UNHCR Joint Data Center on Forced Displacement, 2024. URL: https://www.jointdatacenter.org/wp-content/uploads/2024/11/Somalia-displacement-report_FINAL.pdf (дата звернення: 12.09.2025).

Somaliland had significantly higher expected hunger severity ($p<0.05$). These findings are associated with peculiar climatic conditions in these states that predispose them to higher vulnerability to drought. Specifically, Puntland and Somaliland are dominated by pastoral and agro-pastoral farmers who are mostly vulnerable to drought-induced livestock losses with ultimate impacts on food security[1]. In addition, compared to Banadir, Puntland and Somaliland are characterized by weak market access, poor food supply infrastructure, and low economic diversification (Abdi et al., 2025).

Based on home and street security, the results showed that those who felt unsafe in streets and not always safe in streets and homes had higher expected severe food insecurity[2]. This emphasizes the importance of human safety, which remains a major problem in many parts of Somalia (Kinyoki et al., 2017). Specifically, human mobility and daily economic activities are disrupted by insecurity with consequential impacts on food security[3]. This cannot be overemphasized in Somalia, where human displacement remains a major economic bottleneck and there is growing need of humanitarian assistances[4].

Impacts of Income Shocks on Severe Food Insecurity

The impacts of income shocks on severe food insecurity are presented in Table 2 with estimation of the ATE and ATET. The results showed that most of the estimated parameters of ATE and ATET are positive and statistically significant ($p<0.05$). Therefore, income shocks are directly associated with severe food insecurity. Specifically, the result indicate that the ATE for non-farm business closure shows that those who were affected by it had their expected severe food insecurity index being higher by 0.1704. The ATET also shows that expected severe food insecurity index among affected households was 0.3617 higher, compared to if they were not affected. Closure of non-farm businesses was one of the major features of households' coping strategies during the COVID-19 pandemic (Kotikula et al., 2025; FAO, 2025[5]).

The ATE and ATET parameters for exposure to theft/looting of properties are positively signed ($p<0.01$). The result for ATE indicates that compared to the control group, the expected severe food insecurity index for those affected by theft/looting of properties was higher by 0.2623. Also, the ATET implies that affected households had their expected severe food insecurity index being higher by 0.7444, compared to if they were never affected. It should be noted that insurgencies are often associated with destruction of people's properties and looting (Bakonyi, 2010). This often leaves affected households financially stranded having lost their sources of livelihood (Rohwerder, 2014).

The results also showed that the ATE and ATET for the increase in prices of farming/business inputs shock are with positive sign ($p<0.05$). These results indicate that compared to the control group, the expected severe food insecurity index for those affected by increase in prices of farming/business inputs was higher by 0.2263. Also, the ATET shows that the expected severe food insecurity index was higher by 0.4404 among affected households, compared to if they were not affected. The results further showed that the estimated ATE and ATET for non-availability of farming/business inputs are statistically significant ($p<0.05$). These results indicate that affected households had their expected severe food insecurity index being higher by 0.2041, compared to the control group. In addition, for ATET, affected households had their expected severe food insecurity index being higher by 0.3898, compared to if they were never affected. Although COVID-19 brought about changes in the prices and availability of business inputs, the magnitude of these changes are further aggravated by drought. The implication is that given inherent economic vulnerability, some businesses operated below their optimum economic efficiency scale, while other eventually closed (Bareisaite et al., 2021; United Nations Development Programme & Federal

1 Somalia Food Security Outlook: February–September 2023. FEWS NET, 2023. URL: https://fews.net/east-africa/somalia/food-security-outlook/february-2023 (дата звернення: 12.09.2025).

2 Somalia hunger crisis report – March 2025. World Food Programme (WFP), 2025.

3 Somalia hunger crisis report – March 2025. World Food Programme (WFP), 2025.

4 Somalia Food Security Outlook: February–September 2023. FEWS NET, 2023. URL: https://fews.net/east-africa/somalia/food-security-outlook/february-2023 (дата звернення: 12.09.2025).

5 Somalia: Drought, conflict and high food prices risk pushing 4.4 million people into hunger, the Federal Government of Somalia and UN warn. Food and Agriculture Organization of the United Nations (FAO), 2025, February 26. URL: https://www.fao.org/newsroom/detail/somalia--drought--conflict-and-high-food-prices-risk-pushing-4.4-million-people-into-hunger--the-federal-government-of-somalia-and-un-warn/ (дата звернення: 12.09.2025).

Government of Somalia, 2021[1]; World Bank, 2022[2]; World Bank, 2023[3]).

In addition, households who were affected by increase in the prices of major food items had their expected severe food insecurity index being higher by 0.3953. when compared with unaffected households. Also, the expected severe food insecurity index for households that were affected by increase in price of major food items, was higher by 0.4284, compared to if they never got exposed. One of the major sources of economic hardships during the COVID-19 pandemic was increase in food prices (Ziliak, 2021). This was aggravated by distortion of the essential supply and demand channels (Aday et al., 2020). Therefore, inflation promoted hunger among some households due to reduced purchasing power, with more daring consequences initiated by drought (Mohamed et al., 2024).

Similarly, compared to the control group, households that were affected by illness, injury, or death of income earning members had their expected severe food insecurity index higher by 0.3445. However, the ATET indicates that affected households had their expected severe food insecurity index being higher by 0.5800, compared to if they were never affected. These results highlight the seriousness of food security implications of illness or death of a breadwinner or an income generating member. In the context of drought and COVID-19, the implication can be more severe due to predominance of household resource depletion and erosion of savings (Salvador et al., 2023).

One of the major features of COVID-19 time was drastic reduction in humanitarian assistances to vulnerable

Table 1. Results of Poisson regression model of the determinants of severe food insecurity

Variables	Coeff	Std Error	z-stat
1	2	3	4
Residence (Camp is the reference)			
Nomad	-.1383	0.1366	-1.01
Rural	-.0842	0.0806	-1.05
Urban	-.1331*	0.0697	-1.91
Head age	-.0004	0.0013	-0.31
Household size	-.0061	0.0053	-1.16
Gender (male is the reference)			
Female	.0115	0.0366	0.31
Both	-.1245	0.4532	-0.27
Marital status (Married is the reference)			
Separated	.1569***	0.0629	2.49
Divorced	-.1401*	0.0822	-1.71
Widow/Widower	.0022	0.0659	0.03
Single	-.0795	0.1075	-0.74
Others	-.5187	0.5853	-0.89
Household member sick	.0668	0.0419	1.60
Income activities	-.2924***	0.0425	-6.88
Looked for new job	.0614*	0.0356	1.73
Income sources			
Family farming, livestock, or fishing	-.0726	0.0508	-1.43
Non-farm family business	-.0523	0.0604	-0.87
Wage employment	-.0218	0.0482	-0.45
Unemployment benefits	.1452**	0.0665	2.18
Assistance from family within the country	.0152	0.0505	0.30
Assistance from non-family individuals	.0028	0.0517	0.06
Properties, investments or savings	.1484	0.2188	0.68
Pension	-.0668	0.0978	-0.68
Assistance from government	-.1433	0.1360	-1.05
Assistance from NGOs	-.0633	0.0596	-1.06
Income change (Increased is the reference)			
Stayed the same	-.0121	0.0797	-0.15
Reduced	.2417***	0.0773	3.13
Not received	-.1225	0.1766	-0.69
Population group (host community is the reference)			
IDP in camp	.1083	0.0804	1.35
IDP out of camp	.0105	0.0585	0.18
Refugee	.0947	0.0758	1.25
Returnee	.1393**	0.0664	2.10

1 Somalia Socio-Economic Impact Assessment (SEIA) of COVID-19. UNDP Somalia. United Nations Development Programme & Federal Government of Somalia, 2021.

2 Somalia's Economy Expected to Grow Despite Significant Shocks. World Bank. Press Release, November 29, 2022.

3 Somalia's Economy Resilient Amid Climatic and Global Shocks: Water Management Key to Sustainable and Resilient Development. World Bank. Press Release, November 30, 2023.

ISSN 2524-2547 *Соціальна економіка / Social Economics*. 2025. Випуск/Issue 72

Continuation Table 1

1	2	3	4
State (Banadir is the reference)			
Galmudug	.0375	0.0903	0.42
Hirshabelle	-.0612	0.0870	-0.70
Jubaland	.0625	0.0617	1.01
Puntland	.1668**	0.0725	2.30
Somaliland	.1503**	0.0722	2.08
South West State	.0816	0.0531	1.54
Impact of COVID : Lost all work-related sources of income is the reference			
Work but make less	-.1788***	0.0460	-3.89
No impacts	-.4176***	0.0764	-5.46
Better off	-.0629	0.1139	-0.55
Home safety: Yes feel safe is the reference			
Yes but not always	.1015*	0.0526	1.93
No, I don't feel safe	.1206	0.0883	1.37
Safe street Yes feel safe is the reference) Yes but not always	.3512***	0.0533	6.59
No, I don't feel safe	.4105***	0.0860	4.77
Income shocks			
Job loss	.1864***	0.0436	4.28
Closure of non-farm business	.0623	0.0499	1.25
Theft or looting	.1557***	0.0512	3.04
Farming disruption	.0551	0.0520	1.06
Input price increase (farm or business)	-.0009	0.0539	-0.02
Output price fall	-.0384	0.0532	-0.72
Non-availability of inputs (farm or business)	.0356	0.0606	0.59
Reduction of outputs	-.0287	0.0594	-0.48
Food price increase	.2208***	0.0544	4.06
Illness, injury or death of household members	.1773***	0.0464	3.82
Difficulties accessing markets	-.1128**	0.0449	-2.52
Reduction of humanitarian assistances	.0583	0.0435	1.34
Cyclone or tropical storms	.3696***	0.0553	6.68
Drought	.0869*	0.0531	1.64
Locust invasion	.0619	0.0483	1.28
Conflict/community violence	.0138	0.0507	0.27
Other events	-.3066**	0.1549	-1.98
Constant	-.3221**	0.1444	-2.23
Number of obs = 2,505			
LR chi2(62) = 955.67			
Prob > chi2 = 0.0000			
Log likelihood = -3534.7795			
VIF = 2.04			

Notes: *** - statistically significant at 1%, ** - statistically significant at 5%, *** - statistically significant at 10%

Source: results generated from data from the World Bank, 2021-2022 (https://data.worldbank.org/)

households (Poole et al., 2020). The results for reduction of assistance from UN agencies only showed statistical significance ($p<0.01$) in the ATE. This indicates that compared to the control group, households which were affected by reduction of assistances from UN agencies had their expected severe food insecurity index being higher by 0.2252. Therefore, in absence of supplementary incomes from alternative livelihoods, some households' financial resources were depleted with significant impacts on their food security status (Cardwell & Ghazalian, 2020).

The ATE and ATET for cyclone and tropical storms in coastal areas also showed statistical significance ($p<0.01$). The results indicate that compared to the control group, the households who were affected by cyclone and tropical storms in coastal areas had their expected severe food insecurity index being higher by 0.4935. Also, the households who were affected by cyclone and tropical storms had their expected severe food insecurity index being higher by 0.9171, compared to if they were never affected. The ATE and ATET for being affected by drought are statistically significant ($p<0.10$). These results indicate that compared to the control group, those households that were affected by drought had their expected severe food insecurity index being higher by 0.2229. However, compared to if they were never affected, being affected by drought resulted into the expected severe food insecurity index higher by 0.2453. These results concur with the expected negative impact of environmental hazards on households' income and food security (Gumucio et al., 2022). Specifically, while drought universally impacted households in Somalia, cyclone and tropical storms are often location specific (Nor, 2025). The findings attest to significant welfare consequences of some environmental hazards, and their grave impacts in a fragile economy like Somalia (Anisa, 2021).

In addition, some households were affected by locust invasion. The ATET shows statistical significance

Table 2. ATE and ATET of the Impacts of Income Shocks on Severe Food Insecurity

	ATE		ATET	
Income Shocks	Coef.	z-stat	Coef.	z-stat
Job loss	.4793***	7.87	.6532***	7.64
Non-farm business closure	.1704**	2.22	.3617***	3.65
Theft/looting of properties	.2623***	3.01	.7444***	7.49
Farming disruption	.0313	0.43	.2568**	2.31
Increase in price of farming/business inputs	.2263***	2.83	.4404***	3.82
Fall in the price of farming/business output	-.0040	-0.05	.1477	1.21
Lack of availability of farming/business inputs	.2041**	2.24	.3898***	2.93
Reduction of farming/business output	.0991	1.15	.3246**	2.53
Increase in price of major food items consumed	.3953***	4.26	.4283***	3.88
Illness, injury, or death of income earning members	.3445***	4.89	.5800***	5.28
Affected by Difficulty of accessing markets	-.1158	-1.33	-.1122	-0.82
Reduction of assistance from UN agencies	.2252***	3.63	-	-
Cyclone and tropical storms in coastal areas	.4935***	4.65	.9171***	8.15
Affected by drought	.2229*	1.85	.2453*	1.72
Locust invasion	-.0013	-0.01	.2422***	3.12
Conflict/community violence	.1212	1.52	.1159	1.05

Notes: *** - statistically significant at 1%, ** - statistically significant at 5%, *** - statistically significant at 10%

Source: results generated from data from the World Bank, 2021-2022 (https://data.worldbank.org/)

($p<0.01$). Therefore, the result implies that compared to the control group, those affected by locust invasion had their expected severe food insecurity being higher by 0.2422. The implication is that locust invasion produces significant impacts on the food security status among the affected households, whereas such impacts become diluted within the entire population. Similar results were found for farming disruption and reduction of farming /business outputs, where the ATEs are not statistically significant but the ATETs do. These imply that compared with the control group, households whose farming activities were disrupted and had reduction of farming /business outputs had their expected severe food insecurity index higher by 0.2041 and 0.3246, respectively. These findings underscore the significant impacts of farming activities' disruption such as that produced by locust invasion on food security (Xu et al., 2021; Khan et al., 2023).

Conclusion. The objective of this study was to analyse the impacts of drought and a wide range of income-related shocks on the severity of hunger among households in Somalia. The Poisson regression treatment-effects was used with potential outcomes framework. The results demonstrate that drought remained the most widespread income shock during the 2022 crisis and severe food insecurity was widespread. The regression results showed that several income shocks significantly promoted expected hunger severity. These findings reaffirm the multidimensional nature of welfare erosion in Somalia, where environmental hazards interact with economic disruptions to weaken household economic resilience. The analysis also reveals that certain socioeconomic characteristics have significant influence on severe hunger. Overall, the findings point to a broader policy message: in fragile and shock-prone settings like Somalia, food insecurity is not driven by single shocks but by overlapping crises. Effective responses must therefore integrate climate adaptation, livelihood protection, market stabilization, and expansion of predictable, well-targeted social protection. This study contributes to the growing empirical literature on climate shocks, economic fragility, and food insecurity in conflict-affected environments through a carefully estimated econometric model taking into cognizance the need for parameter compliance with being best, linear and unbiased estimator.

ISSN 2524-2547 *Соціальна економіка / Social Economics*. 2025. Випуск/Issue 72

Список використаної літератури

1. Abdi, A. H., Sugow, M. O., & Halane, D. R. (2024). Exploring climate change resilience of major crops in Somalia: implications for ensuring food security. International Journal of Agricultural Sustainability, 22(1), Article 2338030. https://doi.org/10.1080/14735903.2024.2338030
2. Abdi, Y. H., Abdullahi, Y. B., Abdi, M. S., Bashir, S. G., Ahmed, N. I., Alasow, A. A., & Hassan, G. D. (2025). Regional disparities and sociodemographic determinants of food insecurity in Somalia: a secondary cross-sectional analysis of a National survey. Journal of Health, Population and Nutrition, 44(1), 1-11. https://doi.org/10.1186/s41043-025-01078-9
3. Abdullahi, A. M., Nor, F. I., & Abdullahi, A. M. (2024). Climate-induced humanitarian crisis, assessing the impact of recent floods and disease outbreaks in Somalia. Annals of Medicine and Surgery, 86(7), 3806-3807. http://dx.doi.org/10.1097/MS9.0000000000002139
4. Aday, S., & Aday, M. S. (2020). Impact of COVID-19 on the food supply chain. *Food Quality and Safety, 4*(4), 167–180. https://doi.org/10.1093/fqsafe/fyaa024
5. Ahmed, A. H., & Ali, I. I. (2024). The impact of drought on food security in Somalia: A comprehensive review. *Current Research in Environmental Science & Eco Letters, 1*(2), 1–9.
6. Ahmed, M. M., Asowe, H. A., Dirie, N. I., Mohamud, A. K., Lucero-Prisno, D. E. III, Okesanya, O. J., Ogaya, J. B., Musa, S. S., Musa, M. K., Othman, Z. K., & Shomuyiwa, D. (2024). The nexus of climate change, food insecurity, and conflict in Somalia: A comprehensive analysis of multifaceted challenges and resilience strategies. *F1000Research, 13*, 913. https://doi.org/10.12688/f1000research.154400.1
7. Ali, A., Hashi, A. A., & Ali, M. H. (2025). Spatiotemporal variability of meteorological droughts and pasture resilience in Somalia. *Discover Sustainability, 6*(1), 260. https://doi.org/10.1007/s43621-025-01530-0
8. Anisa, H. (2021). *The influence of political instability on environmental governance at the Horn of Africa: A case study of Somalia* (Doctoral dissertation, University of Nairobi). University of Nairobi Repository.
9. Bakonyi, J. (2010). Between protest, revenge and material interests: A phenomenological analysis of looting in the Somali war. *Disasters, 34*(s1), S238–S255. https://doi.org/10.1111/j.1467-7717.2010.01156.x
10. Bareisaite, A., Aga, G., & Ahad, T. (2021, January 13). *Coronavirus and fragility: The impact of COVID-19 on Somalia's private sector*. World Bank. https://blogs.worldbank.org/africacan/coronavirus-and-fragility-impact-covid-19-somalias-private-sector
11. Cardwell, R., & Ghazalian, P. L. (2020). COVID-19 and international food assistance: Policy proposals to keep food flowing. *World Development, 135*, 105059. https://doi.org/10.1016/j.worlddev.2020.105059
12. Dallmann, D., Marquis, G. S., Colecraft, E. K., & Dodoo, N. D. (2023). Marital transition is associated with food insecurity, low dietary diversity, and overweight in a female population in rural Ghana. *African Journal of Food, Agriculture, Nutrition and Development, 23*(1), 22149–22171. https://doi.org/10.22004/ag.econ.340640
13. Damei, M. Y. (2023). Food insecurity in Somalia: A systematic review on causes and consequences. *Journal of Research in Business and Management, 11*(11), 41–49.

References

1. Abdi, A. H., Sugow, M. O., & Halane, D. R. (2024). Exploring climate change resilience of major crops in Somalia: implications for ensuring food security. International Journal of Agricultural Sustainability, 22(1), Article 2338030. https://doi.org/10.1080/14735903.2024.2338030
2. Abdi, Y. H., Abdullahi, Y. B., Abdi, M. S., Bashir, S. G., Ahmed, N. I., Alasow, A. A., & Hassan, G. D. (2025). Regional disparities and sociodemographic determinants of food insecurity in Somalia: a secondary cross-sectional analysis of a National survey. Journal of Health, Population and Nutrition, 44(1), 1-11. https://doi.org/10.1186/s41043-025-01078-9
3. Abdullahi, A. M., Nor, F. I., & Abdullahi, A. M. (2024). Climate-induced humanitarian crisis, assessing the impact of recent floods and disease outbreaks in Somalia. Annals of Medicine and Surgery, 86(7), 3806-3807. http://dx.doi.org/10.1097/MS9.0000000000002139
4. Aday, S., & Aday, M. S. (2020). Impact of COVID-19 on the food supply chain. *Food Quality and Safety, 4*(4), 167–180. https://doi.org/10.1093/fqsafe/fyaa024
5. Ahmed, A. H., & Ali, I. I. (2024). The impact of drought on food security in Somalia: A comprehensive review. *Current Research in Environmental Science & Eco Letters, 1*(2), 1–9.
6. Ahmed, M. M., Asowe, H. A., Dirie, N. I., Mohamud, A. K., Lucero-Prisno, D. E. III, Okesanya, O. J., Ogaya, J. B., Musa, S. S., Musa, M. K., Othman, Z. K., & Shomuyiwa, D. (2024). The nexus of climate change, food insecurity, and conflict in Somalia: A comprehensive analysis of multifaceted challenges and resilience strategies. *F1000Research, 13*, 913. https://doi.org/10.12688/f1000research.154400.1
7. Ali, A., Hashi, A. A., & Ali, M. H. (2025). Spatiotemporal variability of meteorological droughts and pasture resilience in Somalia. *Discover Sustainability, 6*(1), 260. https://doi.org/10.1007/s43621-025-01530-0
8. Anisa, H. (2021). *The influence of political instability on environmental governance at the Horn of Africa: A case study of Somalia* (Doctoral dissertation, University of Nairobi). University of Nairobi Repository.
9. Bakonyi, J. (2010). Between protest, revenge and material interests: A phenomenological analysis of looting in the Somali war. *Disasters, 34*(s1), S238–S255. https://doi.org/10.1111/j.1467-7717.2010.01156.x
10. Bareisaite, A., Aga, G., & Ahad, T. (2021, January 13). *Coronavirus and fragility: The impact of COVID-19 on Somalia's private sector*. World Bank. https://blogs.worldbank.org/africacan/coronavirus-and-fragility-impact-covid-19-somalias-private-sector
11. Cardwell, R., & Ghazalian, P. L. (2020). COVID-19 and international food assistance: Policy proposals to keep food flowing. *World Development, 135*, 105059. https://doi.org/10.1016/j.worlddev.2020.105059
12. Dallmann, D., Marquis, G. S., Colecraft, E. K., & Dodoo, N. D. (2023). Marital transition is associated with food insecurity, low dietary diversity, and overweight in a female population in rural Ghana. *African Journal of Food, Agriculture, Nutrition and Development, 23*(1), 22149–22171. https://doi.org/10.22004/ag.econ.340640
13. Damei, M. Y. (2023). Food insecurity in Somalia: A systematic review on causes and consequences. *Journal of Research in Business and Management, 11*(11), 41–49.

14. Devereux, S. (2021). Social protection responses to COVID-19 in Africa. *Global Social Policy, 21*(3), 421–447. https://doi.org/10.1177/14680181211021260

15. Dirie, K. A., Maamor, S., & Alam, M. M. (2024). Impacts of climate change in post-conflict Somalia: Is the 2030 Agenda for SDGs endangered? *World Development Perspectives, 35*, 100598. https://doi.org/10.1016/j.wdp.2024.100598

16. Gumucio, T., Greatrex, H., & Lentz, E. (2022). Causal chains linking weather hazards to disasters in Somalia. *Weather, Climate, and Society, 14*(3), 849–860. https://doi.org/10.1175/WCAS-D-21-0165.1

17. Harris, E. (2023). Drought caused 43,000 deaths in Somalia in 2022, half among children. *JAMA, 329*(15), 1249. https://doi.org/10.1001/jama.2023.5260

18. Hassan, A. O., & Abdulle, A. S. (2025). Investigating the nexus between unemployment and food insecurity in Somalia. *Discover Sustainability, 6*, 1377. https://doi.org/10.1007/s43621-025-02393-1

19. Hussein, M., Law, C., & Fraser, I. (2021). An analysis of food demand in a fragile and insecure country: Somalia as a case study. *Food Policy, 101*, 102092. https://doi.org/10.1016/j.foodpol.2021.102092

20. Hussein, S. A., Osman, M. M., Abdulle, Y. S., Hussein, A. A., Afrah, T. A., Mohamed, A. H., Adem, R., Hayle, A. A., Ali, A. N., Mohamud, M. F. Y., & Ali, A. A. (2025). The human cost of drought—Children at risk: A call to action for Somalia. *Disaster Medicine and Public Health Preparedness, 19*, e120.https://doi.org/10.1017/dmp.2025.122

21. Jamil, S., Mohammadnezhad, M., & Muhammad, F. (2025). Can Somalia avert a food security catastrophe? *The Lancet, 405*(10492), 1814. https://doi.org/10.1016/S0140-6736(25)00713-5

22. Khan, I., Ullah, W., Karami, A., Qazi, I., & Ahamad, I. (2023). Analyze the socioeconomic consequences of locust outbreaks on agriculture, rural communities, and food security. *Indus Journal of Animal and Plant Sciences, 1*(1), 14–20.

23. Kinyoki, D. K., Moloney, G. M., Uthman, O. A., Kandala, N. B., Odundo, E. O., & Noor, A. M. (2017). Conflict in Somalia: Impact on child undernutrition. *BMJ Global Health, 2*(2), e000262. https://doi.org/10.1136/bmjgh-2016-000262

24. Kotikula, A., Pournik, M., & Yoshimura, K. (2021). *Somalia* (No. 36767). The World Bank Group. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/367671

25. Lin, T. K., Kafri, R., Hammoudeh, W., Mitwalli, S., Jamaluddine, Z., Ghattas, H., Giacaman, R., & Leone, T. (2022). Pathways to food insecurity in the context of conflict: The case of the occupied Palestinian territory. *Conflict and Health, 16*(1), 38. https://doi.org/10.1186/s13031-022-00470-0

26. Matsuura Kannari, M., Luh, Y.-H., & Islam, A. H. M. S. (2023). Weather shocks, livelihood diversification, and household food security: Empirical evidence from rural Bangladesh. *Agricultural Economics, 54*(4), 455–470. https://doi.org/10.1111/agec.12776

27. Mayhew, L., Alasia, I. J., Opitz-Stapleton, S., Dagane, I. A., Mbeche, I., Abdi, M., Sheik, S. Y. N., Harir, A. M., Hassan, A. S., & Egemonye, O. (2023). *Somalia: Drought and rising costs take hold*. SPARC Issue Brief. Overseas Development Institute. https://odi.org/en/publications/somalia-drought-and-rising-costs-take-hold

14. Devereux, S. (2021). Social protection responses to COVID-19 in Africa. *Global Social Policy, 21*(3), 421–447. https://doi.org/10.1177/14680181211021260

15. Dirie, K. A., Maamor, S., & Alam, M. M. (2024). Impacts of climate change in post-conflict Somalia: Is the 2030 Agenda for SDGs endangered? *World Development Perspectives, 35*, 100598. https://doi.org/10.1016/j.wdp.2024.100598

16. Gumucio, T., Greatrex, H., & Lentz, E. (2022). Causal chains linking weather hazards to disasters in Somalia. *Weather, Climate, and Society, 14*(3), 849–860. https://doi.org/10.1175/WCAS-D-21-0165.1

17. Harris, E. (2023). Drought caused 43,000 deaths in Somalia in 2022, half among children. *JAMA, 329*(15), 1249. https://doi.org/10.1001/jama.2023.5260

18. Hassan, A. O., & Abdulle, A. S. (2025). Investigating the nexus between unemployment and food insecurity in Somalia. *Discover Sustainability, 6*, 1377. https://doi.org/10.1007/s43621-025-02393-1

19. Hussein, M., Law, C., & Fraser, I. (2021). An analysis of food demand in a fragile and insecure country: Somalia as a case study. *Food Policy, 101*, 102092. https://doi.org/10.1016/j.foodpol.2021.102092

20. Hussein, S. A., Osman, M. M., Abdulle, Y. S., Hussein, A. A., Afrah, T. A., Mohamed, A. H., Adem, R., Hayle, A. A., Ali, A. N., Mohamud, M. F. Y., & Ali, A. A. (2025). The human cost of drought—Children at risk: A call to action for Somalia. *Disaster Medicine and Public Health Preparedness, 19*, e120. https://doi.org/10.1017/dmp.2025.122

21. Jamil, S., Mohammadnezhad, M., & Muhammad, F. (2025). Can Somalia avert a food security catastrophe? *The Lancet, 405*(10492), 1814. https://doi.org/10.1016/S0140-6736(25)00713-5

22. Khan, I., Ullah, W., Karami, A., Qazi, I., & Ahamad, I. (2023). Analyze the socioeconomic consequences of locust outbreaks on agriculture, rural communities, and food security. *Indus Journal of Animal and Plant Sciences, 1*(1), 14–20.

23. Kinyoki, D. K., Moloney, G. M., Uthman, O. A., Kandala, N. B., Odundo, E. O., & Noor, A. M. (2017). Conflict in Somalia: Impact on child undernutrition. *BMJ Global Health, 2*(2), e000262. https://doi.org/10.1136/bmjgh-2016-000262

24. Kotikula, A., Pournik, M., & Yoshimura, K. (2021). *Somalia* (No. 36767). The World Bank Group. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/367671

25. Lin, T. K., Kafri, R., Hammoudeh, W., Mitwalli, S., Jamaluddine, Z., Ghattas, H., Giacaman, R., & Leone, T. (2022). Pathways to food insecurity in the context of conflict: The case of the occupied Palestinian territory. *Conflict and Health, 16*(1), 38. https://doi.org/10.1186/s13031-022-00470-0

26. Matsuura Kannari, M., Luh, Y.-H., & Islam, A. H. M. S. (2023). Weather shocks, livelihood diversification, and household food security: Empirical evidence from rural Bangladesh. *Agricultural Economics, 54*(4), 455–470. https://doi.org/10.1111/agec.12776

27. Mayhew, L., Alasia, I. J., Opitz-Stapleton, S., Dagane, I. A., Mbeche, I., Abdi, M., Sheik, S. Y. N., Harir, A. M., Hassan, A. S., & Egemonye, O. (2023). *Somalia: Drought and rising costs take hold*. SPARC Issue Brief. Overseas Development Institute. https://odi.org/en/publications/somalia-drought-and-rising-costs-take-hold

28. Mengistu, S. W., & Kassie, A. W. (2022). Household-level determinants of food insecurity in rural Ethiopia. *Journal of Food Quality, 2022*(1), 3569950. https://doi.org/10.1155/2022/3569950

29. Mohamed, J., Abdi, M. J., Mohamed, A. I., Muhumed, M. A., Abdeeq, B. A., Abdi, A. A., Abdilahi, M. M., & Ali, D. A. (2024). Predicting the short and long-term effects of food price inflation, armed conflicts, and climate variability on global acute malnutrition in Somalia. *Journal of Health, Population and Nutrition, 43*(1), 68. https://doi.org/10.1186/s41043-024-00557-9

30. Mugera, H. K., & Yoshimura, K. (2023). *The toll of drought on displaced and vulnerable persons in Somalia*. World Bank–UNHCR Joint Data Center on Forced Displacement. https://www.jointdatacenter.org/wp-content/uploads/2023/12/THE-TOLL-OF-DROUGHT-ON-DISPLACED-AND-VULNERABLE-PERSONS-IN-SOMALIA.pdf

31. Muse, N. M., Tayfur, G., & Sadegh Safari, M. J. (2023). Meteorological drought assessment and trend analysis in Puntland Region of Somalia. *Sustainability, 15*(13), 10654. https://doi.org/10.3390/su151310652

32. Musei, S. K., Nyaga, J. M., & Dubow, A. Z. (2021). SPEI-based spatial and temporal evaluation of drought in Somalia. *Journal of Arid Environments, 184*, 104296. https://doi.org/10.1016/j.jaridenv.2020.104296

33. Nasteho, M. G. (2016). *Unemployment and poverty in Puntland Somalia* (Doctoral dissertation, Kampala International University, College of Economics and Management).

34. Nor, M. I. (2025). Exploring Somalia's worsening climate-induced humanitarian crisis during the 2024 Deyr season drought: Building resilience amidst adversity. *SSRN*. https://doi.org/10.2139/ssrn.5081527

35. Oberg, C., Hodges, H., & Masten, A. S. (2021). Risk and resilience of Somali children in the context of climate change, famine, and conflict. *Journal of Applied Research on Children: Informing Policy for Children at Risk, 12*(1), 10.

36. Odongo, R. A., Schrieks, T., Streefkerk, I., de Moel, H., Busker, T., Haer, T., MacLeod, D., Michaelides, K., Singer, M., Assen, M., & Otieno, G. (2025). Drought impacts and community adaptation: Perspectives on the 2020–2023 drought in East Africa. *International Journal of Disaster Risk Reduction, 119*, 105309. https://doi.org/10.1016/j.ijdrr.2025.105309

37. Omar, A. A., Hassan, S. M., & Mohamed, M. J. (2022). Drought effects in Somalia and solution proposals. *African Journal of Climate Change and Resource Sustainability, 1*(1), 13–25.

38. Omar, A. O., Alasow, A. A., Farah, A. A., & Shahid, S. (2024). Spatiotemporal analysis of agricultural drought severity and hotspots in Somaliland. *International Journal of Sustainable Development & Planning, 19*(11), 1805–1817. https://doi.org/10.18280/ijsdp.191104

39. Oyekale, A. S., & Molelekoa, T. C. (2025). Impacts of income shocks and social protection on rural households' food insecurity experiences during the COVID-19 pandemic in conflict-affected states in Northern Nigeria. *Social Economics, 70*, 27–46. https://doi.org/10.26565/2524-2547-2025-70-03

40. Poole, D. N., Escudero, D. J., Gostin, L. O., Leblang, D., & Talbot, E. A. (2020). Responding to the COVID-19 pan-

28. Mengistu, S. W., & Kassie, A. W. (2022). Household-level determinants of food insecurity in rural Ethiopia. *Journal of Food Quality, 2022*(1), 3569950. https://doi.org/10.1155/2022/3569950

29. Mohamed, J., Abdi, M. J., Mohamed, A. I., Muhumed, M. A., Abdeeq, B. A., Abdi, A. A., Abdilahi, M. M., & Ali, D. A. (2024). Predicting the short and long-term effects of food price inflation, armed conflicts, and climate variability on global acute malnutrition in Somalia. *Journal of Health, Population and Nutrition, 43*(1), 68. https://doi.org/10.1186/s41043-024-00557-9

30. Mugera, H. K., & Yoshimura, K. (2023). *The toll of drought on displaced and vulnerable persons in Somalia*. World Bank–UNHCR Joint Data Center on Forced Displacement. https://www.jointdatacenter.org/wp-content/uploads/2023/12/THE-TOLL-OF-DROUGHT-ON-DISPLACED-AND-VULNERABLE-PERSONS-IN-SOMALIA.pdf

31. Muse, N. M., Tayfur, G., & Sadegh Safari, M. J. (2023). Meteorological drought assessment and trend analysis in Puntland Region of Somalia. *Sustainability, 15*(13), 10654. https://doi.org/10.3390/su151310652

32. Musei, S. K., Nyaga, J. M., & Dubow, A. Z. (2021). SPEI-based spatial and temporal evaluation of drought in Somalia. *Journal of Arid Environments, 184*, 104296. https://doi.org/10.1016/j.jaridenv.2020.104296

33. Nasteho, M. G. (2016). *Unemployment and poverty in Puntland Somalia* (Doctoral dissertation, Kampala International University, College of Economics and Management).

34. Nor, M. I. (2025). Exploring Somalia's worsening climate-induced humanitarian crisis during the 2024 Deyr season drought: Building resilience amidst adversity. *SSRN*. https://doi.org/10.2139/ssrn.5081527

35. Oberg, C., Hodges, H., & Masten, A. S. (2021). Risk and resilience of Somali children in the context of climate change, famine, and conflict. *Journal of Applied Research on Children: Informing Policy for Children at Risk, 12*(1), 10.

36. Odongo, R. A., Schrieks, T., Streefkerk, I., de Moel, H., Busker, T., Haer, T., MacLeod, D., Michaelides, K., Singer, M., Assen, M., & Otieno, G. (2025). Drought impacts and community adaptation: Perspectives on the 2020–2023 drought in East Africa. *International Journal of Disaster Risk Reduction, 119*, 105309. https://doi.org/10.1016/j.ijdrr.2025.105309

37. Omar, A. A., Hassan, S. M., & Mohamed, M. J. (2022). Drought effects in Somalia and solution proposals. *African Journal of Climate Change and Resource Sustainability, 1*(1), 13–25.

38. Omar, A. O., Alasow, A. A., Farah, A. A., & Shahid, S. (2024). Spatiotemporal analysis of agricultural drought severity and hotspots in Somaliland. *International Journal of Sustainable Development & Planning, 19*(11), 1805–1817. https://doi.org/10.18280/ijsdp.191104

39. Oyekale, A. S., & Molelekoa, T. C. (2025). Impacts of income shocks and social protection on rural households' food insecurity experiences during the COVID-19 pandemic in conflict-affected states in Northern Nigeria. *Social Economics, 70*, 27–46. https://doi.org/10.26565/2524-2547-2025-70-03

40. Poole, D. N., Escudero, D. J., Gostin, L. O., Leblang, D., & Talbot, E. A. (2020). Responding to the COVID-19 pan-

demic in complex humanitarian crises. *International Journal for Equity in Health, 19*(1), 41. https://doi.org/10.1186/s12939-020-01162-y

41. Said, M., & Bashir, A. (2023). Analysis of climate change impacts on food security in Somalia. *International Journal of Media and Networks, 1*(1), 101–107.
42. Salvador, C., Nieto, R., Vicente-Serrano, S. M., García-Herrera, R., Gimeno, L., & Vicedo-Cabrera, A. M. (2023). Public health implications of drought in a climate change context: A critical review. *Annual Review of Public Health, 44*(1), 213–232. https://doi.org/10.1146/annurev-publhealth-071421-051636
43. Thalheimer, L., Gaupp, F., & Webersik, C. (2023). Systemic risk and compound vulnerability impact pathways of food insecurity in Somalia. *Climate Risk Management, 42*, 100570. https://doi.org/10.1016/j.crm.2023.100570
44. Xu, Z., Elomri, A., El Omri, A., Kerbache, L., & Liu, H. (2021). The compounded effects of COVID-19 pandemic and desert locust outbreak on food security and food supply chain. *Sustainability, 13*(3), 1063. https://doi.org/10.3390/su13031063
45. Zhao, H., Andreyeva, T., & Sun, X. (2024). Food security and health outcomes following gray divorce. *Nutrients, 16*(5), 633. https://doi.org/10.3390/nu16050633
46. Ziliak, J. P. (2021). Food hardship during the COVID–19 pandemic and Great Recession. *Applied Economic Perspectives and Policy, 43*(1), 132–152. https://doi.org/10.1002/aepp.13099

demic in complex humanitarian crises. *International Journal for Equity in Health, 19*(1), 41. https://doi.org/10.1186/s12939-020-01162-y

41. Said, M., & Bashir, A. (2023). Analysis of climate change impacts on food security in Somalia. *International Journal of Media and Networks, 1*(1), 101–107.
42. Salvador, C., Nieto, R., Vicente-Serrano, S. M., García-Herrera, R., Gimeno, L., & Vicedo-Cabrera, A. M. (2023). Public health implications of drought in a climate change context: A critical review. *Annual Review of Public Health, 44*(1), 213–232. https://doi.org/10.1146/annurev-publhealth-071421-051636
43. Thalheimer, L., Gaupp, F., & Webersik, C. (2023). Systemic risk and compound vulnerability impact pathways of food insecurity in Somalia. *Climate Risk Management, 42*, 100570. https://doi.org/10.1016/j.crm.2023.100570
44. Xu, Z., Elomri, A., El Omri, A., Kerbache, L., & Liu, H. (2021). The compounded effects of COVID-19 pandemic and desert locust outbreak on food security and food supply chain. *Sustainability, 13*(3), 1063. https://doi.org/10.3390/su13031063
45. Zhao, H., Andreyeva, T., & Sun, X. (2024). Food security and health outcomes following gray divorce. *Nutrients, 16*(5), 633. https://doi.org/10.3390/nu16050633
46. Ziliak, J. P. (2021). Food hardship during the COVID–19 pandemic and Great Recession. *Applied Economic Perspectives and Policy, 43*(1), 132–152. https://doi.org/10.1002/aepp.13099

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ВПЛИВ ПОСУХИ ТА РІЗКИХ ЗМІН ДОХОДІВ НА ГОСТРУ НЕСТАЧУ ПРОДОВОЛЬСТВА В СОМАЛІ ПІД ЧАС ПАНДЕМІЇ COVID-19: ПІДХІД НА ОСНОВІ ПОТЕНЦІЙНИХ РЕЗУЛЬТАТІВ ІЗ ВИКОРИСТАННЯМ РЕГРЕСІЇ ПУАССОНА

Економічна діяльність домогосподарств у Сомалі сильно залежить від періодичних посух та інших екологічних небезпек, таких як повені та циклони. Вплив цих потрясінь посилюється через те, що домогосподарства піддаються іншим потрясінням, і їхній сукупний вплив легко відчувається на харчуванні домогосподарств. Тому в цьому дослідженні було проаналізовано вплив посухи та інших потрясінь на добробут, на серйозну продовольчу нестабільність у Сомалі. Дані були отримані під час другого етапу високочастотного телефонного опитування переміщених осіб, яке охопило 2505 домогосподарств. Модель регресії Пуассона була оцінена з використанням потенційної рамки результатів для обчислення середнього ефекту лікування (ATE) та середнього ефекту лікування на лікованих (ATET). Результати показали вплив коваріатних та ідіосинкразичних потрясінь, серед яких найпоширенішими були посуха (87,36%), зростання цін на продовольство (79,84%) та скорочення гуманітарної допомоги (62,68%). Просторові закономірності свідчать про значно вищий вплив посухи в центральних і південних штатах. Серйозна продовольча нестабільність залишається поширеною, багато домогосподарств повідомляють про випадки вичерпання запасів їжі, голодування перед сном або цілоденне голодування. Результати регресії показують, що допомога по безробіттю, пошук роботи, зменшення доходу, розлучення, небезпечні умови проживання, статус репатріанта та проживання в Пунтленді або Сомаліленді значно збільшують очікувану

тяжкість голоду, тоді як проживання в місті та участь у діяльності, що приносить дохід, зменшують її. Кілька потрясінь, включаючи закриття несільськогосподарських підприємств, крадіжки/мародерство, зростання цін на сировину та продукти харчування, хвороби або смерть осіб, які забезпечують дохід, посуху, навали сарани та циклони/шторми, суттєво погіршують продовольчу безпеку. Хоча деякі потрясіння мають незначний середній ефект лікування (ATE), їх ефект лікування на лікованих (ATET) є значним, що свідчить про непропорційний вплив на вже вразливі групи населення. Ці висновки підкреслюють нагальну потребу в посиленні соціальної захисту, що реагує на потрясіння, підтримці засобів до існування та цілеспрямованих гуманітарних втручаннях у нестабільних умовах.

Ключові слова: *шоки доходів, посуха, ATE, ATET, гострий голод, Сомалі.*

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