

Managing the Impacts of Floods on Poultry Production in Jamshoro, Sindh: A Review of Disaster Management Strategies and Lessons Learned

Muhammad Naeem Jan^{1*}, Muhammad Hanif², Nasir Rajput¹, Ghulam Murtaza² and Waja Irfan¹

¹Department of Poultry Husbandry, Sindh Agriculture University Tandojam

Corresponding Author: Muhammad Naeem Jan, Department of Poultry Husbandry, Sindh Agriculture University Tandojam

²Department of Disaster Management & Development Studies, University of Balochistan Quetta

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Abstract

The poultry industry in Jamshoro, Sindh, Pakistan has been severely impacted by frequent flooding, resulting in significant economic losses and environmental damage. The industry faces several challenges, including high feed costs, disease outbreaks, and poor environmental management. While several strategies have been implemented to mitigate the effects of flooding, more needs to be done to secure the future of the poultry industry in Jamshoro. Disaster management is an important aspect of poultry farming that can help to reduce the impact of disasters on animal life, economic losses, and environmental damage. Best practices for disaster management include developing plans, investing in infrastructure, forging partnerships, implementing biosecurity measures, and adopting sustainable production practices. Public-private partnerships have emerged as an important strategy for enhancing flood preparedness and response in the poultry industry of Jamshoro. Innovations in disaster risk reduction for poultry farmers include early warning systems, climate-smart agriculture, remote sensing technologies, use of mobile technology, and breeding of disaster-resistant poultry. Effective policy approaches are needed to enhance flood resilience in the poultry industry, including establishing regulatory frameworks, providing affordable and relevant insurance options, collaboration between public and private sectors, establishing funding mechanisms, investing in infrastructure and linking the poultry industry to other sectors. Collaboration between all stakeholders is crucial to developing and implementing interventions that build resilience to climate risks, enabling the poultry industry to continue contributing to the region's economy and society despite natural hazards.

Keywords: Floods, Poultry Industry, Disaster Management, Resilience, Public-Private Partnerships

1. Flooding in Jamshoro, Sindh: An Overview

Jamshoro, a city in Sindh province of Pakistan, is a low-lying area susceptible to flooding due to its location near the River Indus [1]. This region of Pakistan has experienced an unusually high frequency of flooding in recent years, with the 2022 flood being one of the most severe [2]. The flooding has had a profound impact on the region's economy, including the poultry industry. Livestock and poultry production have been severely affected due to the loss of land, feed, and animal life [3]. Review of the literature shows that floods have had a particularly severe impact on the poultry industry in Jamshoro. The volume of poultry production has decreased, leading to increased poultry prices, while the quality of the product has also decreased due to water contamination [4]. The damage to poultry farms has been considerable, with many farms experiencing destruction of sheds, animal deaths, and loss of stored feed and equipment

[5]. Despite the risk of flooding, there is a lack of flood protection infrastructure in Jamshoro, including dykes, reservoirs, and drainage facilities [6]. The absence of these facilities exacerbates the effects of flooding. The poultry industry in particular is more vulnerable due to its low-lying location and the high concentration of farms in areas that are prone to flooding [7]. To address the challenges posed by flooding, authorities in Jamshoro have implemented several strategies. These include improved disaster preparedness planning, floodwater drainage systems, and local early warning systems [8]. There have also been efforts to improve the design of poultry sheds to make them more flood-resistant [9]. While these measures are an important step forward, more needs to be done to build resilience in the poultry sector in Jamshoro, including increased investment in flood protection infrastructure. The flooding in Jamshoro has had a significant impact on the poultry industry in the

region. The loss of livestock and poultry production has had far-reaching economic implications. While several strategies have been implemented to mitigate the effects of flooding in the region, more needs to be done to secure the future of the poultry industry in Jamshoro in the face of the continued threat of flooding.

2. The Poultry Industry of Jamshoro, Sindh: Current Situation

The poultry industry in Jamshoro, Sindh, is an important sector for the region's economy, providing jobs and income [10]. The industry has grown significantly in recent years, with large commercial farms as well as medium and small-scale operations [11]. However, the industry faces several challenges, including disease outbreaks, poor environmental management, and a lack of compliance with animal welfare standards [12]. Poultry industry in Jamshoro is heavily reliant on imported feed, particularly soybean meal and corn [13]. The high cost of imported feed, coupled with fluctuations in currency exchange rates and transportation costs, poses challenges for local poultry farmers. Additionally, the industry faces high energy costs due to limited access to affordable electricity and gas [14]. The industry has also faced several health challenges, including the outbreak of avian influenza in 2021, which resulted in significant losses of poultry [15]. The lack of biosecurity measures on some farms and limited veterinary facilities in the region have made it difficult to manage disease outbreaks. Furthermore, poor waste management practices on some farms have led to environmental pollution and concerns over public health [16]. The industry has responded to these challenges by adopting new technologies, including improved breeding practices, feed formulations, and disease control measures [17]. Some farmers have also adopted more sustainable production methods, such as integrated farming systems and organic production [18]. However, these changes have been limited due to the high cost of inputs and a lack of access to credit and technical support. Poultry industry is an important sector for the economy of Jamshoro, it faces several challenges, including disease outbreaks, high feed costs, and environmental concerns. The industry has responded by adopting new technologies and sustainable practices, but more needs to be done to ensure the long-term viability of the sector.

3. The Impact of the 2022 Floods on the Poultry Sector

The 2022 floods in Jamshoro, Sindh, caused significant damage to the poultry industry in the region [19]. The floods destroyed sheds, feed, and equipment, resulting in the loss of poultry and losses for farmers [20]. The floods also caused environmental pollution, including contamination of water sources and soil [21]. The impact of the floods on the poultry sector has been devastating, with some farmers reporting a complete loss of their flocks [22]. The loss of poultry production has had far-reaching economic implications, including rising poultry prices and decreased export opportunities [23]. Furthermore, the loss of animal life has had implications for food security in the region [24]. While there have been efforts to assist poultry farmers affected by the floods, these have been limited due to the scale of

the disaster and the limited available resources [25]. Many farmers have struggled to recover from the disaster and have had to take out loans to rebuild their farms [26]. The limited access to credit and other resources has made it challenging for farmers to resume poultry production at pre-flood levels. The floods have highlighted the need for improved disaster preparedness planning and flood protection infrastructure in the region, as well as the need for greater support for affected farmers [27]. The poultry sector in particular requires increased investment in infrastructure, research, and extension services to build resilience in the face of flooding and other challenges [28]. The 2022 floods in Jamshoro have had a severe impact on the poultry industry, resulting in significant losses of animal life, economic losses, and environmental pollution. While there have been efforts to assist affected farmers, more needs to be done to build resilience in the industry and prevent similar disasters from occurring in the future.

4. Disaster Management in the Poultry Industry: Best Practices

The recent floods in Jamshoro have highlighted the need for improved disaster management practices in the poultry industry [29]. Farmers need to be prepared for disasters to minimize losses of animal life, economic losses, and environmental damage [30]. This article presents best practices for disaster management in the poultry industry, based on a review of the literature and expert opinions. Farmers should develop disaster management plans that include risk assessments, emergency procedures, and contingency plans [31]. The plans should be regularly reviewed and updated to ensure their effectiveness in the event of a disaster. Additionally, farmers should participate in training programs on disaster management to enhance their knowledge and skills. Farmers should invest in infrastructure to mitigate the impact of disasters, such as flood protection measures, backup power generators, and secure storage facilities for feed and equipment [32]. This infrastructure can help to reduce the risk of losses and damage in the event of a disaster. Farmers should develop partnerships with government agencies, NGOs, and other stakeholders to enhance their capacity for disaster management [33]. Collaborative efforts can help to identify and respond to risk factors and mitigate the impact of disasters. Farmers should implement biosecurity measures to prevent disease outbreaks that can occur in the aftermath of disasters, such as disinfection procedures and limiting access to poultry farms [34]. These measures can reduce the risk of disease transmission and prevent further losses. Farmers should adopt sustainable production practices that reduce environmental impact and build resilience in the face of disasters, such as integrated farming systems and organic production [35]. These practices can help to reduce the risk of environmental pollution and promote long-term sustainability in the industry. Disaster management is an important aspect of poultry farming that can help to reduce the impact of disasters on animal life, economic losses, and environmental damage. Best practices for disaster management include developing plans, investing in infrastructure, forging partnerships, implementing

biosecurity measures, and adopting sustainable production practices.

5. Public-Private Partnerships for Flood Preparedness and Response

Public-private partnerships (PPPs) have emerged as an important strategy for enhancing flood preparedness and response in the poultry industry of Jamshoro [36]. PPPs allow for collaboration between government agencies, industry associations, non-governmental organizations, and private sector businesses to develop and implement flood management plans [37]. This article presents a review of the literature on PPPs for flood preparedness and response in the poultry industry, and identifies best practices for their implementation. PPPs should be based on a clear understanding of the roles and responsibilities of each partner, as well as the risks and opportunities associated with flood preparedness and response [38]. This requires open communication and active participation from all stakeholders, as well as clear guidelines for decision-making and resource allocation. PPPs should adopt a multi-stakeholder approach that involves the participation of all relevant actors in the poultry industry, including farmers, processors, input suppliers, and retailers [39]. This approach can help to identify and respond to the needs and priorities of each stakeholder group, as well as reduce the risk of conflicts and miscommunications. PPPs should aim to create a resilient poultry industry that is able to withstand the impact of floods and other disasters [40]. This can be achieved through investment in infrastructure, research and development, extension services, and market linkages. PPPs should prioritize the creation of supportive policy frameworks that promote disaster risk reduction, including laws and regulations that require the implementation of flood management plans and the establishment of appropriate institutional mechanisms for managing floods [41]. PPPs should leverage funding and technical assistance from international donors and development agencies to support the implementation of flood management plans [42]. This requires developing effective partnerships with such agencies and identifying areas where they can contribute to flood preparedness and response in the poultry industry. PPPs should incorporate mechanisms for monitoring and evaluation to ensure their sustainability and effectiveness [43]. This includes establishing indicators and targets for flood management, as well as conducting regular reviews and assessments of progress and impact. PPPs have become an essential strategy for enhancing flood preparedness and response in the poultry industry of Jamshoro. Best practices for implementing PPPs include clear understanding of roles and responsibilities of each partner, multi-stakeholder approach, building resilience, creation of supportive policy frameworks, leveraging funding and technical assistance from international donors, and incorporation of mechanisms for monitoring and evaluation.

6. Innovations in Disaster Risk Reduction for Poultry Farmers

Disasters such as floods pose a significant risk to poultry farming activities in Jamshoro, and there is a need for

innovative approaches to disaster risk reduction [44]. This article reviews some of the various innovations in disaster risk reduction for poultry farmers, focusing on public-private partnerships that have been implemented in the region. Early warning systems are a vital innovation for poultry farmers, providing them with the necessary information to mitigate potential disaster risks [45]. Early warning systems have been developed in many parts of the world and have been effective at reducing losses related to disasters. The public-private partnerships in Jamshoro have led to the development of several early warning systems that use different tools such as mobile applications and sensors for collecting data to predict and alert farmers on potential disaster risks. Climate-smart agriculture (CSA) technologies, such as drip irrigation systems and greenhouse farming techniques, have been introduced to help farmers in Jamshoro address crop failure due to floods and other climatic events [46]. The public-private partnerships allow for the provision of subsidized CSA technologies to interested poultry farmers, helping them to build resilience to climate risks. The use of remote sensing technologies such as satellite imagery and drones have been implemented in the poultry industry to identify potential disaster risks and to monitor the impact of disasters on poultry farms [47]. A PPP through the Jamshoro government has established a monitoring system for poultry farms which uses satellites to assess the impact of floods on their farms and assist in damage assessments. The use of mobile technology to disseminate information on disaster preparedness and response to poultry farmers has played a critical role in improving disaster risk reduction [48]. The public-private partnerships in Jamshoro have enabled the development of mobile applications and SMS services that provide poultry farmers with relevant disaster preparedness information, including signs to look out for and ready-to-use action manuals during disasters. Genetic engineering and breeding of disaster-resistant poultry have been recognized as one way to mitigate the risks associated with disasters. The development of poultry breeds that are resistant against climate events like floods, drought or cyclones can be a promising innovation in disaster risk reduction in the poultry industry [49]. Innovations in disaster risk reduction for poultry farmers through public-private partnerships in Jamshoro contribute significantly to enhancing the resilience of the sector in the face of hazards. Innovations discussed include early warning systems, CSA, remote sensing technologies, use of mobile technology and breeding of disaster-resistant poultry.

7. Policy Recommendations for Improving Flood Resilience in the Poultry Industry

Effective policy approaches are needed to enhance flood resilience in the poultry industry of Jamshoro [50]. This article aims to provide policy recommendations based on extensive research on the current situation in the industry. These recommendations are aimed at addressing the underlying issues that lead to poor flood resilience among poultry farmers and apply to the entire industry. The government needs to establish regulatory frameworks that require poultry farmers to follow the best practices related to disaster risk reduction. This would include the documentation

of flood management procedures, the establishment of contingency plans and utilization of early warning systems [51]. These requirements would help to ensure that poultry farms maintain a high level of preparedness throughout the year. Poultry farmers need access to affordable and relevant insurance options to protect against flood-related losses. The government can play a significant role in increasing awareness and adoption of insurance by small-scale farmers, which is often out of reach due to the cost of premiums [52]. By offering subsidies and partnering with private insurance providers, the government can make insurance affordable and accessible for poultry farmers at risk of flood disasters. The public sector institutions responsible for managing flood disasters should collaborate with private sector partners in the poultry industry to create standardized disaster risk reduction plans for the sector. These plans should be developed in consultation with farmers, processors, input suppliers, and retailers [53]. This collaboration would help ensure the development of practical and effective flood management strategies tailored to the needs of the poultry industry.

Government should establish a funding mechanism to support the implementation of disaster risk reduction programs in the poultry industry [54]. This would include funding for research and development of innovations related to flood management, as well as training and capacity building programs for stakeholders in the poultry industry. The government should invest in infrastructure to improve flood resilience in the poultry sector [55]. Infrastructure improvements that could enhance flood resilience include improved drainage, embankments, and better roads to access farms during flooding events. This would benefit small-scale poultry farmers who often lack the financial means to invest in such infrastructure. Government should prioritize linking the poultry industry to other sectors such as meteorology, health, and education [56]. This would enable poultry farmers to leverage cross-sectoral knowledge and resources to improve their disaster preparedness. For instance, farmers can benefit from access to weather and disaster forecasts from meteorological agencies and the incorporation of disaster management education in the poultry industry. In conclusion, policy recommendations are essential to creating a conducive environment for improved flood resilience in the poultry sector. Policy recommendations should include establishing regulatory frameworks, providing affordable and relevant insurance options, collaboration between public and private sectors, establishing funding mechanisms, investing in infrastructure and linking the poultry industry to other sectors.

8. Conclusion: Building a Resilient Poultry Sector in a Changing Climate

The poultry industry in Jamshoro is crucial to the economy, but is increasingly at risk due to changing climate conditions and floods. This review article highlights the need for innovative approaches to enhance the disaster resilience of the poultry sector, such as early warning systems and climate-smart technologies. However, effective policy measures, including insurance options, funding mechanisms, and

collaboration between public and private sectors, are also necessary to strengthen flood resilience. All stakeholders must coordinate their efforts to develop and implement interventions that build resilience to climate risks, enabling the poultry industry to continue contributing to the region's economy and society despite natural hazards.

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