Summer Internship Report

at

Sphere India

(April 22nd to June 21th, 2024)

A Report

By-

KRATI GUPTA

PGDM (Hospital and Health Management)

2023 – 2025

International Institute of Health Management Research, New Delhi

ACKNOWLEDGEMENT

I, **Krati Gupta** (PG/23/052), express my sincere gratitude to **IIHMR Delhi** Institute for the invaluable opportunity to be part of their esteemed organization. This summer internship has not only been a significant professional experience but has also been life-changing, teaching crucial lessons in resilience and responsibility for personal development.

Dr. Ratika Samtani's guidance has been pivotal in steering this project. Her dedication and constructive feedback have been invaluable, playing a crucial role in its successful completion. I am deeply honored to acknowledge Dr. Samtani's inspiration and unwavering support throughout this endeavor.

I extend my heartfelt thanks to **Mr. Vikrant Mahajan**, Chief Executive Officer of Sphere India, for endorsing and enabling this enriching two-month Summer Internship Program, providing valuable networking opportunities with industry professionals.

I would also like to thank **Mr. Saikhom Kennedy**, Senior Manager- Operations, **Ms. Nupur Tyagi**, Manager- Knowledge & Capacity Sharing, and Ms. Mishel Mohan, Deputy Manager- Knowledge and Capacity Sharing, for allowing me to work on various projects and supporting me throughout my internship.

I extend my warm gratitude and regards to everyone who helped me during my internship. Special thanks to my parents, all my colleagues, and **Deepanshi Rajput** for their support and help during this journey.

Thank you all for making this internship experience so fulfilling and memorable.

KRATI GUPTA

CERTIFICATE OF APPROVAL

The Summer Internship Project of titled "**BUILDING RESILIENCE: EARLY WARNING SYSTEMS AND FOOD AND NUTRITION SECURITY IN THE CONTEXT OF CLIMATE CHANGE-INDUCED DISASTERS**" at "**SPHERE INDIA**" is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **Post Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed, or conclusion drawn therein but approve the report only for the purpose it is submitted.

Dr. Ratika Samtani

Assistant Professor

IIHMR, Delhi

INTERNSHIP COMPLETION CERTIFICATE

Completion of summer internship from Sphere India

The certificate is awarded to

Ms. Krati Gupta

In recognition of having successfully completed his/her internship in the department of

Knowledge and Capacity Sharing

and has successfully completed her Project on

Building Resilience: Early Warning Systems and Food and Nutrition Security in the Context of Climate Change-Induced Disasters

21st June 2024

Sphere India

She comes across as a committed, sincere & diligent person who has a strong drive & zeal for learning.
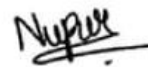
We wish her all the best for future endeavors

Ms. Mishel Mohan

Manager- Knowledge and Capacity Sharing

Organization Supervisor

Ms. Nupur Tyagi

Manager- Program Implementation

Head-HR/Department Head

FEEDBACK FORM

(Organization Supervisor)

Name of the Student: Ms. Krati Gupta

Summer Internship Institution: Sphere India

Area of Summer Internship: Disaster Management and Climate Resilience with specific focus on Food and Nutrition Security in Disasters

Attendance: 100%

Objectives met:

1. Prepared comprehensive meeting minutes, concept notes, and session reports for several webinars including: Heatwave Preparedness: Mental Health & Psychosocial Impact of Heatwaves, Principles of Partnership: Building Effective Collaborations, Building Resilience to Heat Waves: Safeguarding Informal Economy Workers, Marine Conservation: Efforts and Urgency in India, etc.
2. Attended and presented a Research paper titled- "Building Resilience: Early Warning Systems and Food and Nutrition Security in the Context of Climate Change-Induced Disasters" at the Young Leader's Conclave organized by the National Institute of Disaster Management (NIDM), Ministry of Home Affairs, Government of India.
3. Attended and documented one-day dissemination Workshop on "District Level Heat Threshold and Heat Assessment in India" organized by the Department of Geography, Faculty of Sciences, Jamia Millia Islamia, New Delhi.
4. Use of MS Excel for qualitative and quantitative analysis.
5. Use of Canva for designing IEC materials and other documents.

Deliverables:

1. Session Reports for the following sessions:
   1.1. Heatwave Preparedness: Mental Health & Psychosocial Impact of Heatwaves
   1.2. Workshop on "District Level Heat Threshold and Heat Assessment in India" organized by the Department of Geography, Faculty of Sciences, Jamia Millia Islamia, New Delhi.
   1.3. Building Resilience to Heat Waves: Safeguarding Informal Economy Workers
2. Concept Note for the following sessions:
   2.1. Principles of Partnership: Building Effective Collaborations
   2.2. Marine Conservation: Efforts and Urgency in India

2.3.Heatwave Awareness: Strategies, Impacts, and Solutions: A Holistic Perspective
3. Prepared Presentations on the following topics:
    3.1.Building Resilience: Early Warning Systems and Food and Nutrition Security in the Context of Climate Change-Induced Disasters.
    3.2.Strengthening Disaster Relief Logistics in India
    3.3.Significance of Earth Day: A Call to Action against Climate Change
    3.4.Behavioral changes to achieve LiFE (Lifestyle for Environment)
4. Prepared Review paper on Building Resilience: Early Warning Systems and Food and Nutrition Security in the Context of Climate Change-Induced Disasters.
5. Worked on a stakeholder mapping and consultation for Education in emergency and Food and nutrition security as part of the review project.
6. Worked on a detailed list of National and state-level health-related policies and schemes relevant to Health Sector Coordination for updating the Handbook for Multistakeholder Coordination for Emergency Preparedness and Response for the Health sector.
7. Worked on Training Evaluation Form Analysis for the following sessions:
    8.1.Discussion Session on the Role of NGOs in Post-Disaster Resilience Specific to Rajasthan
    8.2.Training On Education in Emergencies
    8.3.Roundtable Consultation on Climate Crisis and Public Health: Understanding the Impacts and Pathways Forward
8. Worked on Qualitative and Quantitative analysis of pre- and post-training assessment of Psychosocial Support in Emergencies (PSS) South Regional training.

Strengths: Strong documentation skills. Eager to learn and work on relatively new topics. Clear communication and presentation skills. Strong subject knowledge and practical experience.

Suggestions for Improvement: Continuous learning for building professional experience including developing technical writing skills further to synthesize information in a concise and precise manner.

Signature of the Officer-in-Charge (Internship)

Date: 21.06.2024

Place: Noida, Uttar Pradesh

FEEDBACK FORM

(IIHMR MENTOR)

Name of the Student: KRATI GUPTA

Summer Internship Institution: SPHERE INDIA

Area of Summer Internship: Knowledge and Capacity Sharing Department

Attendance: (Disaster Management and Climate Resilience with specific 100% focus on Food and Nutrition Security in Disasters.)

Objectives met: 1. Prepared comprehensive meeting minutes, concept notes, and session reports for several webinars. 2. Use of MS Excel and Canva.
3. Attended & presented Research Paper at NIDM
4. Attended & documented one-day dissemination workshop at Jamia Millia Islamia, New Delhi

Deliverables:
1. Session Reports
2. Concept Notes
3. Prepared Presentations
4. Prepared Review paper

5. Worked on qualitative & quantitative analysis of pre- and post- training of PSS
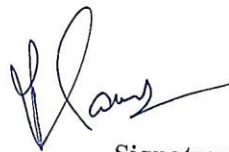
Strengths:
1. Clear communication
2. Presentation Skills
3. Strong Documentation Skills
4. Strong subject Knowledge and practical experience

Suggestions for Improvement:
1. Practice Mindfulness
2. Strengthen Research Methodology
3. Improve Time Management

Date: 10th December, 2024

Signature of the Officer-in-Charge

Place: New Delhi

(Internship)

PLAGIARISM REPORT

Krati Gupta ST report

ORIGINALITY REPORT

10%	**7%**	**6%**	**1%**
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Samuel Chukwujindu Nwokolo, Anthony Umunnakwe Obiwulu, Paul C. Okonkwo. "Africa's Propensity for a Net Zero Energy Transition", CRC Press, 2024 Publication	1%
2	M. C. Tirado, D. Hunnes, M. J. Cohen, A. Lartey. "Climate Change and Nutrition in Africa", Journal of Hunger & Environmental Nutrition, 2015 Publication	1%
3	www.sphereindia.org.in Internet Source	1%
4	eficor.org Internet Source	1%
5	agricoop.nic.in Internet Source	1%
6	reliefweb.int Internet Source	1%
7	link.springer.com Internet Source	<1%

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ABBREVIATIONS

CCA: Climate Change Adaptation

DRR: Disaster Risk Reduction

EFICOR: Evangelical Fellowship of India Commission on Relief

EWS: Early Warning Systems

FAO: Food and Agriculture Organization

FNS: Food and Nutrition Security

GOI: Government of India

IAC: Inter-Agency Coordination

IEC: Information, Education, and Communication

IFPRI: International Food Policy Research Institute

IPCC: Intergovernmental Panel on Climate Change

KCS: Knowledge and Capacity Sharing

MHA: Ministry of Home Affairs

NDMA: National Disaster Management Authority (or relevant national authority)

NGOs: Non-Governmental Organizations

NIDM: National Institute of Disaster Management

PSS: Psychosocial Support in Emergencies

SDGs: Sustainable Development Goals

SVR: Support Vector Regression

UN: United Nations

WHO: World Health Organization

LIST OF TABLES AND FIGURES

ORGANIZATIONAL LEARNING

ORGANIZATION PROFILE

Sphere India is a national coalition of humanitarian organizations established in 2003 to promote Sphere Principles and Standards. It has evolved into a collaborative platform connecting stakeholders in humanitarian aid, disaster risk reduction, climate risk management, development, and peacebuilding, including representatives from government, the private sector, the UN, NGOs, community organizations, academic institutions, media, and individuals.

Sphere India advocates for a rights and needs-based approach, emphasizing humanitarian principles and global frameworks for disaster risk reduction, climate change adaptation, and sustainable development. It ensures accountability to affected and at-risk populations by facilitating inter-agency coordination, providing a platform for diverse stakeholders, promoting knowledge sharing and capacity building, and developing mechanisms to uphold accountability during crises.

VISION

Sphere India envisions a Disaster Resilient India with an effective and efficient Disaster Management System accountable to affected and at-risk populations to protect, assist, and enable crisis-affected people to rebuild their lives with dignity.

MISSION

Enhance the collaborative accountability of humanitarian and DRR actors in India to affected populations by developing systems for effective and efficient humanitarian and DRR coordination, predictable humanitarian finance, appropriate policy, knowledge, and capacity sharing.

Collaborators and Knowledge Partners

ROLE OF ORGANIZATION

Sphere India plays a crucial role in development and humanitarian efforts through several key functions:

- **Needs- and Rights-Based Approach:** Ensuring marginalized communities' needs and rights are met with a focus on humanitarian principles.
- **Inter-Agency Coordination:** Enhancing effectiveness and collaboration among stakeholders for a unified disaster management system.
- **Stakeholder Platform:** Promoting transparency, accountability, and multi-stakeholder collaboration for resilience building.
- **Knowledge and Capacity Sharing:** Providing expertise and best practices for disaster risk reduction, climate adaptation, and humanitarian work.
- **Sustainable Initiatives:** Advocating for risk reduction, sustainable development, and community resilience.
- **Collaborative Advocacy:** Ensuring equitable access to quality assistance and upholding humanitarian standards for vulnerable groups

Summary:

Sphere India plays a multifaceted role that encompasses collaboration, information sharing, a rights-based approach, adherence to humanitarian principles, and sustainable development efforts. Their contributions are essential in tackling complex issues in India and beyond. Sphere India's collective commitment to quality and accountability drives its mission to assist affected and at-risk populations while upholding national and global goals.

ABOUT THE DEPARTMENT

❑ **Knowledge and Capacity Sharing (KCS) at Sphere India:**

The Knowledge and Capacity Sharing (KCS) vertical at Sphere India began as a Knowledge Management Program in 2009. Its primary aim is to collate organizational learning, best practices, knowledge sharing among Sphere India members, and collaborative outreach to disseminate knowledge using various mediums.

❑ **Broad Objectives of KCS Vertical:**

1. **Collation of Knowledge Products and Practices:** Gathering knowledge and practices from different member organizations.

2. **Documentation of Good Practices:** Systematically recording successful practices.

3. **Facilitating Inter-Agency Learning:** Promoting learning through lessons learned exercises.

4. **Supporting Innovations:** Developing new knowledge products and supporting innovative approaches.

5. **Dissemination of Information:** Sharing information through diverse media channels.

❑ **My Role in the KCS Department:**

During my internship in the **Knowledge and Capacity Sharing (KCS) Department** at Sphere India, I focused on the **Food and Nutrition Security (FNS)** project. My responsibilities included:

- **Literature Review:** Conducting a comprehensive review of existing literature on FNS, particularly in the context of climate change.
- **Assessing Climate Change Impact:** Evaluating how climate change affects food production and distribution, leading to food insecurity and malnutrition.
- **Analyzing Organizational Strategies:** Reviewing how different organizations implement early warning systems and other strategies to mitigate the impacts of climate change on FNS.
- **Identifying Best Practices and Challenges:** Documenting successful practices and challenges faced by organizations in ensuring food security and nutrition amidst climate change.

This project aimed to enhance understanding of climate resilience and provide practical recommendations for improving preparedness strategies for food and nutrition security. My work contributed to Sphere India's mission of promoting knowledge sharing and capacity building among humanitarian stakeholders.

WORK DONE DURING INTERNSHIP

During my internship at Sphere India, I was actively involved in several key projects and tasks that contributed to both my professional development and the organization's objectives:-

- **Workshop and Session Documentation:** I documented reports for various workshops and sessions, which covered topics such as heatwave preparedness, mental health impacts of heatwaves, safeguarding informal economy workers, building effective collaborations, marine conservation, and holistic strategies for heatwave awareness. These reports captured the key insights and outcomes of each session, contributing to the organization's knowledge base.

- **Handbook Development:** I contributed to updating the Handbook of Multistakeholder Coordination for Emergency Preparedness and Response for the Health Sector. This involved developing content and compiling a comprehensive list of national and state-level health-related policies and schemes, ensuring the handbook was up-to-date and comprehensive.

- **Training Evaluation:** In the realm of training evaluation, I analyzed pre-and post-training assessments for the Psychosocial Support in Emergencies (PSS) South Regional training. This involved both qualitative and quantitative analysis to measure the effectiveness of the training program and provide insights for improvement.

- **Interview and Stakeholder Mapping**: Interviewing Mr. Samson Christian, the Zonal Manager at EFICOR, was another crucial task. This interview focused on EFICOR's role in building resilience through early warning systems. Additionally, I conducted stakeholder mapping for sectors like Education in Emergencies, Food and Nutrition, and Principles of Partnership, identifying potential stakeholders for future collaborations and initiatives.

- **Survey Design and Data Management:** I created forms with various question types and customized settings to ensure effective data collection. I managed and viewed responses in real time, exporting the data to Google Sheets for analysis, all while maintaining data security and privacy.

- **Data Analysis with Microsoft Excel:** I worked extensively with Microsoft Excel to organize and analyze data. I created and formatted spreadsheets, used basic functions and formulas for calculations, and employed data visualization techniques such as charts and

graphs. Advanced features like pivot tables were utilized to summarize and analyze data efficiently.

- **Designing IEC Materials:** A significant portion of my work involved designing professional Information, Education, and Communication (IEC) materials using Canva. I explored various templates, layouts, and design elements to create customized designs with text, images, and graphics. This included posters, flyers, presentations, and social media graphics, which were essential for communicating Sphere India's initiatives and workshops.

Overall, my internship at Sphere India provided me with valuable experience in survey design, data analysis, report documentation, stakeholder mapping, training evaluation, and content development. These tasks not only enhanced my skills but also contributed to Sphere India's mission of promoting quality and accountability in humanitarian efforts.

OPPORTUNITIES

My summer internship provided a range of chances for development, learning, and significant contributions:

- **Enhancing Technical Skills:** The internship allowed me to enhance my skills in Google Forms, Microsoft Excel, and Canva through practical experience, preparing me for future professional roles.

- **Gaining Insight into Humanitarian Efforts:** Participation in various workshops and sessions provided deep insights into humanitarian challenges and strategies, expanding my understanding of the field.

- **Networking and Professional Connections:** Interviewing key stakeholders and conducting stakeholder mapping helped build valuable professional connections for future collaborations.

- **Contributing to Meaningful Projects:** Working on the Handbook of Multistakeholder Coordination allowed me to contribute to significant projects, applying my skills in a meaningful way.

- **Enhancing Analytical and Research Skills:** Analyzing pre- and post-training assessments improved my analytical and research skills, benefiting future research and evaluation projects.

- **Building Communication and Documentation Skills:** Documenting workshop reports honed my ability to summarize complex information clearly and concisely, enhancing my communication skills.

- **Exposure to Policy and Scheme Development:** Compiling health-related policies and schemes provided valuable exposure to policy development, beneficial for future work in public health or policy.

The internship offered numerous growth opportunities, from technical and analytical skill enhancement to professional networking and understanding humanitarian efforts, preparing me for a successful career in the field.

LEARNINGS

During the 2-month internship, the key learnings include:

- **Presentation Creation:** Learned how to create comprehensive presentations, including structuring content, using visual aids effectively, and delivering engaging presentations.

- **Subject Knowledge:** Gained in-depth knowledge of various topics, including disaster management frameworks, climate change mitigation, Health, Food and Nutrition Security, and the psychology of climate change. Developed a deeper understanding of the challenges and solutions related to these issues.

- **Communication Skills:** Developed strong communication skills through interactions with colleagues, stakeholders, and experts. Learned how to effectively convey complex ideas and information clearly and concisely. Improved skills in listening, negotiation, and persuasion, which are essential for building relationships and collaborating effectively.

- **Data Analysis:** Improved skills in qualitative and quantitative analysis, including analyzing survey data related to early warning systems and food security. Learned how to identify trends and draw meaningful conclusions from data.

- **Stakeholder Engagement:** Gained insights into the importance of stakeholder engagement in project success. Learned how to identify key stakeholders and build relationships with them to ensure effective collaboration.

- **Research Methodologies:** Learned about different research methodologies, including literature review, data collection, and analysis. Applied these methodologies in practice to prepare review papers and presentations on various topics.

- **Project Management:** Developed skills in managing multiple projects simultaneously, including prioritizing tasks, meeting deadlines, and ensuring quality deliverables. Learned how to adapt to changing project requirements and manage project resources effectively.

- **Heatwave Awareness:** Attended different sessions on heatwaves and learned about the mental health and psychosocial impacts of heatwaves. Gained insights into strategies for heatwave preparedness, including safeguarding informal economy workers and mental health.

- **Disaster Relief Logistics:** Learned about the current state of disaster relief logistics in India and global best practices. Gained insights into the challenges and opportunities in strengthening disaster relief logistics.

- **Climate Change and Food Security:** Gained insights into the impact of climate change on food and nutrition security. Learned about the role of early warning systems in ensuring food security and the challenges in implementing climate resilience measures.

- **Behavioral Change for Environment:** Learned about the importance of behavioral change in achieving lifestyle changes for environmental sustainability. Gained insights into the psychology of climate change and effective strategies for motivating behavior change.

- **Emergency Preparedness and Response:** Gained insights into the principles of partnership and building effective collaboration. Learned about the importance of effective communication and coordination in emergency response efforts.

SUGGESTIONS

To further strengthen the impact and reach of the KCS vertical at Sphere India, the following suggestions are proposed:

- **Strengthening Partnerships:** Foster stronger partnerships with academic institutions and research organizations to enhance the depth and breadth of knowledge products and innovative solutions.

- **Leveraging Technology:** Utilize advanced data analytics and AI tools to better analyze trends and patterns in disaster risk reduction (DRR) and climate change adaptation (CCA), ensuring more effective and targeted interventions.

- **Expanding Dissemination Channels:** Increase the use of digital platforms, social media, and online webinars to disseminate knowledge products and best practices to a wider audience, ensuring that valuable information reaches grassroots organizations and communities.

- **Encouraging Community Participation:** Involve community members and local organizations in the documentation and dissemination processes to ensure that the knowledge products are contextually relevant and practical.

- **Continuous Learning and Feedback Loops:** Implement regular feedback loops from member organizations and stakeholders to continually refine and improve knowledge products and capacity-building initiatives.

- **Resource Mobilization:** Secure funding and resources dedicated to innovation and capacity-building projects, enabling the development and implementation of cutting-edge solutions for FNS and DRR.

- **Enhancing Training Programs:** Develop comprehensive training programs focused on emerging challenges in FNS and DRR, equipping stakeholders with the skills and knowledge needed to address these issues effectively.

- **Monitoring and Evaluation:** Establish robust monitoring and evaluation frameworks to assess the impact of KCS initiatives and ensure that the objectives are met effectively.

- **Promoting Cross-Sector Collaboration:** Encourage collaboration across different sectors such as health, agriculture, and education to create integrated approaches to disaster resilience and sustainable development.

- **Documenting Case Studies:** Regularly document and share detailed case studies of successful projects and interventions, providing actionable insights and inspiration for other organizations.

- **Promoting Inclusivity and Diversity:** Foster an inclusive and diverse organizational culture by implementing policies for gender equality, cultural diversity, and inclusion of marginalized groups.

- **Conducting More Internal Staff Welfare Programs:** Enhance team building and overall employee well-being by organizing regular staff welfare programs.

- **Increasing Field Exposures:** Incorporate more activity-based learning opportunities to provide practical, hands-on experience for stakeholders.

PROJECT REPORT

"Building Resilience: Early Warning Systems and Food and Nutrition Security in the Context of Climate Change-Induced Disasters – A Review Article"

ABSTRACT

Climate change significantly threatens global food and nutrition security (FNS), increasing health risks, particularly for vulnerable populations. Extreme weather events brought on by climate change, such as droughts and floods are increasingly frequent and severe, directly affecting agricultural productivity and food distribution systems, leading to food insecurity and malnutrition. Organizations engaged in disaster relief play a crucial role in mitigating these impacts on FNS by using and promoting early warning systems (EWS) for climate change and disasters. These systems provide timely information to help organizations prepare and respond effectively, enabling the pre-positioning of food stocks and other logistical preparations to maintain FNS.

Sustaining the availability of food in the future requires addressing the impact of climate change on food security. This review paper examines the role of early warning systems (EWS) in enhancing resilience against climate change-induced disasters. This review aims to understand the strategies, effectiveness, and challenges associated with EWS in ensuring FNS.

KEYWORDS: Climate Change Resilience, Food and Nutrition Security, Early Warning Systems, Adaptation, Logistics, Disaster Response

INTRODUCTION

One of the most important issues facing the world today is climate change, which has a significant impact on food and nutrition security (FNS) (1). The rising frequency and severity of extreme weather events, such as floods, droughts, and cyclones, are exacerbating food insecurity and malnutrition among vulnerable populations. These events are also disrupting agricultural production and food distribution systems (2). Increasing temperatures and shifting precipitation patterns are adversely impacting crop yields, livestock productivity, and fisheries, resulting in serious repercussions for global food security. More than 1 billion people around the world experience hunger, while another 1 billion suffer from "hidden hunger," marked by insufficient access to vital vitamins and minerals (3). According to the Intergovernmental Panel on Climate Change (IPCC, 2023), the vast majority of natural disasters—nine out of ten—are now linked to climate change. These disasters not only destroy crops and infrastructure but also disrupt markets, leading to food price volatility and further worsening the hunger crisis (3). Projections indicate that food production may decline by 16% by 2030, with the number of people at risk of hunger potentially increasing from an estimated 73.9 million to 90.6 million in India alone—a 23% increase (4). These concerning estimates highlight the pressing need for practical solutions to lessen the negative effects of climate change on food security.

RATIONALE

In this critical context, Early Warning Systems (EWS) are essential tools for foreseeing and minimizing the effects of climate-induced disasters. By providing timely alerts, EWS enables communities and organizations to prepare for and respond to extreme weather events, thereby protecting agricultural productivity and food distribution systems. Despite the recognized importance of EWS, there is a notable gap in research on how organizations implement and utilize these systems to manage food and nutrition emergencies. Understanding the strategies, practices, and challenges faced by organizations in effectively using EWS is crucial for developing robust response mechanisms. This literature review explores the intersection of EWS and FNS, focusing on how EWS can be leveraged to build resilience against climate change-induced disasters. The study aims to examine existing strategies, identify best practices, and uncover challenges associated with utilizing EWS to enhance food and nutrition security. By concentrating on these aspects, the review seeks to assist in formulating effective strategies to mitigate the effects of climate change on food security and bolster resilience among vulnerable communities.

RESEARCH QUESTION

How do Early Warning Systems (EWS) contribute to food and nutrition security and enhance community resilience in regions affected by climate change-induced disasters?

OBJECTIVES

Primary Objective:

- To evaluate the effectiveness of Early Warning Systems (EWS) in enhancing food and nutrition security and building resilience against climate change-induced disasters.

Secondary Objectives:

1. To identify key strategies and best practices in implementing EWS for managing food and nutrition security.

2. To assess the challenges and limitations of utilizing EWS for disaster preparedness and response.

3. To analyze the impact of EWS on community awareness, agricultural productivity, and food distribution networks.

4. To explore the role of community participation and capacity-building in the success of EWS.

5. To document case studies and practical insights from organizations and regions effectively using EWS to mitigate the impact of climate change-induced disasters.

METHODOLOGY

This research examined the concepts of food and nutrition security and early warning systems comprehensively. A narrative review was conducted through an extensive search of multiple academic databases, including PubMed, Scopus, Web of Science, Google Scholar, and ScienceDirect. Additionally, gray literature from international and national organizations such as the United Nations (UN), Intergovernmental Panel on Climate Change (IPCC), Food and Agriculture Organization (FAO), International Food Policy Research Institute (IFPRI), and World Health Organization (WHO) was included.

The search strategy involved various combinations of specific keywords like "Climate Change Resilience," "Food and Nutrition Security," "Early Warning Systems," "Adaptation," "Logistics," and "Disaster Response" to ensure a focused and relevant collection of literature. Given the narrative review methodology, no rigid criteria for inclusion or exclusion were established. However, the review targeted peer-reviewed articles, reports, and policy documents published between 2000 and 2024, discussing the effects of climate change on food and nutrition security and the role of early warning systems in mitigating these impacts. Ethical considerations were upheld by properly citing and acknowledging all sources.

An anonymized interview was also conducted with a representative from EFICOR, a national NGO working on disaster relief. The interview aimed to gain practical insights and document a case study on the implementation and challenges of early warning systems for food and nutrition security in the context of climate change-induced disasters. The interview was anonymized to ensure confidentiality, and the representative's designation was not specified to maintain privacy. The insights obtained from this interview contributed valuable first-hand information on the operational aspects of early warning systems and their effectiveness in addressing food and nutrition security challenges.

From the literature review, specific themes were identified and elaborated to address the study's objectives. This approach enabled a comprehensive understanding of the intersection between early warning systems and food and nutrition security amidst increasing climate-induced disasters.

ASSESSING FOOD AND NUTRITION SECURITY

The 1996 World Food Summit's definition of food security, is "a situation that exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and preferences for an active and healthy life."(5) Despite decades of international efforts, food insecurity remains a widespread issue. In 2023, severe food insecurity affected over 333 million people in 78 countries (6). Globally, there are 650 million undernourished people (7) and more than 2.3 billion people worldwide are undernourished in some way (8). By 2050, it is projected that there will be over 150 million people facing protein shortages and about 140 million with zinc deficiencies worldwide(9). In India, the number of individuals in danger of starvation is expected to rise from 73.9 million to 90.6 million by 2030, a 23% increase (4).

Food and nutrition security is often hindered by structural inequities, such as restricted access to healthful food options, a lack of nutrition knowledge, and socioeconomic imbalances (10). The concept of food security encompasses six dimensions (Figure 1). Four dimensions recognized by the FAO until 2021 address both chronic and transitory situations: *availability, access, utilization, and stability* (11). *Availability* requires that sufficient food be consistently produced, delivered, or imported to meet demand. *Access* ensures that everyone has the means to acquire the appropriate foods needed for a nutritious and culturally appropriate diet. *Utilization* emphasizes the importance of properly preparing and consuming food based on basic nutrition knowledge, proper handling, and access to sanitary facilities and enough water to avoid foodborne illnesses.
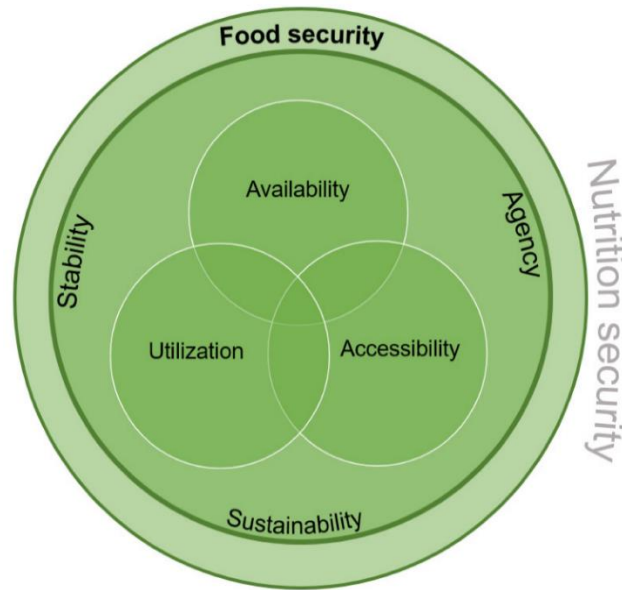
Figure 1: Food and Nutrition Security Dimensions (12)

Stability makes sure that food is consistently available, accessible, and used, allowing individuals to maintain a healthy and active life despite potential shocks or crises. Additionally, *sustainability and agency* have been recognized by the FAO as the fifth and sixth dimensions in recent reports (13). *Sustainability* focuses on the long-term viability of food systems, keeping in mind that the cultivation and consumption of food practices shouldn't jeopardize the ability of coming generations to feed themselves. The *agency* highlights the importance of individuals and communities having the power to make decisions about their food systems, affecting the distribution, production, processing, and consumption of food (14).

CLIMATE CHANGE'S IMPACTS ON THE SECURITY OF FOOD AND NUTRITION

Global food and nutrition security is seriously endangered by climate change, which has an impact on food production, distribution, and accessibility (15). Reduced food supply and stability result from increasing temperatures and altered precipitation patterns, which also have an impact on crop yields, livestock farming, and water supplies. Extreme weather events brought on by climate change, such as floods and droughts, further aggravate food poverty by upsetting food supply systems and driving up food costs. Sustainable agricultural practices, such as climate-smart

agriculture, are essential for increasing production, lowering greenhouse gas emissions, and strengthening resilience to maintain food security in the face of climate change. Addressing the consequences of climate change on agribusiness and food systems is essential for achieving global food security goals and mitigating hunger and malnutrition in vulnerable populations.

EARLY WARNING SYSTEMS: DEFINITION, COMPONENTS, AND IMPORTANCE

Early warning systems (EWS) are integrated tools and processes designed to predict and provide timely information about potential hazards, enabling proactive measures to mitigate their impact. EWS encompasses hazard monitoring, risk assessment, communication, and response mechanisms. In terms of climate change, EWS plays a vital role in anticipating extreme weather events and facilitating timely interventions to protect food and nutrition security. These systems are crucial for disaster risk management; because they give people, communities, and organizations relevant and timely information so, they can get ready and respond correctly when possible risks arise (16). EWS can range from financial performance monitoring in insurance companies to hazard forecasting and risk analysis in real-world situations (17). By reducing economic losses, injuries, and deaths, EWS empowers people to take preventive actions when disasters are imminent (18). An effective EWS requires an integrated approach, considering various components such as hazard identification, exposure, vulnerability, and community capacity, while addressing gaps in social components and multi-hazard situations for improved risk reduction and management (19). This network of tools and processes monitors and predicts hazards like floods, tsunamis, landslides, volcanoes, and droughts, using organized communication networks and preparedness processes to keep people safe (20).

The primary components of EWS are (Figure 2):

- **Risk Knowledge:** Risk knowledge is the foundation of an early warning system. It involves systematically collecting and analyzing data to understand the risks and vulnerabilities of communities. This includes assessing the likelihood and potential impact of various hazards, such as floods, earthquakes, and storms (21).

- **Monitoring and Warning:** An early warning system's primary duty is to monitor and warn. It requires constant observation of hazard factors and antecedents to produce precise alerts quickly. This includes detecting early signs of a disaster, such as changes in weather patterns or seismic activity, and providing warnings to those at risk (21).

- **Dissemination and Communication:** Dissemination and communication are crucial components of an early warning system. To facilitate appropriate responses that will help protect lives and livelihoods, clear messages with basic, helpful information are essential. Effective communication channels are established to ensure that individuals who are at risk receive the warnings, including regional, national, and community-level communication networks (21).

- **Response Capability:** A response capability is the final component of an early warning system. It involves the preparedness and capacity to respond to warnings by having plans in place, understanding safe practices, and knowing evacuation routes and secure areas. This includes ensuring that communities are equipped to respond quickly and effectively to minimize the impact of disasters (21).
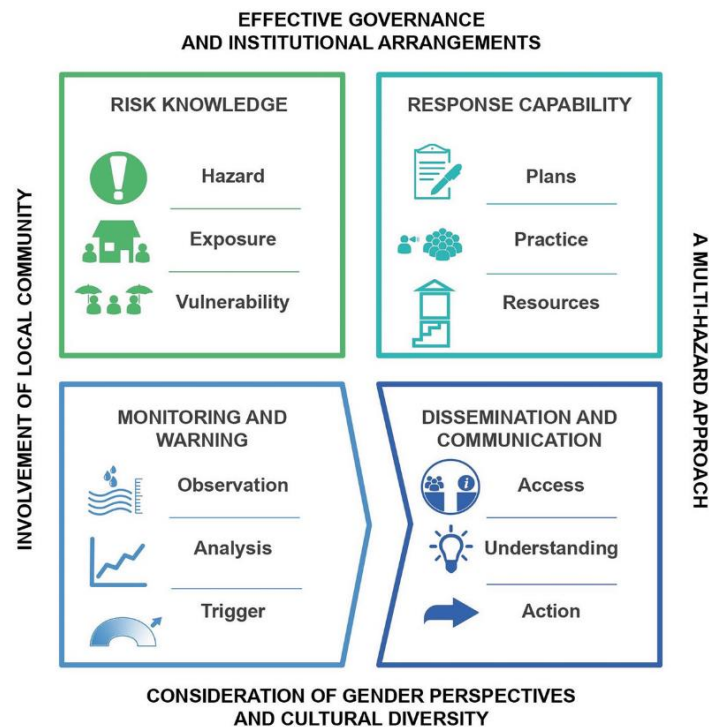

Figure 2: Components of Early Warning System (23,24)

In addition to these primary components, other important aspects of early warning systems include establishing team roles and responsibilities (22), setting S.M.A.R.T. goals (i.e. specific, measurable, achievable, relevant, and time-bound) (22), engaging local communities, and ensuring effective governance and institutional arrangements. Establishing a dedicated team to identify at-risk individuals, assign interventions, and monitor progress is essential for implementing an effective early warning system effectively. Engaging local communities and involving them in the early warning process is critical for building trust and ensuring that warnings are effective (21). Effective governance and institutional arrangements are necessary for the sustainability and cohesiveness of early warning systems (21).

IMPORTANCE OF EWS

- **Timely Alerts and Evacuation Plans:** Early warning systems provide timely notifications about approaching natural disasters, enabling authorities and locals to prepare evacuation plans and minimize the impact of disasters (25).
- **Enhanced Preparedness and Resilience**: Early warning systems help communities develop a preparation culture by providing early information. Residents and local officials can be proactive in strengthening infrastructure, safeguarding valuables, and assembling emergency kits, making communities less susceptible to disasters and more resilient (25).
- **Technology's Role**: Early warning systems have undergone a technological revolution, allowing for faster information distribution and more precise forecasts. Real-time data from sensors, machine learning algorithms, and satellite imagery enhance forecasting accuracy, enabling more informed decision-making and efficient emergency management (25).
- **Community Engagement and Education:** Effective early warning systems require community engagement and education. Drills, awareness campaigns, and educational initiatives enable people to understand the significance of early warnings and the proper way to respond, reducing anxiety and increasing the efficiency of disaster relief operations (25).
- **Economic Impact Mitigation:** Early warning systems are essential in reducing economic losses by providing early notice. Governments can strategically deploy resources,

businesses can safeguard their assets, and insurers can prepare for claims, enabling communities to recover more swiftly and suffer less long-term financial hardship (25).

- **Global Collaboration and Information Sharing:** International cooperation increases the efficacy of early warning systems by pooling resources, knowledge, and experience. This improves the accuracy and reach of early warnings, ensuring that communities receive timely information and are better prepared for disasters (25).

- **Inclusive and Sensitive:** Early warning systems need to be comprehensive and responsive to the diverse vulnerabilities within communities. This ensures that the systems are people-centered, end-to-end, and multi-hazard, effectively mitigating the risk produced by disasters (26).

- **Building Resilience:** By increasing readiness, which fortifies the ability to bounce back quickly and lowers risk, the deployment of early warning systems can support the development of resilience.

- **Reducing Loss of Life and Property:** If activated 24 hours prior to the disaster, effective early warning systems can cut damage by 30% and save many lives. This emphasizes how crucial early warning systems are to lessen the damaging effects of disasters (26)

Box 1: Case Study: EWS Impact on Food Security in Red Sea State, Sudan (34)

In the research paper titled "The Impact of Early Warning Systems on Food Security at Red Sea State, Sudan: Gaps, Challenges, and the Way Forward," authors Ahmed Abdel Aziz and Awatif Ayadh Ali explore how Early Warning Systems (EWS) impact food security in the Red Sea State (RSS) of Sudan. This study focuses on evaluating the effectiveness of EWS, identifying gaps, and suggesting necessary improvements.

The findings reveal a generally low perception of food security improvement through EWS in RSS. The system heavily relies on central government reserves and food aid mobilization during crises, reflecting a lack of self-sufficiency and proactive measures. A major issue that has been noted is the lack of steady funding. The state government has not prioritized EWS in its financial plans, and there is insufficient long-term donor funding, which severely hinders the system's effectiveness.

Another significant issue is the slow response to food security crises. The EWS team noted noticeable delays between the availability of information and the actual crisis response. Governance and coordination issues further exacerbate these problems, with poor governance and a lack of political commitment being major barriers. Additionally, the remoteness of vulnerable communities and the extensive geographical coverage required for assistance complicate response efforts.

Despite these challenges, local communities have demonstrated resilience by utilizing local reserves and developing coping mechanisms before crises escalate. To address the identified gaps, the study recommends increasing political commitment, enhancing coordination among relevant stakeholders, and securing dedicated funding. Empowering local communities through education and resource management is also highlighted as a crucial step to mitigate the impact of food security crises.

This case study highlights the crucial part that EWS plays in reducing the negative impact that disasters brought on by climate change have on food security. EWS can be employed more successfully in promoting food and nutrition security and creating resilience by filling financial gaps, speeding up reaction times, and strengthening governance and coordination. This study contributes to the broader discourse on the importance of robust Early Warning Systems in safeguarding food security, highlighting the practical challenges and necessary improvements specific to the Red Sea State, Sudan.

Box 2: Case Study: EFICOR's Role in Building Resilience through Early Warning Systems

Organization Overview

The Evangelical Fellowship of India Commission on Relief (EFICOR) is a national relief and development organization that has been serving the poor and marginalized in India since 1967. EFICOR is committed to various initiatives, including disaster response, building resilience, sustainable development, and training and capacity-building programs. Their interventions focus on livelihoods and food security, climate change adaptation, emergency response and resilience, peace building, urban resilience, maternal and child health and nutrition, and research and publications.

Interview Insights

In a detailed discussion with a representative of EFICOR, several critical aspects of the organization's approach to disaster risk reduction and food and nutrition security were highlighted. The conversation focused on the strategies and challenges of implementing early warning systems (EWS) in the context of climate change-induced disasters, particularly floods, in Bihar and Jharkhand.

EFICOR places a strong emphasis on building community capacity to handle disasters. This includes training community members to understand and respond to early warning signals effectively. The representative mentioned that EFICOR organizes workshops and simulation exercises to prepare communities for various disaster scenarios.

EFICOR's disaster preparedness strategies involve multiple layers of intervention. The organization works on enhancing the accuracy and timeliness of early warning systems. This involves collaboration with meteorological departments and local authorities to ensure that warnings are disseminated quickly and effectively to at-risk populations. They employ flood measurement techniques, such as installing river gauges and prepare communities to monitor water levels and predict potential flooding events. Training sessions are conducted to educate community members on how to interpret early warning signals and take necessary actions to mitigate the impact of disasters. Furthermore, EFICOR establishes early warning groups within villages. These groups are responsible for monitoring weather conditions, communicating warnings, and coordinating evacuation and other emergency responses.

The representative highlighted several challenges faced by EFICOR in disaster management. Ensuring that early warning messages reach all community members, especially in remote areas, remains a significant challenge. Limited financial and logistical resources can hinder the organization's ability to implement large-scale preparedness programs. Additionally, engaging the community and ensuring their active participation in disaster preparedness activities requires continuous effort and trust building.

EFICOR recognizes the critical importance of nutrition security, especially for weaker demographic groups such as children and pregnant women, during climate-induced disasters. The organization implements several measures to ensure food and nutrition security. EFICOR maintains emergency food supplies that can be quickly distributed to affected communities. Programs focused on maternal and child health provide essential nutritional support to prevent malnutrition during and after disasters. The organization also promotes sustainable farming methods to increase food security include crop diversity and soil conservation and build community resilience.

During the interview, several solutions were proposed to enhance the effectiveness of early warning systems. Developing community-based early warning systems that leverage local knowledge and resources can improve accuracy and responsiveness. Integrating modern technologies, such as mobile apps and automated weather stations, can enhance the reach and reliability of early warning messages. Continuous training and capacity-building initiatives ensure that community members are well-equipped to respond to early warnings. Strengthening collaboration between several stakeholders such as local communities, NGOs, and government agencies, creates a more coordinated and effective disaster response framework.

Conclusion

EFICOR's comprehensive approach to disaster risk reduction and food and nutrition security, as highlighted by their representative, demonstrates the critical role of early warning systems and community capacity building in enhancing resilience against climate change-induced disasters. Despite facing challenges, EFICOR's ongoing efforts to improve preparedness and response mechanisms continue to make a significant impact on the lives of vulnerable communities in India.

NATIONAL EARLY WARNING SYSTEM

The Government of India (GOI) has assigned specific agencies (see Table 1) to oversee the monitoring of various natural disasters, establish Early Warning Systems (EWS), and issue necessary alerts for impending hazards. These agencies utilize the latest available technologies and methods for early warning and monitoring where possible. They provide essential information to the Ministry of Home Affairs (MHA), which then disseminates alerts and warnings through multiple communication channels (27).

Table 1: National Agencies Contributing to Specified Natural Hazard Early Warning Systems (27)

S.No.	Hazard	Ministry	Agency
1	Avalanches	Ministry of Defense (MOD)	Snow and Avalanche Study Establishment (SASE)
2	Cold Wave Earthquake Heat Wave	Ministry of Earth Sciences (MOES)	India Meteorological Department (IMD)
3	Cyclone	Ministry of Earth Sciences (MOES)	India Meteorological Department (IMD), Regional Specialized Meteorological Centre (RSMC), Tropical Cyclone Warning Centers (TCWC) for different regions
4	Drought	Ministry of Agriculture and Farmers' Welfare (MAFW)	Central Drought Relief Commissioner (CDRC), Crop Weather Watch Group (CWWG)
5	Epidemics	Ministry of Health and Family Welfare (MHFW)	Ministry of Health and Family Welfare (MHFW)
6	Floods	Ministry of Jal Shakti (MOJS)	Central Water Commission (CWC)
7	Landslides	Ministry of Mines (MOM)	Geological Survey of India (GSI)
8	Tsunami	Ministry of Earth Sciences (MOES)	India National Centre for Oceanic Information Services (INCOIS)

EFFECTIVENESS OF EARLY WARNING SYSTEMS IN SAFEGUARDING FOOD AND NUTRITION SECURITY

EWS plays a significant role in addressing food insecurity challenges exacerbated by factors such as armed conflicts, climate change, and the COVID-19 pandemic (28). They utilize diverse data sources, including satellite imagery, survey data, and unconventional textual data, to offer a comprehensive understanding of the complex factors influencing food security situations (29).

Incorporating conflict-sensitive approaches and leveraging machine learning models like support vector regression (SVR), EWS can effectively forecast crop production, identify food shortages, and guide policy interventions to enhance food security outcomes (30). Collaborative partnerships and the use of science products such as agrometeorological and remote sensing tools further enhance the accuracy and timeliness of early warnings, enabling proactive responses to potential food crises.

The United Nations has implemented an executive action plan dubbed "Early Warnings for All" (2023–2027) (31) to assure worldwide safety from catastrophic storms, floods, or other climatic calamities. The four main goals of this plan are to: detect, observe, monitor, analyze, and forecast; communicate and disseminate warnings; manage disaster risk; and enhance readiness and reaction abilities. Nonetheless, despite these endeavors, a third of the world's populace, particularly in low- and middle-income nations, remains without access to early warning systems, making them more vulnerable to the effects of climate change (32). By analyzing factors like crop production forecasts, climate change impacts, and early signs of food crises, EWS enables governments and organizations to adjust food imports, allocate resources efficiently, and implement interventions to prevent food shortages and ensure food security for vulnerable populations. These systems facilitate early risk predictions, effectively. Communication with at-risk communities, and rapid response mechanisms, ultimately contributing to disaster risk reduction and saving lives and livelihoods in the face of food-related emergencies.

CHALLENGES ASSOCIATED WITH EARLY WARNING SYSTEMS IN ENSURING FOOD AND NUTRITION SECURITY

Lack of funds and resources, which restrict technical capabilities, data gathering, and communication networks, are major obstacles to early warning systems in guaranteeing food and nutrition security (19). Technical challenges arise from the need for advanced data analysis, forecasting models, and monitoring technologies, which are difficult to develop and maintain, especially in resource-limited settings (19). Geographical coverage limitations often leave remote or hard-to-reach areas vulnerable and unaware of impending crises (19). Accessibility and communication barriers, such as language, literacy, and technology access, hinder the dissemination and uptake of early warning information (33). Coordination and institutional challenges, due to weak collaboration among stakeholders, reduce system effectiveness (19). Additionally, early warning systems need to integrate multiple hazards like natural disasters, conflict, economic shocks, and disease outbreaks to provide comprehensive risk assessments. Building community engagement and trust is essential but challenging, especially in areas with a history of unreliable systems (33). Furthermore, early warning systems must adapt to evolving contexts influenced by climate change, demographic shifts, and technological advancements (19).

Addressing these issues requires increased investment, technological innovation, institutional strengthening, and community engagement to ensure that early warning systems effectively enhance global food security and nutrition.

DISCUSSION AND CONCLUSION

The review's conclusions highlight how crucial Early Warning Systems (EWS) are to reducing the negative effects of catastrophes brought on by climate change on food and nutrition security (FNS). EWS is pivotal in providing timely information and facilitating proactive measures to protect agricultural productivity and food distribution systems. Despite their proven effectiveness, the implementation of EWS faces several challenges. The review identifies gaps in the research on how organizations utilize EWS to manage food and nutrition emergencies. Additionally, practical challenges such as ensuring the timely dissemination of warnings to remote areas, engaging communities in preparedness activities, and securing sufficient financial and logistical resources are significant obstacles. These obstacles highlight the necessity of ongoing work and creativity to expand the use and capabilities of EWS. The integration of modern technologies, such as mobile applications and automated weather stations, can enhance the accuracy and reach of EWS. Collaborative efforts between government agencies, NGOs, and local communities are crucial for creating a coordinated disaster response framework. Additionally, support for policy is crucial both domestically and globally for the sustainable implementation and scaling of EWS.

One of the primary needs is for further research to enhance both the preparedness and effectiveness of EWS in mitigating the influence of such disasters on food and nutrition security. As climate change intensifies, the occurrence and intensity of climate-related disasters are anticipated to increase, further worsening food insecurity. Robust research efforts are essential to develop advanced EWS that can predict and respond to these events more effectively.

The review concludes that EWS are indispensable tools for mitigating the implication of climate change on FNS. Effective EWS can significantly enhance community resilience, reduce economic losses, and save lives. However, their successful implementation requires addressing several challenges, including improving communication channels, securing financial resources, and engaging communities in preparedness actions.

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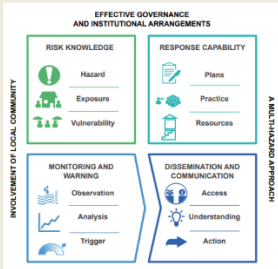
ANNEXURE

Final Poster:

"Building Resilience: Early Warning Systems and Food and Nutrition Security in the Context of Climate Change-Induced Disasters"

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INTRODUCTION

Climate change-induced extreme weather disrupts food production, increasing food insecurity and malnutrition (IPCC, 2023).

Disaster response organizations rely on Early Warning Systems (EWS) to mitigate these impacts.

Food production is projected to decline by 16% by 2030, exacerbating hunger risks, notably in India (IFPRI, 2022).

OBJECTIVE

Assess organizational implementation and utilization of Early Warning Systems (EWS) for climate-induced disaster logistics to ensure food security and nutrition.

METHODOLOGY

Literature Review:
- Comprehensive search of academic databases, research articles, and policy documents

Keywords:- Climate Change Resilience, Food and Nutrition Security, Early Warning Systems, Adaptation, Logistics, Disaster Response

Expert Interview: To validate the findings and gain practical insights, an interview was conducted with Mr. Samson Christian, Zonal Manager at EFICOR. The interview focused on the practical challenges and recommendations for enhancing EWS for FNS

FOOD AND NUTRITION SECURITY:

FIGURE: DIMENSIONS OF FOOD SECURITY

EARLY WARNING SYSTEM:

FIGURE: COMPONENTS OF EARLY WARNING SYSTEM

CHALLENGES IN IMPLEMENTING CLIMATE RESILIENCE MEASURES

- Inadequate community engagement
- Insufficient translation of DRR policies into community action,
- Lack of participatory approaches involving communities, and
- Gaps in institutional communication and collaboration.
- The nebulous nature of climate change,
- Political barriers hinder the incorporation of climate change science into DRR strategies.

GAPS IN THE LITERATURE AND NEED FOR FURTHER RESEARCH

- Lack of focus on humanitarian food supply chains.
- Insufficient research on addressing food loss and waste, coordination, globalization, and resilience
- Limited studies on how citizens can be involved.
- Climate migrants in their international destinations and their impacts on host communities.
- EWS effectiveness , highlighting the role of public actions in mitigating risks.

INTERVIEW INSIGHTS: EFICOR'S ROLE IN BUILDING RESILIENCE THROUGH EARLY WARNING SYSTEMS

EFICOR's efforts in disaster risk reduction and food security are crucial for enhancing resilience against climate change-induced disasters. Despite challenges, their ongoing work significantly impacts vulnerable communities in India.

RECOMMENDATIONS

- Further research is needed to enhance the preparedness and effectiveness of EWS
- Organizations should assess the effectiveness of EWS through various methods, considering data collection methods, public responses, contextual factors, and system-wide improvements.
- Develop mechanisms to incorporate EWS data into the management of food supply chains to preemptively address disruptions and shortages.
- Leveraging machine learning models like support vector regression to enhance the predictive accuracy of food security early warning platforms.

CONCLUSION

This study highlights the crucial role of early warning systems (EWS) in ensuring food security amid climate change-induced disasters. Effective EWS usage significantly enhances organizational preparedness and response capabilities. Key findings show that organizations utilizing community-based EWS, integrating modern technologies, and focusing on capacity building are better prepared. However, challenges such as inadequate community engagement and limited resources persist. .

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Pictorial Journey: