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Review on the Determinants of Rural Households' Adaptation Strategies to Floods in Ethiopia

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Abstract

Floods are a significant natural hazard in Ethiopia, frequently causing severe damage to lives, property, and the economy. This review investigates the determinants of rural households' adaptation strategies to floods in Ethiopia. The research highlights the increasing frequency and severity of floods, exacerbated by climate change, land use changes, and human activities. It examines various adaptation strategies employed by households, including livelihood diversification, physical infrastructure modifications, and changes in agricultural practices. The study identifies key factors influencing these strategies, such as access to information, government support, economic conditions, and household characteristics. Despite the critical need for effective adaptation, the study finds that less than 3% of households have implemented sufficient strategies, leading to significant economic and social impacts. The findings underscore the importance of enhancing adaptive capacity and providing targeted support to vulnerable communities to mitigate the adverse effects of floods. This article reviews contributes to the understanding of flood adaptation in Ethiopia and offers insights for policymakers to develop more effective disaster risk reduction strategies.

Keywords: *Flood adaptation strategies, Rural households, Climate change*

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1. Introduction

Floods are major natural hazards in Brazil (Birtukan and Abraham, 2016). In Ethiopia, floods are the most frequent natural disasters and are becoming increasingly severe (Alemseged et al., 2014; Mabutu and Mulwafu, 2019). While some parts of the country suffer from limited rainfall, others experience heavy floods (Samson and Migistrate, 2008). During the high-flow period, overbank flow from the Baro River, due to its limited natural channel capacity, inundates major portions of villages (Alemseged et al., 2014).

Floods are a common natural phenomenon causing loss of lives, property, and economic disruption (Selamawit, 2018). Ethiopian topography and human activities have made the country highly vulnerable to floods (WHO, 2002; FDPPA, 2007).

Globally, the impacts of river floods are significant and rising, with complex damaging effects (WHO, 2002; Brenden et al., 2014). Extreme floods hinder development (Pauw et al., 2010) and threaten national food security (Del Nino et al., 2003). They frequently disrupt infrastructure such as roads, rail lines, airports, electronic supplies, and sewage systems (WHO, 2002). Floods also leave people without shelter (Hermandez-Guarrero et al., 2012), limit economic activity (Linne Kamp et al., 2011), and increase the burden of diseases (Nyakundi et al., 2011). They cause human suffering, widespread diseases, damage buildings, and displace populations, crops, and infrastructure (WHO, 2002; Selamawit, 2018).

In Ethiopia, river flooding poses a serious threat to millions living in river basins (Alemseged et al., 2013). Floods have resulted in deaths, communicable diseases, and interruptions in health services (Gambella Health Bureau, 2006). Recent floods have caused significant losses, including 614 deaths, displacement of 34,300 people, loss of 2,700 livestock, and destruction of 760 traditional silos (Dawit and Habtamu, 2011). The impacts of floods include displacement, death, injuries, and infrastructure collapse (Selamawit, 2018). Floods also disrupt business activities, destroy crops and livestock, deteriorate health, lead to abandonment of homes, and destroy infrastructure (Alemseged et al., 2014). As a result, people have learned to live with floods through adaptation strategies (Mabutu and Mulwafu, 2019). They are equipped with strategies to deal with recurrent calamities

(Alemseged et al., 2014). Adaptation is essential in developing countries, particularly in Ethiopia, where flood vulnerability is high (Tamiru, 2020). Consequently, many households practice adaptation strategies. Rural households use home feeding and marketing during shocks as major adaptation strategies (Fikeremaryam et al., 2016). They also rely on help from relatives, friends, or neighbors for food and money to cope with the adverse effects of floods (Alemseged et al., 2013).

2.Empirical Studies

The increased severity of floods in terms of frequency, extent, depth, and duration is deteriorating the livelihoods of farmers and livestock keepers (Alemseged et al., 2014). Land use changes contribute to the increased frequency and magnitude of floods (Samson and Magistrate, 2008). People are exposed to recurrent floods due to river overflows and excessive rainfall causing flash floods. Riverine floods occur gradually and can persist for 3 to 4 months (Alemseged et al., 2014). Climate change, rainfall, rising temperatures, and snowmelt are physical factors contributing to flood increases (Selamawit, 2018). Approximately 90% of households have reported a significant increase in flood depth and extent, with an average of 1.45 flood events per year (Alemseged et al., 2014).

Adapting to floods is crucial for disaster risk reduction (Mabutu and Mulwafu, 2019). The reduction of flood vulnerability depends on the readiness of adaptive capacity, yet less than 3% of households have applied adaptation strategies (Alemseged et al., 2014; Chaiyaporn and Chanathip, 2016). Most adaptation strategies used by households are insufficient to deal with the impact of floods (Alemseged et al., 2014). They are sensitive to flood hazards and inadequate for addressing flood severity (Alemseged et al., 2014; Kasturi and Bhagirath, 2018). Consequently, about 86% of households have experienced significant negative economic impacts due to floods (Alemseged et al., 2014). Various factors influence adaptation strategies (Mabutu and Mulwafu, 2019). Perception of flood risk and gender influence adaptation strategies (Fredrick and Beneath, 2019). Socio-economic factors such as lack of grazing areas, housing, fuel wood, marketing, and agricultural land also play a role (Selamawit, 2018). Capacity, financial means, and insufficient labor forces are additional factors (Alemseged et al., 2014). Determinants of adaptation strategies include low levels of technology, poverty, and lack of information (Gedefaw et al., 2018). However, floods have not received the attention they deserve in Ethiopia (Alemseged et al., 2014). Many studies have paid little attention to floods in Jor District. Research on floods and adaptation strategies in this area is minimal (Alemseged et al., 2014). Previous studies have mainly highlighted the impacts of floods, losses, and effects on household settlements in Jor District, without investigating the quantitative factors of adaptation strategies.

3. Adaptation Strategies to Floods

Floods are major environmental crises in Ethiopia, common during the rainy season (June-September) (FDPPA, 2006). Their frequency and magnitude have increased over decades (Abaya et al., 2008). The Baro River floodplain faces changing conditions, with future flood risks likely increasing in Itang district (Alemseged et al., 2014). Excessive rain from Gambella and surrounding regions causes river overflows (Samson and Mangistrate, 2008). Human activities like deforestation, overgrazing, urbanization, and agricultural expansion exacerbate floods (Selamawit, 2018). Studies have examined flood adaptation strategies focusing on livelihood diversification. Gedefaw et al. (2018) highlight temporal migration and off-farm employment as key strategies. Similar findings by Dawit and Habtamu (2011) and Alemseged et al. (2014) emphasize income-generating activities. Alemseged et al. (2014) also identify selling assets, using savings, borrowing money, leveraging social connections, and engaging in income-generating activities as flood prevention mechanisms.

Physical environmental structures are basic adaptation strategies. Alemseged et al. (2013) note constructing boundary walls and drainage ditches to divert floods from cropland. Raising floor levels, storing properties in elevated places, and keeping animals safe are additional strategies (Alemseged et al., 2014). Changing crop-livestock practices is another adaptation strategy. Habtamu (2020) identifies herd destocking, changing herd composition, diversifying fodder, herd splitting, and risk sharing as key strategies. Planting early maturing crops and reducing livestock numbers are also effective (Gedefaw et al., 2018). Alemseged et al. (2013) find harvesting premature crops as a preventive measure. Other strategies include breed selection, crop diversification, changing crop varieties, livestock mobility, and using small ruminants (Dawit and Habtamu, 2011). Temesgen et al. (2009) highlights early and late planting of crops as additional strategies.

4.Determinants of Flood Adaptation Strategies

Several factors influence households' adaptation strategies to floods (Alemseged et al., 2014). Institutional factors, such as access to information, are crucial (Habtamu et al., 2020). Lack of information constrains adaptation (Temesgen et al., 2009). Access to early warning systems is also important (Abayineh and Belay, 2017).

However, these studies often lack quantitative analysis. Poverty and government support significantly influence adaptation strategies. Government support is a key determinant (Habtamu et al., 2020). Poverty and low technology levels also impact adaptation (Gedefaw et al., 2018). These findings, however, lack clarity due to various intervening factors.

Economic factors play a role in adaptation strategies. Dependency ratios, labor shortages, and household incomes are significant determinants (Alemseged et al., 2014; Temesgen et al., 2009; Habtamu et al., 2020). Farm and non-farm income and farm size also influence adaptation (Beletech et al., 2019). These findings are qualitative and suggest multiple factors. Household factors, such as literacy levels and knowledge, also influence adaptation strategies (Alemseged et al., 2014; Tamiru, 2020). Limited household capacities further impact adaptation (Alemseged et al., 2014). Some results lack measurability and validity concerning flood adaptation. The same finding indicated that the lack of knowledge determines the adaptation strategies (Tamiru, 2020). Similar, the limited households' capacities influence the adaptation strategies (Alemseged et al, 2014). Some of these results lack measurability and validity with adaptation to floods. Furthermore, some of the findings have indicated the influence of financial factors to the adaptation strategies. Tamiru (2020) revealed that the access to credit determines the adaptation strategies. Temesgen et al (2009) result showed that the lack of money constrains the adaptation strategies. The other study has indicated that the lack of financial mean determines the adaptation strategies (Alemseged et al, 2014). These studies have lack a quantitative based evidences.

5.Conclusion and Recommendations

Floods will remain a major hazard in Ethiopia, with increasing frequency and severity due to climate change and human activities, necessitating diverse adaptation strategies and enhanced support for vulnerable communities to mitigate significant economic and social impacts.

Efforts will focus on improving information dissemination, increasing government support, promoting livelihood diversification, investing in infrastructure, supporting agricultural adaptation, addressing socio-economic barriers, and fostering community-based strategies to enhance flood resilience. By implementing these recommendations, policymakers and stakeholders will help rural households in Ethiopia better adapt to the increasing threat of floods, thereby reducing their vulnerability and enhancing their overall resilience.

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