

Exploring the Future: The Role of Fathers in Strengthening Maternal-Child Health during Flood-Related DisastersJosephine Francis Xavier¹¹ Nursing, and Environmental Studies, Faculty of Health, York University, Toronto, Canada

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Abstract: *Introduction:* Natural disasters, particularly floods, significantly impact maternal and child health, leading to increased premature births, fetal growth restrictions, and maternal stress, along with disrupted access to healthcare services. While research on disaster resilience is growing, the role of fathers in disaster preparedness and response remains overlooked. This paper highlights the essential role fathers play in enhancing maternal and child health resilience during natural disasters, contrasting previous research that primarily focused on maternal health. It aims to emphasize the importance of fathers' support in mitigating the effects of disasters on maternal and child health and promoting family and community resilience during natural calamities. *Methods:* This study employs a state-of-the-art review approach to synthesize findings from 19 peer-reviewed studies, policy reports, and case studies published between January 2023 and December 2024. A systematic search was conducted using Google Scholar, focusing on terms such as "fathers' roles," "flood disasters," and "disaster resilience." *Findings:* The review underscores that father involvement in disaster preparedness, emotional support, and healthcare access can reduce maternal stress, enhance infant care, and promote family recovery. Case studies from the Iowa floods, Hurricanes Irma and María, and the El Niño floods in Peru illustrate the positive impact of father engagement in disaster response. The PRIMED framework—prevention, Risk Assessment, Intervention, Mitigation, Emergency Preparedness, Disaster Recovery, Rehabilitation, and Reconstruction—is proposed as an actionable model for integrating fathers into disaster management strategies. *Discussion:* Fathers' engagement in disaster preparedness complements maternal caregiving and strengthens community-level resilience. However, sociocultural norms, policy gaps, and lack of training often limit their participation. Integrating father-focused disaster preparedness programs, including formal training, psychosocial support, and healthcare accessibility initiatives, is essential for fostering long-term mother and child wellbeing. *Conclusion:* Disaster resilience strategies must move beyond a mother-centric approach and recognize the crucial role of fathers in protecting maternal and child health during crises. Policymakers and healthcare professionals should incorporate father-inclusive frameworks into disaster management policies to ensure equitable and practical family support systems during emergencies.

Keywords: Disaster preparedness, Father support, Disaster resilience, Maternal-child health, Policy development, Community involvement.

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Introduction

Natural disasters such as floods, hurricanes, and wildfires are increasingly complex crises that disproportionately affect vulnerable populations, particularly women and children (United Nations Office for Disaster Risk Reduction [UNDRR], 2020). This paper focuses primarily on flood-related disasters, given their frequency, severity, and documented impact on maternal and child health across both high- and low-resource settings. Between 2000 and 2019, over 4 billion people were affected by disasters globally, with women and children among the most vulnerable due to heightened health risks, displacement, and caregiving responsibilities (UNDRR, 2020). Women and children make up 75% of disaster victims, with pregnant women facing notably elevated risks (UNDRR, 2020). The projected 40% surge in disaster occurrences by 2030 underscores the urgent need for initiatives focused on protecting maternal and child health in these scenarios (UNDRR, 2020). The projected 40% surge in disaster occurrences by 2030 underscores the urgent need for initiatives focused on protecting maternal and child health in these scenarios (UNDRR, 2020).

While the discourse on disaster resilience has primarily centred on maternal health, it is crucial to acknowledge the pivotal role fathers play in disaster management and response. This is not a future concern; it is a pressing issue that demands immediate and targeted action. Surprisingly, there needs to be more focus on fathers in disaster management, a gap that this paper aims to address.

This paper highlights the crucial role fathers play, supported by global case studies and recent research findings. The study takes an international perspective, incorporating examples from both high-income and Low- and Middle-Income Countries (LMICs) to ensure its findings are broadly applicable. Disasters exacerbate existing vulnerabilities and increase the likelihood of premature deliveries, postpartum depression, and developmental challenges for children who were in the womb at the time of the disaster (UNDRR, 2020). While families operate as interdependent systems, researchers and disaster management policies have primarily targeted interventions for mothers and children, inadvertently neglecting fathers as vital stakeholders in

crisis response and recovery. Fathers play a unique and often unrecognized role in alleviating maternal stress, supporting infant care, and ensuring access to essential resources during and after disasters. Recognizing and integrating fathers into disaster response strategies is not about shifting focus away from the family unit—it is about leveraging an untapped resource to create a more holistic and practical approach to disaster resilience. Recent studies highlight that father involvement in disaster preparedness and recovery significantly reduces psychological distress among mothers and enhances overall family stability.

For example, during the Iowa floods, fathers who actively participated in post-disaster family life helped mitigate maternal depression and facilitated a faster recovery for their families (Brock et al., 2014). Their emotional and logistical support not only improved mothers' mental health but also contributed to greater household resilience. Similarly, research on the 2017 El Niño floods in Peru demonstrated that social capital, including fathers' engagement in disaster recovery efforts, played a crucial role in reducing post-traumatic stress disorder (PTSD) and food insecurity among affected mothers (Culquichicón et al., 2024).

These findings underscore the broader need for structured father-inclusive disaster policies. Climate-related disasters continue to expose weaknesses in healthcare and policy systems concerning maternal and child health (Astorga et al., 2023). However, the positive impact of fathers' involvement in disaster resilience strategies highlights their potential role as key stakeholders in disaster response, emphasizing their capacity to support family and community well-being during crises.

The Nurses Taking on Readiness Measures (N-TORM) initiative, developed by Heagele et al. (2024), is a structured, nurse-led educational program designed to enhance household emergency preparedness. This initiative provides a model for training fathers in disaster readiness, equipping them with the necessary skills to support maternal and child health during crises. Similarly, this paper proposes the PRIMED framework—Prevention, Risk Assessment, Intervention, Mitigation, Emergency Preparedness, Disaster Recovery, Rehabilitation, and Reconstruction—as a family-

inclusive strategy for disaster preparedness. Based on recommendations from the Centers for Disease Control and Prevention (CDC, 2024), PRIMED emphasizes community engagement and proactive risk management to strengthen family and community resilience.

By implementing structured disaster management strategies like PRIMED, fathers can play an active role in emergency planning, response coordination, and recovery efforts. This is particularly critical in the context of flood-related emergencies, which formed the basis for the selected case studies and analysis presented in this paper. This paper argues that empowering fathers in disaster preparedness is essential for fostering resilient families and communities. It further explores ways to encourage paternal involvement, integrate father-inclusive policies into existing disaster frameworks, and assess the long-term benefits of their participation in promoting family mental health and stability.

Methods

This article provides a state-of-the-art review (Grant & Booth, 2009) examining contemporary issues related to fathers' roles in disaster preparedness, crisis management, and maternal-child health resilience. It explores how fathers contribute to emergency response efforts while identifying gaps in research and policy. The analysis is based on 19 peer-reviewed studies and grey literature, including policy papers and case studies. A systematic search was conducted from January 2023 to December 2024 using Google Scholar and institutional databases. Search terms included "flood disasters and family resilience," "fathers' roles in disaster preparedness," "paternal support in emergencies," and "disaster recovery and maternal-child health."

Search Strategy

Studies were included if they were published between 2023 and 2024, focused on fathers' roles in disaster management, and were peer-reviewed or policy-based. Research covering high-income and low- and middle-income countries (LMICs) was prioritized. Studies lacking empirical data or relevance to fathers' roles were excluded. A total of 19 studies were selected and summarized in Table 1. These cover case studies such as the Iowa floods, Hurricanes Irma and María, and the Chennai floods, demonstrating fathers' contributions to disaster preparedness, emotional support, and recovery efforts across diverse settings.

Additionally, policy reports from the CDC and UNDRR provide insights on integrating fathers into disaster resilience frameworks. They highlight the importance of breastfeeding support, mental health care, and structured emergency response strategies in strengthening family and community resilience.

Results

Key Challenges in Maternal and Child Health During Floods

Floods severely disrupt healthcare services, exacerbate mental health issues, and limit access to nutrition, thereby heightening social vulnerabilities. These challenges are particularly acute in LMICs, where infrastructure and healthcare systems are already strained. However, even in high-income countries, extreme weather events have revealed vulnerabilities in maternal and child health responses. Coordinated measures are essential to alleviate the adverse effects on at-risk populations. These natural disasters impede access to vital healthcare for mothers and children. A recent study conducted in India underscores significant disparities in the utilization of neonatal care following disasters, pointing to notable variations in accessibility to postnatal care (PNC) services.

The findings indicate that areas frequently affected by disasters experience a marked reduction in the availability of these essential services, thereby compromising the health outcomes for newborns in such regions (Barman et al., 2023). The 2013 floods in Calgary led to a slight increase in gestational hypertension; however, there were no significant effects on other health outcomes. The presence of universal prenatal care, combined with the magnitude of the disaster, may have lessened the flood's impact on expectant mothers (Hetherington et al., 2021). Access to universal prenatal services can play a critical role in mitigating the adverse effects of significant stressors, such as natural disasters, on maternal health. It underscores the importance of maintaining robust healthcare systems to support vulnerable populations during emergencies and the need for preparedness and resilience measures to protect maternal and fetal well-being in crises.

Disasters negatively impact maternal mental health. The 2017 El Niño floods in Peru highlighted the role of community support in terms of high-level cognitive and social capital to have helped mothers recover from PTSD

one year post-disaster (Culquichicón et al., 2024). Research conducted in Puerto Rico highlighted the necessity for mental health resources tailored explicitly for perinatal women following Hurricanes Irma and María. Addressing climate change is a vital aspect of managing the mental health impacts of natural disasters during the perinatal period, as well as for all vulnerable populations. (Martínez-González et al., 2023; Kortsmit et al., 2024).

Breastfeeding becomes particularly vital during disasters, as it provides a safe and nutritious food source for infants when access to clean water and infant formula is compromised. Floods disrupt food access and breastfeeding practices. In Pakistan, sociocultural factors influenced breastfeeding during disasters (Hirani et al., 2023). Several sociocultural elements were recognized as either obstacles or enablers to these mothers' ability to breastfeed their infants. Informal assistance, formal assistance, the culture surrounding breastfeeding, and spiritual customs helped displaced mothers continue their breastfeeding practices. Conversely, insufficient privacy, cultural beliefs, customs and expectations, subtle oppression, and inadequate healthcare support acted as hindrances to the breastfeeding practices of displaced mothers (Hirani et al., 2023). Fathers' involvement during the Chennai floods highlighted their role in supporting maternal and infant nutrition (The Hindu, 2023). Floods lead to risks like miscarriage and preterm labour, especially in resource-limited areas (The Economic Times, 2023). Poor sanitation during floods increases the risk of gastrointestinal illnesses in infants (Culquichicón et al., 2024). Breastfeeding provides a safe and hygienic source of nutrition that can significantly reduce these health risks by eliminating the need for potentially contaminated water or formula preparation. Therefore, coordinated responses addressing healthcare disruption, mental health support, and nutritional needs are essential for protecting mothers and children during floods.

Fathers' role in enhancing resilience during natural disasters

Fathers play a crucial role in enhancing family resilience during disasters through emotional support, practical caregiving, such as assisting with child care, helping with maternal health needs, ensuring access to clean water and food and active and community engagement. This role is universal, though the extent of father

participation varies across different regions based on cultural norms, economic pressures, and disaster preparedness policies. Their involvement helps mitigate the adverse effects of disasters on maternal and child health. By providing emotional support, fathers reduce maternal stress and improve family dynamics, with research showing lasting positive effects on maternal mental health (Brock et al., 2014). Fathers also address logistical challenges during crises, organizing safety measures and ensuring access to vital services, as seen during the Chennai floods (The Hindu, 2023).

Natural disasters worsen the challenges for perinatal women in rural areas and can limit their access to support systems, adversely affecting their mental health (Hine et al., 2024). Urgent investment in rural perinatal services is needed to promote proactive disaster planning and reduce the impact of such events on these women and their families. These services are crucial for infant nutrition, disaster preparedness, and strengthening community resilience through resource coordination and advocacy (Hine et al., 2024). Fathers can play a vital role in bridging these service gaps by facilitating access to emergency resources, supporting maternal emotional needs, and participating in localized disaster planning efforts, especially where institutional support is weak.

Community-based programs that involve fathers can enhance disaster management and recovery. To maximize their contributions, structured support, including formal training in emergency preparedness and maternal-child health, is essential (Brock et al., 2014; Martínez-González et al., 2023). Collaboration among healthcare teams, community leaders, and responders is necessary, emphasizing trauma-informed care to address psychological impacts. Supporting fathers in these roles can strengthen family structures and improve maternal and child health outcomes during disasters. Fathers' contributions extend beyond immediate crisis response and have a substantial impact on long-term family resilience. Studies from the Iowa floods show that father involvement reduces the mother's mental health issues, such as postpartum depression, with effects that continue long after the disaster (Brock et al., 2014).

Discussion

The findings underscore the intricate role of fathers in enhancing maternal and child health resilience during

disasters. Their active participation in caregiving and planning significantly alleviates the psychological and logistical burdens faced by female caregivers. For instance, research conducted in rural Pakistan demonstrates how sociocultural factors shape caregiving practices, highlighting the necessity for culturally responsive interventions (Hirani et al., 2023). Fathers are essential in mitigating the adverse effects of disasters on the health of mothers and children. While the specific challenges vary across different global regions, the need for integrating fathers into disaster preparedness efforts remains a consistent factor in strengthening family resilience worldwide. Their contributions to caregiving, advocacy, and recovery significantly bolster both family and community resilience.

Research by Brock et al. (2014) indicates that partner support interacts with maternal stress from flooding to reduce its impact on postpartum depression, illustrating the importance of incorporating father-inclusive approaches in disaster response frameworks. Culturally sensitive interventions, such as those seen in rural Pakistan, reveal that addressing socioeconomic barriers can enhance fathers' engagement (Hirani et al., 2023). Additionally, policies that emphasize gender-sensitive crisis management strategies may help dismantle patriarchal norms that hinder male involvement in caregiving. By normalizing male participation in nurturing roles, such policies challenge cultural taboos and societal expectations that discourage fathers from actively engaging in maternal and child health. For instance, when disaster preparedness initiatives include father-focused training and communication campaigns, they not only equip men with essential skills but also send a powerful message that caregiving is a shared responsibility. Over time, this can foster cultural change where paternal involvement becomes a norm rather than an exception, ultimately leading to more equitable and resilient family systems during and after disasters.

Following calamities, fathers take the lead in economic recovery and migration efforts. Following the Chennai floods, many fathers pursued safe housing and livelihood possibilities for their families and immediate relatives (The Economic Times, 2023). Similarly, studies from Peru show that social capital and paternal leadership were essential in assisting families to recover their livelihoods following a disaster (Culquichicón et al., 2024). Such adjustments are crucial for building resilience in the face of recurring environmental dangers.

Recommendations

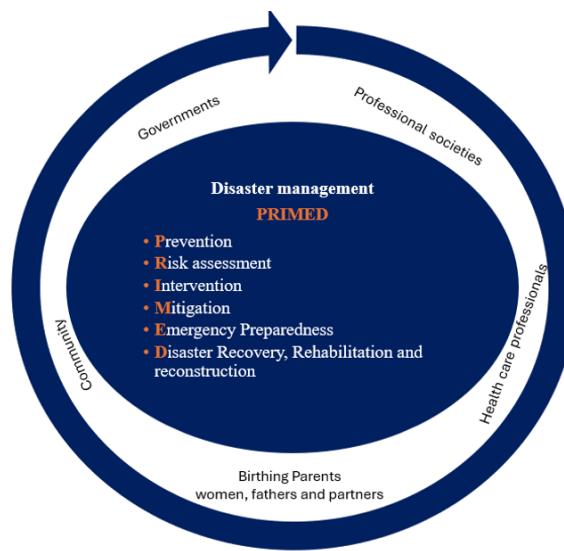
To enhance maternal and child health during disasters, it is essential to engage and empower fathers within disaster response frameworks. Given that disasters impact families worldwide, these efforts must be adaptable to different cultural and economic settings. Strategies should prioritize the needs of pregnant and postpartum women while leveraging the supportive roles of fathers. Integrating psychosocial services into disaster management can provide comprehensive care for families experiencing stress. Community programs should encourage fathers to participate in resilience-building initiatives, thereby fostering stability. Furthermore, advocating for the inclusion of fathers in disaster preparedness policymaking reinforces their role as essential contributors to family and community resilience. Clear policies that integrate paternal support into emergency planning—such as community-based preparedness programs or psychosocial training modules targeting fathers—can significantly enhance maternal and child health outcomes. For instance, during the 2017 El Niño floods in Peru, community engagement that included paternal involvement helped reduce food insecurity and psychological distress among mothers (Culquichicón et al., 2024). This illustrates how inclusive disaster policies that actively engage fathers can mitigate the adverse impacts of crises on vulnerable family members.

PRIMED Disaster Management Framework for Maternal and Child Health

Based on the findings of this review, the PRIMED framework—Prevention, Risk Assessment, Intervention, Mitigation, Emergency Preparedness, Disaster Recovery, Rehabilitation, and Reconstruction, as illustrated in Figure 1, has been developed as a structured and comprehensive approach to fathers' involvement in addressing maternal and child health challenges during natural disasters. Adapted from the Centers for Disease Control and Prevention [CDC] guidelines, this model ensures that every phase of disaster management is covered, with a particular emphasis on vulnerable populations such as pregnant women, postpartum mothers, and children (2024). The framework emphasizes collaboration among governments, healthcare professionals, and communities to strengthen family resilience across diverse settings, including both high-income and resource-limited

regions. As illustrated in Figure 1, PRIMED follows a cyclical model anchored around the family unit, highlighting fathers as key agents of resilience. Their active participation, supported through structured policies and community engagement, can significantly improve maternal and child health outcomes throughout the disaster continuum. The adaptable structure of the PRIMED framework can ensure effective implementation in both high-income and low-resource settings. Additionally, it can serve as a forward-looking model to guide future disaster preparedness, response, and resilience strategies for fathers.

Figure1: PRIMED Strategy for Disaster Management



Preventing disasters involves taking proactive steps to reduce their impact. It is crucial to implement policies that lower vulnerabilities, such as promoting sustainable environmental practices and enhancing urban flood resilience (Khandelwal et al., 2025). Additionally, strengthening healthcare infrastructure, including building flood-resistant hospitals, is vital to maintaining service delivery during disasters (Martínez-González et al., 2023). For example, enforcing building codes in disaster-prone areas can significantly reduce the risk of healthcare disruptions. Engaging fathers in prevention-focused seminars that teach first aid, breastfeeding support, and logistical planning has proven effective in areas affected by disasters, as demonstrated during the Chennai floods (The Economic Times, 2023). These preventive strategies include establishing father-led disaster response groups in communities to facilitate knowledge sharing and preparedness. Additionally,

implementing cost-effective training programs through digital platforms, radio broadcasts, and community workshops on emergency obstetric care and infant feeding is crucial.

To protect maternal and child health, a risk assessment of disaster-related risks is essential. Geographic Information System (GIS) data helps identify high-risk areas and populations for targeted interventions (Biu et al., 2024). Regular updates to these assessments are crucial for adapting to changing environmental and social factors that impact preparedness strategies (Hirani et al., 2023). This proactive approach identifies vulnerable healthcare facilities and ensures resource allocation where needed. Programs like N-TORM can empower fathers to map community vulnerabilities in high-risk flood zones, such as those in India, using GIS data (Barman et al., 2023). Their participation is vital for ensuring preparedness plans effectively address current risks and healthcare access gaps. Continuously updating risk assessments fosters informed decision-making at the family and community levels. Training fathers in using GIS tools and mobile applications to map high-risk zones further enhances local preparedness (Biu et al., 2024). Collaborating with local religious and community leaders to promote participation, especially in areas where traditional norms discourage father involvement, remains crucial for fathers' engagement.

The interventions aim to provide prompt support during and after disasters, with a focus on involving fathers. Key strategies include forming rapid response teams for maternal and child health, with fathers acting as logistical coordinators and emotional support. They can assist with evacuations, ensure medical care for pregnant individuals, and manage safety protocols. Adequate emergency medical supplies must also be available (Hirani et al., 2023; CDC, 2024). Additional strategies include creating father-focused emergency kits with prenatal vitamins and first-aid resources and establishing mobile maternal-child health units staffed by trained volunteers, including fathers, for emergency birth care and newborn health monitoring.

To enhance disaster response, training healthcare providers in emergency obstetric and neonatal care is essential (Brock et al., 2014), along with incorporating training for fathers in similar competencies. Mobile health units that provide emergency services effectively reach disaster-affected communities. Additionally,

targeted interventions, such as deploying mobile health services and strengthening health systems, will improve accessibility and quality of postnatal care (PNC) (Barman et al., 2023). Mobile health units that deliver maternal and childcare services will further enhance the intervention phase, particularly in resource-constrained areas (Harville et al., 2010). These combined efforts prioritize immediate and effective disaster responses, emphasizing the pivotal role fathers play in emergencies.

Mitigation strategies can significantly enhance maternal and child health during disasters. Effective measures include early warning systems and evacuation plans focused on pregnant women and children. Establishing protective buffer zones around healthcare facilities and engaging the community through education boosts disaster preparedness. Conducting simulations and drills increases resilience and improves evacuation safety. Involving fathers in planning is critical for the safety of families. Community programs, like N-TORM's training (Heagele et al., 2024), prepare families for emergencies and encourage resource sharing. Additionally, including fathers in drills enhances family resilience and evacuation efficacy. Implementing flood-resistant clinics in disaster-prone areas and providing cash transfer programs supports housing stability for fathers, reducing post-disaster financial stress.

Emergency preparedness is crucial for effective responses to disasters impacting maternal and child health. Fathers can lead by stockpiling essential healthcare supplies like prenatal vitamins and clean delivery kits and by establishing reliable communication systems for quick information sharing during crises (Hirani et al., 2023; Brock et al., 2014; Martínez-González et al., 2023). The N-TORM framework (Heagele et al., 2024) provides a good example that highlights the need for structured, nurse-led training to engage fathers in emergency response. Positioning resources in disaster-prone areas, conducting father-focused drills on evacuation, infant nutrition, and maternal care, and training local fathers as first responders are vital for building their capacity in emergencies.

Disaster recovery emphasizes the need to restore health services for mothers and children post-disasters. It is vital to rebuild resilient healthcare facilities and provide mental health support to affected families (Martínez-González et al., 2023). Integrating maternal and child health services with community recovery initiatives

enhances resilience (Hirani et al., 2023). Establishing counselling centres and support groups for parents is crucial for mental health recovery, with fathers playing a key role by advocating for services and helping reestablish routines. Recovery efforts in resource-limited settings should include mental health support for fathers and collaboration with NGOs to fund healthcare reconstruction that prioritizes maternal and child health.

The PRIMED framework offers a clear and practical approach to tackling maternal and child health challenges during natural disasters by empowering fathers and reinforcing their roles as key agents and advocates for family wellbeing before, during, and after crises. By adopting this framework, stakeholders can better prepare for emergencies, mitigate risks, and strengthen healthcare systems for vulnerable groups. It emphasizes the importance of prevention, community engagement, and targeted interventions, all aimed at creating sustainable solutions to reduce the harmful effects disasters can have on maternal and child health.

Moving forward, research needs to delve into the long-term effects of involving fathers in disaster preparedness and how cultural and economic factors influence their participation. It would also be beneficial to explore how disasters impact fathers' mental health and to hear children's views on their dads' roles in these situations. Understanding these dynamics will inform the development of inclusive strategies that harness paternal support as a critical component of disaster resilience. It would also be beneficial to explore how disasters affect fathers' mental health and to incorporate children's perspectives on their fathers' roles in such crises. These insights can provide a more nuanced understanding of family dynamics under stress. From a policy standpoint, we should look at integrating father involvement into disaster management plans, creating educational programs to help fathers develop necessary skills, and launching public awareness campaigns to highlight the importance of their involvement. These steps can really empower fathers and improve health outcomes for mothers and children during disasters.

Conclusion

This article highlights the importance of including fathers in disaster resilience strategies, particularly in protecting maternal and child health during crises. Recognizing regional differences, this paper advocates for a global

approach, as disasters create vulnerabilities that transcend national and economic boundaries. By participating in disaster preparedness, response, recovery, and advocacy, fathers can reduce stress for mothers and enhance the resilience of families and communities. Initiatives that promote fathers' involvement and offer structured education can equip fathers with crucial skills to manage emergencies effectively. Furthermore, the PRIMED framework, which employs father-inclusive tactics, provides a comprehensive approach to tackling the complexities of maternal and child health during disasters. A globally inclusive approach that adapts to both resource-rich and resource-constrained settings is essential to maximizing fathers' impact on disaster resilience efforts. By encouraging cooperation among families, communities, and policymakers, engaging fathers contributes to a more thorough and equitable response to the increasing threats posed by natural disasters.

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