

# Assessing Farm-Household Resilience to Food Insecurity Induced by the Drought Hazard in the North Central Province of Sri Lanka

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## 1. Introduction

Drought is one of the recurrent phenomena of most climatic regions of the world, and it is identified as a more complex hazard due to its inherent features than other hazards. Mainly, drought is known as a natural hazard accelerated by rapid climate change. The frequency of occurrence and severity of drought is increasing worldwide (Wilhite, 2021). Providing a universally accepted definition for drought is impossible because the meaning of drought may differ from region to region and person to person (Wilhite, 2021). However, drought can be defined as a lack of precipitation or rainfall within a considerable time a season or more. Drought is defined conceptual and operationally, and more often, researchers accepted four types of operational droughts, i.e., Meteorological, Agricultural, Hydrological, and Socioeconomic or Famine (Kchouk et al., 2021). Drought creates diverse socio-economic and environmental impacts. Food insecurity caused by agricultural drought is the worst result, particularly among farming communities that depend on rain-fed agriculture in many developing countries of the World and South Asia (Chandrasekara et al., 2021).

Sri Lanka is one of the tropical countries that is highly vulnerable to drought, and once every 3-4 years, a severe drought occurs (Prasanna, 2018). Though drought frequency and severity have increased, drought is not new to Sri Lanka because there is evidence of drought occurrence since ancient times (Madduma Bandara, 2017). For example, the most severe drought occurred in 2016-2017 when 24 districts were affected by drought and 1,116,178 families and 3,944,176 persons became victims, and the government had to spend more than 6500 million rupees for distributing drought relief (National Disaster Relief Services Centre, 2017). Many research findings have highlighted that farming communities in the Dry Zone area are more vulnerable to drought, mainly minor irrigation and rain-fed farmers, than major irrigation farmer (Scarborough & Senaratne, 2011). Much research has been conducted on drought, focusing on different aspects, such as farmers' perception, adaptation strategies, understanding of drought occurrence and severity, etc. (Madduma Bandara, 1983; Tennakoon, 1986). Though there is a plethora of research, drought research on farmers' household resilience to food insecurity is very limited in Sri Lanka. Hence, this research attempted to analyze whether there is a variation in farmers' household resilience to food insecurity among farming communities in the North Central Province (NCP) of Sri Lanka.

## 2. Materials and Methods

A mixed method was adopted for this research, and primary and secondary data were collected. The main instrument of primary data collection was a questionnaire survey, and secondary data was collected from different sources such as articles, Divisional Secretariats, and Agrarian Services Centers in the NCP. The total population was 3163 farming households, and 356 were selected as the sample using Slovin's Formula from three Divisional Secretaries Divisions (DSDs), i.e., Mahawilachchiya (120), Kahatagasdigiliya (109) and Medirigiriya (127). The stratified random sampling method was utilized to select farming households, and computer-based software was used to select the sample randomly. The Household Food Security Index (HFSI) was used to calculate the resilience level of the three selected farming communities of

the NCP. The questionnaire was designed to meet the requirements of HFSI after an extensive literature review where 14 questions were included to obtain Yes and No answers. Then, the answers were translated into numerical values of Yes=1 and No=0, and then MS Excel was used to calculate the HFSI values. There are four categories of HFSI, i.e., 0-11(Food Secure), 11-33 (Food insecure but no hunger),33-60(Food insecure but less severe), and 60-100(Extremely Food Insecure) (Gunatilake, 2015). Further, one-way ANOVA was performed to test the statistical significance of variation in food insecurity among the three selected farming communities. Finally, the results were presented as text, tables, and charts.

### 3. Results and Discussion

Table 1 shows the farmers' perception of household resilience, where most farmers (34.6%) agreed that their household resilience is very low. Also, 29.2%, 31.5%, 4.5%, and 0.3% belong to low, moderate, high, and very high categories of resilience, respectively. When comparing the three areas, i.e., Mahawilachchiya, Kahatagasdigilya, and Medirigiriya area, table 1 highlights that Mahawilachchiya, Medirigiriya, and Kahatagasdigilya have become first, second, and third places in terms of drought resilience. Most farmers in the Mahawilachchiya area agree with the very low category (17.4%). In comparison, most farmers in the Kahatagasdigilya (13.8%) and Medirigiriya (12.1%) agreed with moderate resilience. However, farmers in all three areas agreed with the high and very high resilience category of less than 5%. Therefore, according to the perception of farmers, household resilience to drought impacts is very low.

Table 1: Farmers' perception of the level of household resilience to drought impacts

Level of Resilience	Divisional Secretariate Name							
	Mahawilachchiya		Kahatagasdigilya		Medirigiriya		Total	
	Count	%	Count	%	Count	%	Count	%
Very Low	62	17.4%	21	5.9%	40	11.2%	123	34.6%
Low	35	9.8%	33	9.3%	36	10.1%	104	29.2%
Moderate	20	5.6%	49	13.8%	43	12.1%	112	31.5%
High	2	0.6%	6	1.7%	8	2.2%	16	4.5%
Very High	1	0.3%	0	0.0%	0	0.0%	1	0.3%
Total	120	33.7%	109	30.6%	127	35.7%	356	100.0%

Source: Created by the researcher based on field survey data 2023.

Figure 1 shows the results of the Household Food Security Index (HFSI), where HFSI considers the availability of both quality and quantity of essential food even during drought periods for all individual members of the family. According to results, only 6% of farming households in the Kahatagasdigilya area belong to the food secure category of HFSI, i.e., there is enough quality and quantity of food for all members of the family even during a drought period, but there is no household in Mahawilachchiya and Medirigiriya areas. Most farming households (47%) in Kahatagasdigilya belong to the second category of HFSI. It means food insecurity regarding quality and quantity for all family members, especially during drought, but no hunger. Most farming households in Mahawilachchiya (58%) and Medirigiriya (55%) belong to the third category of HFSI, i.e., food insecure but less severe in terms of quality and quantity. The worst category of HFSI is the fourth category or extremely food insecure, where 25%, 15%, and 7% of farming households belong to Mahawilachchiya, Medirigiriya, and Kahatagasdigilya, respectively. Therefore, when comparing the three selected areas according to the results of the HFSI, it was found that farming households in Kahatagasdigilya, Medirigiriya, and Mahawilachchiya areas have become first, second, and third places in terms of household resilience to food insecurity. Further, a one-way ANOVA test proved that there is a statistically significant variation in household food security among three farming

communities of the NCP (P=.000). Socio-economic and environmental factors and the variation in the way of agricultural practices may be the reasons for creating variation in food security among farming communities of the NCP. Further, it was found that the farmers in the NCP are using multiple coping and adaptation strategies to mitigate drought's adverse impacts, mainly to cope with food insecurity.

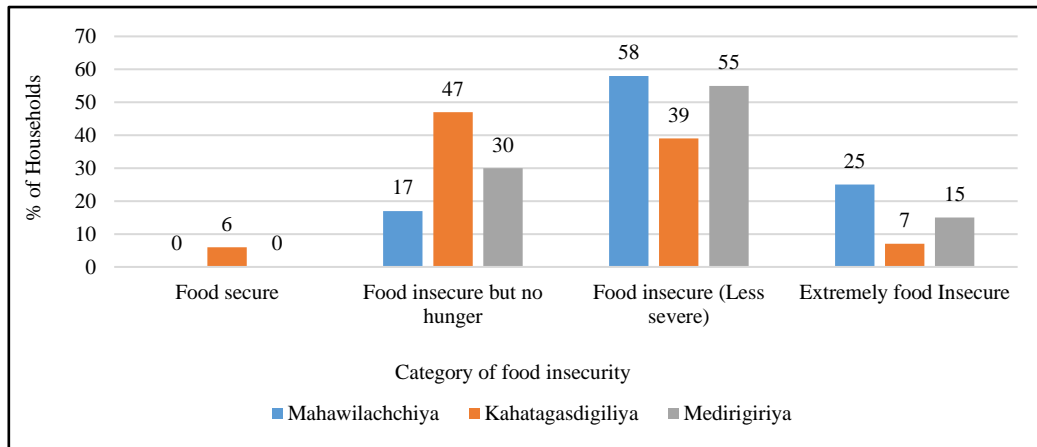


Figure 1: Variation in household food insecurity among the three selected farming communities.

Source: Created by the researcher based on field survey data 2023.

#### 4. Conclusion

Drought is a significant complex hazard that frequently occurs in the NCP of Sri Lanka. Rural communities are most vulnerable to drought, particularly farmers practicing agriculture, i.e., paddy and other seasonal crops under minor irrigation or small village tanks and rain-fed. Food insecurity is the worst result created by drought, and there is a variation in household food insecurity among farming communities of the NCP, and their level of resilience to food insecurity is low. Farmers are using both on-farm and off-farm coping strategies to reduce drought impacts. The government has to spend much money to distribute drought relief, but there is no sustainable solution for mitigating the impacts of drought for an extended period. Hence, the government and other relevant stakeholders should shift from reactive to proactive approaches. It is time to implement a sustainable drought risk management plan to avoid household food insecurity among the farming communities of the NCP where restoration of the village tank cascade system and the introduction of climate-smart agriculture are significant in mitigating the adverse impacts of drought in the NCP. The results of this study will help planners and policymakers when making practical decisions related to enhancing the resilience of farming households to food insecurity of the NCP.

#### 5. Acknowledgment

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#### 6. Keywords

Drought Hazard, Farm-Household Resilience, Food Insecurity, Household Food Security Index.

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