

Action for Resilience in Cities: The Cases of Colombia and Ethiopia

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Abstract

There is urgency in the development scenario of developing nations with respect to the vulnerability and preparedness of cities towards climate change and natural and artificial hazards. In some countries, government plans and policies have been successful in integrating the aspects of critical infrastructure and social development to a certain extent. However, the issues of resilience and vulnerability towards climate change are yet to be knit seriously into the fabric of the urban domain. A prominent reason for this unhealthy trend is that climate change is perceived as something pertaining to the future and is not visualised as an immediate impending threat, especially for the developing urban centres. As a wakeup call, we must remember the cases of increasing extreme weather events in different parts of the world which are a constant reminder of the changing climate scenario and how vulnerable developing cities actually are. This report aims to discuss the term resilience in its true sense and how it is becoming more relevant and hazy at the same time. Furthermore, an attempt has been made to analyse the situation in two developing nations - Colombia and Ethiopia - about their risk resilience structure in place and future challenges. Although the two countries are different geographically and socially, they are plagued by similar environmental and social hazards. In recent years, they have tried to recognize the risks they face and have made progress by formulating positive plans and policies with the help of the Government, private actors and NGOs. The report also aims to illustrate how these policies have helped the economy and social status of the countries and helped in the creation of better resilience to calamities, climate change and disasters, with a concluding comparison of the present situation and resilience prioritization in these countries.

Biographical Notes

Maulsri Jha is an assistant professor at the Amity School of Architecture and Planning at the Amity University, Noida, India. She has a bachelor degree in Architecture from National Institute of Technology, India and a master degree in Infrastructure Planning from the University of Stuttgart, Germany. While working in the industrial sector in India, she was able to closely scrutinize the gaps between the planning stages and implementation stages and the improper utilization of available critical infrastructure. Her higher studies in the field of infrastructure planning helped her in identifying the critical status of resilient planning and its relevance in the present scenario of global climate change. She intends to continue her research in the field of global climate change and urban resilience by drawing comparatives from successful examples and analysing their implementation in vulnerable cities, while keeping in mind issues of sustainability and environmental protection.

Key Words

Resilience, Natural disasters, Disaster Management, Climate Change Resilience, Government Policies in Colombia and Ethiopia

1. Introduction

“Resilience is the action or an act of rebounding back and the ability to recover quickly and easily from a misfortune, shock and illness.” – Oxford English Dictionary. It is revealed by an extensive review of the literature available that the word is used as a capacity of systems and the strategy to cope with uncertainty (Zobel, 2011). The study of resilience falls under the domain of a large variety of experts, all of whom have their own way of defining it (Norris, Stevens, Pfefferbaum, Wyche, & Pfefferbaum, 2008). However, all the explanations contain the basic idea of bouncing back from challenges and dangers. The concept of resilience developed relatively recently and the term is increasingly being used in publications. Use of the term has increased more than ten-folds in scientific literature since 1995 which has led to its spreading in other areas of expertise. This development has both positive and negative connotations. On one hand, it is gaining attention and measures, but on the other hand it is becoming yet another fashionable term that many pseudo intellectuals love to use, much along the same lines as that of the term “sustainable development” (Handmer & Dovers, 1996) (Longstaff, 2005) (Norris, Stevens, Pfefferbaum, Wyche, & Pfefferbaum, 2008).

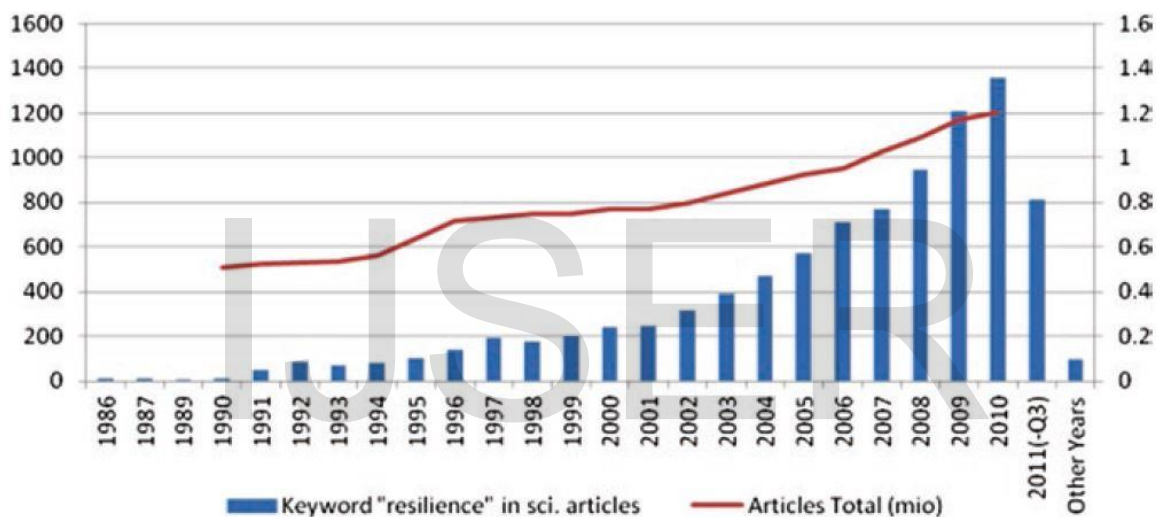


Figure 1: Publications pertaining to Resilience (1996-2013) (Lorenz, 2010)

Regions, both developing and developed, face three kinds of dangers- **Regular events**, **Irregular events** and **Unexampled Events**. **Regular Events** occur so frequently that an organisation has most likely experienced them and it is possible to learn how to respond. **Irregular Events** are those which are not frequent, but the events themselves are imaginable. Responding to them needs rapid action at all levels of organisation which is actually the test of Resilience. **Unexampled Events** have never happened before and are impossible to imagine. They take everyone by surprise and severely challenge the resilience of an organisation (Health, 2010).

Table 1: Management Demands of Three Types of Events (Hollnagel, Woods, & Leveson, 2006)

	Regular Events, Everyday nuisances, incidents, accidents	Irregular Events (critical accidents, disasters)	Unexampled events (catastrophes)
Frequency of occurrence	High, everyday	Low, but events are imaginable	Rare and mostly unimaginable (until they occur)
Magnitude of consequences	Low, and in most cases well-known	High, with reason for concern	Extremely high, may exceed the organisation's ability to cope
Relevant data or information	Statistics, event reports (regular)	Simplified models, shared experience	Hunches, intuition, 'expertise'
Readiness, preparedness to respond	High, and costs are justifiable	Low, and costs are disputed	No readiness, cost are prohibitive
Presence of resources to respond	Available and appropriate	In principle available, but never exclusively	Rudimentary or non-existent
Predictability (of occurrence or of development)	Very high on both accounts	Low on both accounts	Very low, guesswork. My challenge readiness and resources

The cost of prevention of some of the Irregular Events may exceed the amount that the organizations are willing to spend because they feel that the cost is disproportionate to the gain in safety. They then adopt the ALARP (As Low As Reasonably Practicable) approach (Woodruff, 2005). In such situations the funds are already stretched and are being utilised elsewhere. Therefore Disaster Management issues take a back seat. Furthermore, there are four major attributes and attitudes of developing countries that make them non-resilient to impending dangers and disasters. They are **Lack of Readiness/ Preparedness, Lack of Knowledge, Lack of Time and Lack of Resource** (Hollnagel, Handbook of Cognitive Task Design, 2003).

Table 2: RMLA and Maintaining or Sustaining Control (Weick, Stutcliffe, & Obstfeld, 1999)

	Lack of Readiness/ Competence	Lack of Knowledge	Lack of Time	Lack of Resources
Respond			X	
Monitor		X	X	
Learn	X			X
Anticipate	X			X

2. The case of Colombia

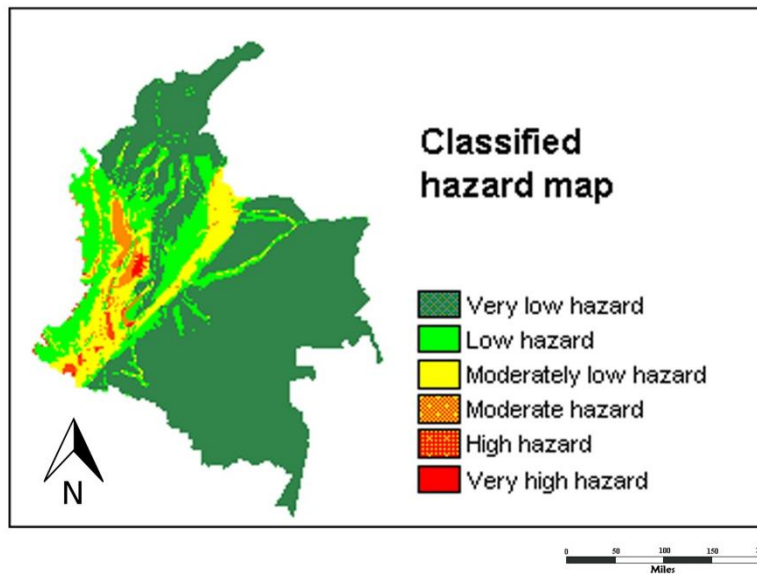


Figure 2: Classified Hazard Map of Colombia (Twente)

Colombia is vulnerable to extreme weather and climate change. The country's priority areas for economic development are sensitive to climate change. The country is still reeling from the human and economic losses due the floods of 2010/11. These factors have prompted the Government to mainstream the issue of resilience into national, sectoral and sub-national plans. The cost of climate-change and disasters could be significant in Colombia if no resilience measures are taken. Various studies indicate that climate-change and disaster damage is likely to cost the country at least 1.9% of its GDP every year (ECLAC, 2013). A combination of climatic and socio-economic factors leads to high vulnerability in Colombia. Its geography and topography make it especially susceptible to climate related hazards. The two most expensive natural hazards are floods and earthquakes and major floods in 2011 affected more than 3 million people (ECLAC, 2012). Average temperatures are expected to rise by 3.2 degrees c by the end of 2100 (IDEAM, 2010), the Andean forest cover could be reduced by 40% by 2050, the glaciers could completely disappear by 2050 and the coastal areas are faced with a gradual rise in sea-level.

A country's adaptive capacity is identified by its ability to learn, mobilise social capital, reorganize, and the economy's flexibility to adjust. In Colombia, prevailing poverty and high income inequality are challenges that hinder progress towards adaptation (OECD, 2013). The poor households are expected to be affected the most by reduced access to freshwater, increased disease and health problems, increasing the risk of extreme poverty (OECD, 2013).

2.1 Enabling Resilient Development and Adaptive Capacity in Colombia

The severe flooding in 2010/11 was the reason for Colombia's decision to adopt a "national adaptation policy". This marked a significant shift in policy as before this, adaptation was mainly restricted to the environmental sector. But since 2010, Colombia has taken strong ownership of environmental issues (DNP, 2012). The National Adaptation Plan has been created as a continuous process and consists of 4 phases:

1. Developing a conceptual framework for adaptation and to increase coherence in adaptation planning (DNP, 2012).
2. Formulating sectoral and sub-national adaptation plans.

3. Implementing, monitoring and evaluating adaptation policies and measures.
4. Monitoring, reporting, and verifying progress, lessons learned and remaining weaknesses to feed back into policy.

For climate change adaptation and mitigation, the Colombian Government has designed an institutional framework called the National Climate Change System (SISCLIMA) (Conpes, 2011). Now adaptation is no longer seen as only an environmental concern, but has become more central to the complete development. Colombia plans to mainstream these adaptation activities into programmes, policies and sectoral policies, so that they are placed under the responsibility of the respective ministries. However, the integration of these plans into the sub-national level has been slower because of capacity constraints and other priorities.

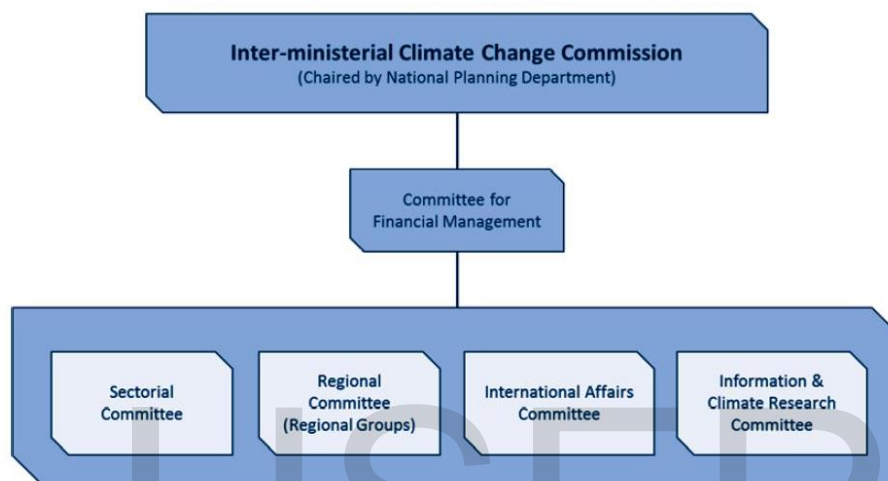


Figure 3: The Institutional Design Envisaged for SISCLIMA ((Forthcoming), 2010)

2.2 Policy Priorities for building resilience

The policy priorities for building resilience are five key growth sectors: mining and energy, transport infrastructure, agriculture, housing and innovation (OECD, 2014); land use planning and water resource management; integration of disaster risk management and climate change adaptation; and development and maintenance of strong financial resilience.

Table 3: Priority Growth Sectors in Colombia (Colombia, 2014)

	Key Growth Sector	Adaptation Priority
Mining and Energy	X	Only Energy
Transport Infrastructure	X	X
Agriculture	X	X
Housing	X	X
Innovation	X	
Health		X

3. The case of Ethiopia

The country experiences high climatic variability with floods and droughts each year caused by high and erratic rainfall. The impacts affect millions of livelihood, food security and

agricultural production, damage the infrastructure and lead to malnutrition and water-borne diseases (Bank, Ethiopia Economic Update II - Laying the Foundation for Achieving Middle Income Status, 2013). Because of high climate variability, precipitation varies across the country. This results in extreme weather events, most notably droughts, floods and soil erosion. Since the 1980's, Ethiopia has experienced seven major droughts, five of which resulted in massive famines which has reduced its GDP by about 4% (Bank, Ethiopia - Economics of Adaptation to Climate Change, 2010). The country's annual average temperature is expected to rise by 3 degrees Celsius by the end of 2050. This will further fuel the onset of extreme events. About 90% of the population lives in the humid highlands and the other 10% live in the lowland areas. These areas face the danger of floods and droughts simultaneously in the coming years (Mengistu, 2006).

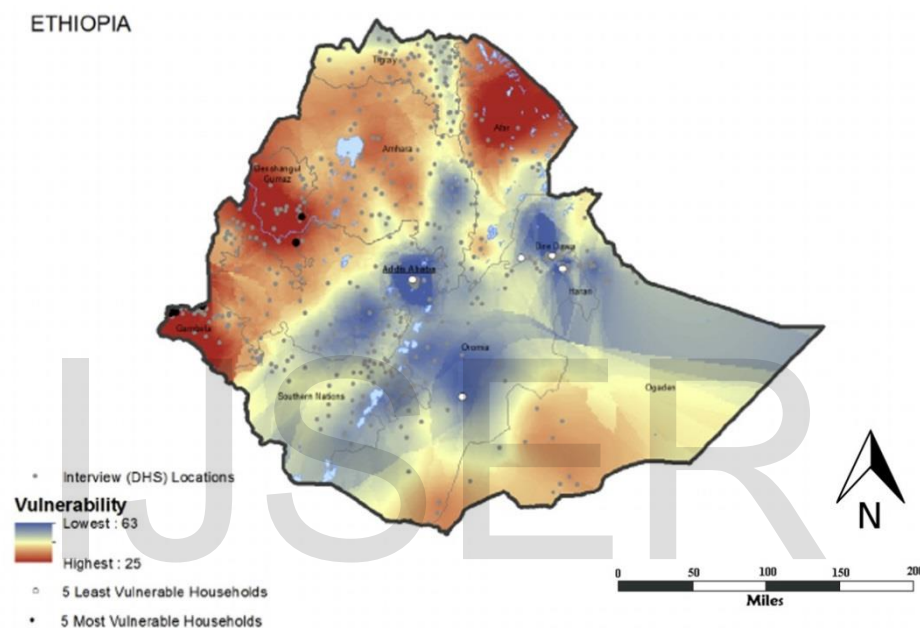


Figure 4: Vulnerability Map of Ethiopia (Bizimana, Kienberger, & Hagenlocher, 2016)

Adaptive capacity is closely linked to generic development and economic growth. Ethiopia suffers from extreme poverty in most of the regions. Additionally, limited access to information and limited education and skills are key constraints for adaptive capacity. There have been many instances when poorer sections have had to migrate with their belongings in the case of extreme hazards. These have severe and long lasting consequences for such households and “poverty traps” are created (Carter, 2007).

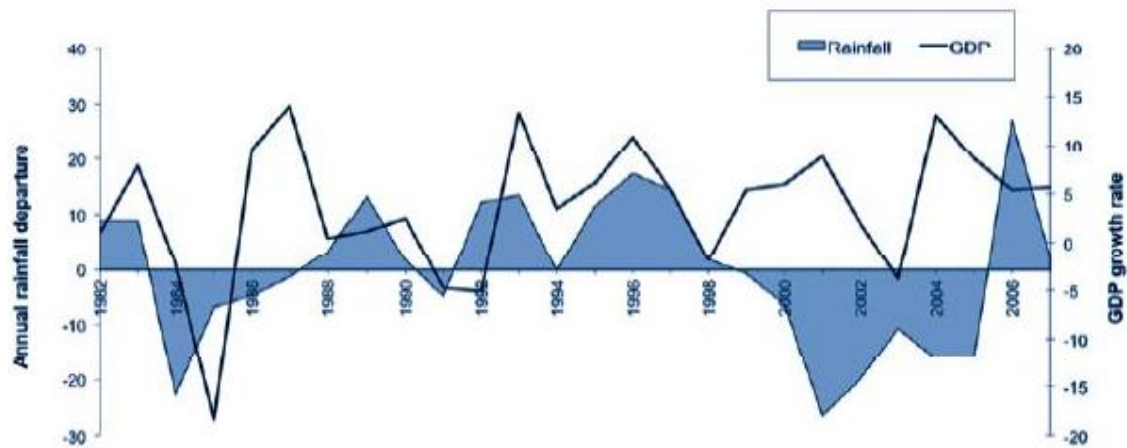


Figure 5: Relationship Between Rainfall Variability and GDP Growth in Ethiopia, 1982-2007 Ethiopia Rainfall Departure from the Mean and GDP Growth (Correlation = 0.10, one year lag correlation = 0.24) (Conway & Schipper, 2011)

3.2 Enabling Resilient Development and Adaptive Capacity

Ethiopia is developing a national-level, strategic response to climate change which is driven by strong political leadership. The late Prime Minister Meles Zenawi took strong initiatives (Bass, 2013) to put Ethiopia on a climate-resilient green development path and the Climate-Resilient Green Economy (CRGE) was launched in September 2011 (EPA, 2011). It consists of four elements: the development of a national *vision* to lay out long-term development goals and the key objectives; the development of a national *strategy* to outline concrete steps for both climate change adaptation and mitigation; the establishment of an *institutional climate change system* to facilitate cross governmental co-operation and planning linkages; and the establishment of *financial and capacity-building mechanisms* to support the implementation of the national CRGE strategy.



Figure 6: Establishment of Financial and Capacity Building Mechanisms (EPA, 2011) (EPA, 2012)

As a further adaptive capacity measure, Ethiopia launched the Growth and Transformation Plan, 2010-2015. The priority policies are as follows:

Table 4: Priority Policies of the Growth and Transformation Plan, 2010-2015 (Engida & Tameru, 2011)

			Strategic Pillars			
1.	2.	3.	4.	5.	6.	7.
Sustaining faster and equitable economic growth.	Maintaining agriculture as a major source of growth.	Creating favourable conditions for Industry to play a key role in the economy.	Enhancing expansion and quality of Infrastructure development.	Enhancing expansion and quality of Social development.	Building capacity and deepening good governance.	Promoting women and youth empowerment and equitable benefits.

4. Key Messages

A direct institutional network has been created between development and climate change adaptation in Colombia and stress has been laid on the importance of developing resilience because of recent events (Blanco, 2008). Colombia is gradually up-scaling climate resilience issues at the sectoral level. At the regional and sub-national level, it faces certain barriers in integrating resilience into the development planning. Colombia's transportation network is not as developed as other countries in the region. Initially, there were plans to expand the network, but with growing concern and awareness about resilience, the focus has shifted towards increasing the robustness of the existing network. Housing is another area where Colombia has identified the worth of increasing resilience. Urbanization is very rapid and exceeds the capability of the local authority to provide a safe and stable environment. Therefore, the National Development Plan 2010 – 2014 has recognised the need for increased resilience in the housing sector. Some of the tasks adopted include reducing the number of precariously situated structures, managing rainwater responsibly, evolving a more comprehensive way of sustainable construction in sustainable cities, and integration risk reduction in water supply systems and sewage treatment plants. The government has now begun to channel both domestic as well as foreign resources in such a way so that it is tied with the agenda of developing resilience and adaptation, since it is a middle-income country (UNGRD, 2013). Following the huge financial needs after the floods of 2010/ 2011, Colombia developed a *Financial Strategy to Reduce the Fiscal Vulnerability of the State against Natural Disasters* in 2012. This strategy aims to maintain financial stability in the face of a disaster and make funds readily available in crises situations. The Finance Ministry is developing strategies for insuring all public and administrative buildings, particularly schools and hospitals. The financial strategy has also developed certain risk retention measures. Three instruments have mainly come up which include an increase in budget flexibility, a contingent credit line with the World Bank and a National Disaster Risk Management Fund. Different development cooperation providers have played a vital role in analysing the various risks involved and developing adaptation and resilience plans. There is scope for better alignment of climate risks and disaster management solutions (ECLAC, 2012). The involvement of a broad group of stakeholders, including the private sector, will help hasten this process.

Shifting our focus on Ethiopia, we observe that development and climate are now strongly interlinked. Ethiopia's GDP was heavily dependent on climatic factors like rainfall, but now with strong concern and awareness about resilience, the country has been able to ensure a stable GDP without heavy dependency on climatic conditions. Agriculture is one of the top concerns in Ethiopia and therefore, a CRS (Climate Resilience Strategy) has been developed by the Ministry for Agriculture. It examines the links between climate change and its impact on agriculture, and came up with about 1000 options for creating agricultural resilience in the face of disasters. There is significant overlap between good development practice and climate resilience (OECD, 2009). The strong political leadership of the late Prime Minister Meles Zenawi has driven Ethiopia's efforts to build a climate-resilient economy. A solid fiscal strategy to deal with climate risks is required for strengthening climate resilience (MoFED, 2012). Sudden changes in international oil and coffee prices have resulted in the biggest shocks to the Ethiopian economy. Therefore, in 2002, the government established the National Disaster Prevention and Preparedness Fund (NDPPF), which is an emergency organisation that provides resources during calamities. Financial resources were collected and stored to be used in the case of emergencies and also for emergency employment schemes. Another program established was the Productive Safety Net Program (PSNP), which is one of the largest food security programs in sub-Saharan Africa. Additionally, development co-operation providers have contributed substantially to Ethiopia's resilience efforts, through both financial and technical support. A large portion of the Ethiopian population did not have access to insurance services, but now many private insurance providers have emerged as an important tool in the resilience building scenario.

5. Conclusions

Mining and energy are a high priority in Colombia. Its comparative advantage in agriculture could be threatened by climate change and therefore, many to improve the resilience of agriculture have been adopted. Colombia has an opportunity to build resilience into its transport infrastructure. Housing is a very vulnerable sector. Innovation is the key for climate change adaptation. Resilient land-use and water policies are vital. Colombia is integrating climate into land-use plans. Water resource management plans are also incorporating resilience. Disaster risk management and climate resilience are being linked better. Financial resilience is being built.

Agriculture is a top priority for resilience in Ethiopia. Climate change will affect agriculture in many ways. Agricultural extension is becoming more resilience-focused. Financial resilience is being incorporated at macro and micro scales. Ethiopia's macroeconomic context has implications for investment needs. A sound financial strategy is being developed to deal with climate extremes. Financial resilience is also needed at the micro-level. The role of international co-operation has been crucial.

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List of Abbreviations:

1. As Low As Reasonably Practicable (ALARP)
2. National Climate Change System (SISCLIMA)
3. Climate-Resilient Green Economy (CRGE)
4. Climate Resilience Strategy (CRS)
5. National Disaster Prevention and Preparedness Fund (NDPPF)
6. Productive Safety Net Program (PSNP)