



## Review Article

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**The Role of Training and Vocational Education (Tve) in the Context of Disaster Risk Reduction (DRR)**Chipo Muchabaiwa<sup>1\*</sup>, Manase Kudzai Chiweshe<sup>2</sup><sup>1</sup>Chinhoyi University of Technology<sup>2</sup>University of Zimbabwe**Article History**

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**Abstract:** The paper examines the role of Training and Vocational Education (TVE) in the context of Disaster Risk Reduction (DRR) using a desktop review approach. The aim of the study is to analyze how TVE provides an opportunity to raise awareness on DRR and help reduce vulnerability of marginalized groups in Zimbabwe. The research is grounded on the Pressure and Release model which identifies lack of skills and training as factors exacerbating vulnerability. It also draws from the Sendai Framework which recognizes the need to promote DRR knowledge through vocational training. The qualitative methodology is followed using content analysis. Findings from existing literature affirm the significant function of TVE in DRR by equipping individuals and communities with knowledge and capacities to prepare, respond and recover thereby building resilience. Additionally, TVE enhances employability and livelihood options that enable absorbing and adapting to shocks. It is concluded that inclusion of marginalized groups in skills training is imperative for effective DRR. Recommendations include improving accessibility and affordability of TVE institutions as well as further context-specific research in African countries. Ultimately, the paper contributes in emphasizing the role of TVE in DRR and informing related policies and programs.

**Keywords:** Disaster risk reduction, training and vocational education, resilience, marginalized groups, vulnerability, skills development

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**INTRODUCTION**

Disaster risk reduction (DRR) is imperative for achieving the United Nations Sustainable Development Goals, which include building resilient communities and infrastructure as well as providing access to quality education. DRR incorporates strategies for analyzing and addressing the root causes of disaster vulnerability such as poverty, climate change impacts, unplanned urbanization, environmental degradation and lack of access to resources, services or information (Torani et al., 2019). In light of the critical function of DRR for sustainable development and resilience, training and vocational education (TVE) has emerged as an effective mechanism that equips individuals and communities with the knowledge and capacities necessary to prepare, respond and recover from disasters.

The Sendai Framework for Disaster Risk Reduction 2015-2030, endorsed by UN member states, recognizes that literacy, skills development and access to information greatly enable resilience to disasters as well as recovery. The framework thus promotes integrating DRR knowledge, including prevention, mitigation, preparedness, rehabilitation and reconstruction information across all education systems – formal, non-formal and professional (Torani et al., 2019). Hence, TVE is regarded as a strategic priority for mainstreaming DRR and empowering populations, particularly marginalized groups, to reduce their vulnerability.

While extensive global evidence affirms education as a whole mitigates disaster impacts, few context-specific studies analyze the mechanisms and pathways through which TVE enables DRR in developing countries like Zimbabwe that face recurrent humanitarian crises. Yet it is assumed that highly trained individuals have better resilience capacities compared to their untrained counterparts in the same communities. This paper therefore examines the specific function of vocational education and skills training in enhancing abilities of Zimbabwean communities to manage disaster shocks. It utilizes desktop analysis of existing works to conceptualize the role of TVE in building knowledge, attitudes, motivations, awareness and skills that are necessary in different stages of the disaster cycle - mitigation, preparedness, response and recovery.

The pressure and release model provides the theoretical grounding highlighting socioeconomic disparities and lack of capabilities as root causes of vulnerability that dynamic pressures like insufficient skills and institutional gaps transform into unsafe conditions (Blaikie et al., 2004). The model thus underpins the rationale for TVE as an avenue to address not only symptoms but also structural drivers of disaster risks. Additionally, the paper draws from the Sendai Framework's multi-level, multi-stakeholder strategy advocating integration of DRR in training and education programs for resilience-building.

While previous studies have established linkages between education, income levels and disaster resilience over long-term periods at macro-level, there remains a knowledge gap on the specific mechanisms and pathways through which TVE develops vulnerability-reducing competencies for communities frequently impacted by shocks (Frankenberg et al., 2013). The unique focus of this paper thus lies in its contextual analysis of TVE as a tool for both human capital development and grassroots-level awareness creation for DRR. Using Zimbabwe as an illustrative case study, it reviews multi-disciplinary evidence to demonstrate how marginalized groups can leverage vocational training opportunities to acquire livelihood capabilities that improve their disaster preparedness and capacity to absorb as well as adapt in the aftermath phase.

In this regard, the paper's original contribution is in addressing the scholarly concern that context-specific research on education and DRR often concentrates on school-based learning while overlook adult-focused TVE systems that can empower vulnerable groups like women, unemployed youth, subsistence farmers and climate refugees through skills training (Hoffmann & Blecha, 2020). Consequently it also informs policy and programming for inclusive, community-based TVE that enhances resilience of at-risk populations. Methodologically, adopting qualitative analysis of academic publications and reports provides a nuanced, evidence-based perspective into the TVE-DRR nexus focused on a climate vulnerable developing country.

The paper's significance lies in creating empirically-grounded understanding of TVE as an instrument for awareness, capability-building, livelihoods and human development centered around DRR for high-risk groups and locations. The contextual knowledge can facilitate governments, humanitarian agencies and vocational training institutions to formulate targeted interventions that promote skills acquisition for resilient and sustainable post-disaster rebuilding.

At community level, demonstrating the applied benefits of participatory TVE engagement has potential to motivate vulnerable households, especially marginalized demographics like women and unemployed youth, to actively take part in training programs as a pathway for positive change. Beyond disaster mitigation, grassroots TVE participation also enables agency, empowerment and socioeconomic mobility for underprivileged groups while addressing structural inequalities - thereby creating communal ownership of resilience-building initiatives.

For researchers and academics, the study expands the knowledge base on linkages between TVE and DRR as well as mechanisms for vulnerability reduction – a pertinent area for theory-building given growing climate change risks globally. Developing conceptual clarity on components of education that

enable resilience provides scope for further investigations into application of context-appropriate training models that communities can themselves replicate for preparedness and mitigation of disaster shocks. The paper concludes by recommending localized, participatory TVE systems focused on marginalized demographics as a priority area for scholarship and practice.

## MATERIALS AND METHODS

This study utilized a qualitative desktop review approach to examine existing literature on the role and impact of training and vocational education (TVE) in building resilience capacities for disaster risk reduction (DRR) and mitigation.

A systematic search was undertaken across multidisciplinary scholarly databases including JSTOR, Taylor & Francis Online, Wiley Online Library and ScienceDirect to retrieve relevant publications on linkages between TVE and DRR spanning the past decade (2010-2023). Additionally, gray literature databases and humanitarian agency repositories were also searched to obtain project reports, evaluations, policy briefs and working papers focused on education or skills training for disaster resilience and climate change adaptation.

The search terms/keywords used in various logical combinations and phrases included ("vocational education" OR "vocational training" OR "skills training") AND ("disaster risk reduction" OR "disaster management" OR "disaster resilience" OR "disaster preparedness"). Documents retrieved were screened for relevance based on titles and abstracts prior to full-text review. Reference lists of selected publications were cross-checked for additional studies meeting the inclusion criteria.

The eligibility criteria for document selection comprised of the following; focus on skills training/vocational education for disaster mitigation and resilience building, published in last 15 years (post-2005), discuss developing country context and available in English language. Opinion pieces, magazine articles, conference proceedings and publications centered only on theoretical education rather than practical skills training were excluded.

Qualitative data was extracted from 30 documents that met the inclusion parameters using a coding framework to record insights on the role of TVE in DRR awareness and capabilities, vulnerability reduction through TVE, TVE for resilient recovery and, challenges in TVE implementation. Extracted data was then analyzed using content analysis technique to identify common themes, formulas and relationships related to the research questions. Cross-case comparisons were made to elicit patterns in findings across various developing countries. Case studies were used to further

illustrate and ground the role of TVE in enhancing disaster resilience.

## LITERATURE REVIEW

Disaster risk reduction (DRR) refers to the systematic efforts focused on analyzing and addressing the root factors that drive disaster vulnerability across different levels - from the policy sphere to community awareness (Nohrstedt et al., 2022). As reiterated across seminal frameworks like the Sendai Framework for Disaster Risk Reduction 2015-2030, the concept encompasses strategies spanning prevention, mitigation as well as preparedness to manage risks and strengthen resilience (United Nations, 2015). Training and vocational education has come to the fore as an instrumental strategy for disaster risk reduction especially in developing countries facing recurrent climate shocks and crises (Torani et al., 2019).

The existing scholarship affirms multiple pathways through which education, skills training and access to actionable information enhance resilience and reduce vulnerability across different stages of the disaster management cycle. According to the expanded definition adopted by UNESCO's International Centre for Technical and Vocational Education and Training, vocational education and training (TVE) refers not just formal technical instruction but more broadly, developing knowledge and capabilities for economic participation, livelihoods and agency (UNESCO-UNEVOC, 2017). As such, in post-crisis settings, TVE offers integrated learning that interlinks social reintegration, economic rehabilitation and community resilience outcomes.

Specifically, Fatemi et al. (2017) posit that TVE builds critical disaster mitigation competencies including specialized knowledge, technical skills, positive attitudes, awareness, and motivations that strengthen anticipation and response at individual as well as systemic levels. From increasing literacy to specialized capacities like carpentry, masonry, agriculture, and infrastructure maintenance, participatory TVE facilitates grassroots-level awareness and agency for vulnerability reduction (Karanci et al., 2015). It empowers communities to organize mitigation activities, detect and react to emerging hazards, and make informed decisions through access to early warning communication, disaster information as well as social connectivity for collective action (Vaughter et al., 2016).

Furthermore, analysing global evidence, Muttarak & Lutz (2014) elucidate that education enables higher disaster preparedness through multiple mechanisms. Firstly, learning and skills acquisition directly boost response capacities during relief such as through search and rescue, evacuation planning, first aid etc. Secondly, TVE increases opportunities for stable livelihoods and income diversity. This buffers economic shocks of disasters allowing faster rehabilitation and

rebuilding at individual as well as community levels. Thirdly, specialized technical training creates human capital for infrastructural development and essential services – thereby making habitats more disaster-resilient in the long run.

Expanding on the human capital perspective, Braun (2016) notes TVE contributes across all disaster phases - during ongoing crises through use of survival skills, in immediate aftermath by managing adverse impacts through quick decision-making, as well as over time by facilitating systemic resettlement and rebuilding. Specifically, vocational and entrepreneurial skills promote alternative livelihood options, enabling vulnerable groups to absorb economic losses as well as adapt through financial stability. Thereby, TVE interventions targeted at high-risk communities ultimately aim towards breaking inter-generational cycles of poverty, deprivation and disaster vulnerability.

However, contextualizing such broad associations, Weichselgartner & Pigeon (2015) argue for greater nuance in unpacking the causal mechanisms that relate skills training with vulnerability reduction. Grounding systemic linkages through empirical evidence is vital to evolve context-specific education models, beyond one-size-fits all international frameworks.

Moreover, while extensive research correlates national education levels with disaster resilience metrics, fewer studies examine local dynamics of how practical TVE systems empower marginalized demographics within vulnerable communities. Yet groups like women, youth, disabled and indigenous people face multiplier risk factors, thereby demanding contextualized mitigation approaches centered on TVE access and participation (Hoffmann & Blecha, 2020).

Indeed Blaikie et al.'s Pressure and Release model identifies lack of adequate skills and absence of institutional support mechanisms as key dynamic pressures transforming socioeconomic disparities into active disaster risks (2004). TVE thereby offers a strategic entry point to address not just the symptoms but more critically, the root causes of vulnerability like social exclusion, gender gaps, poverty and lack of capabilities restricting options and mobility (De Silva & Kawasaki, 2020).

Advancing this reasoning, the Sendai Framework prioritizes human capital development through integrating disaster risk awareness across formal and non-formal education systems, including TVE, to nurture a 'culture of resilience' (Goniewicz & Burkle, 2019). The global framework recommends skills training spanning structural reinforcement, climate smart agriculture, ecosystem management and livelihood diversification to minimize disaster impacts through local capacity building.

Applying this approach, a series of regional investigations reiterate that TVE is invaluable in equipping communities to tackle context-specific challenges of recurring disaster shocks and climate change adversities.

Examining Asian countries repeatedly facing natural calamities, studies report how participatory skills training enhances resilience by enabling disaster prevention and preparedness (Baytiyeh, 2018), upgrading infrastructure vulnerabilities through masonry and construction skills (Noviyanti et al., 2021), as well as fostering climate change adaptation across high-risk groups like farmers, fishers and pastoralists (Hemstock et al., 2017).

Similarly in Africa, analyses affirm a definitive role of community-based TVE in early warning communication, entrepreneurial diversity for climate resilient post-disaster livelihoods and rebuilding localised food systems (Ahmed 2019; Mabaya 2020; Moyo 2019). Critically such investigations highlight gender as a pivotal factor influencing vulnerability and access to resilience-building opportunities. Technical skills combined with leadership training help women secure decision-making positions in disaster planning, response and resource allocation activities within struggling households and districts, thereby addressing deep-rooted marginalization (Moyo, 2019).

Yet despite copious global attention on linkages between TVE and DRR, literatures focused specifically on climate vulnerable developing regions like sub-Saharan Africa remains sparse. Zimbabwe in particular faces recurring droughts, floods and epidemics, having battled with cyclical political and economic adversity as well that exacerbate grassroots fragility. While DRR principles are well-incorporated in national policies, localized evidence tracing how TVE allows at-risk communities to build bottom-up resilience capacities remains scarce yet imperative to evolve context-specific education models.

This paper thus aims to address this knowledge gap by qualitatively analysing the mechanisms and pathways through which TVE fosters resilience and risk-mitigating competencies in African countries like Zimbabwe that continually confront compounding natural as well as human-induced hazards. Using desktop analysis of existing works, it elucidates applied, contextual understanding of how practical TVE engagement enables vulnerable demographics to access life-skills, climate adaptation techniques, livelihoods recovery and human development opportunities that are vital to break recurring cycles of disaster-poverty-deprivation.

Thereby the study's original contribution lies in advancing academic scholarship as well as policy and programming insight on prioritizing inclusive, locally-

customized TVE systems to empower communities systematically marginalized from decision-making yet repeatedly facing climate change and disaster shocks. Focusing research and investment in targeted skills training and vocational education for high vulnerability groups hence offers an adaptive, sustainable pathway to democratize grassroots resilience-building across disaster-prone developing countries like Zimbabwe.

## FINDINGS AND DISCUSSIONS

The desktop review of existing literature affirms that training and vocational education (TVE) plays a significant role in promoting disaster risk reduction and building resilience capacities among vulnerable communities frequently impacted by climate hazards or other shocks.

Overall, there is scholarly consensus supported by global evidence that TVE enhances abilities of individuals as well as social systems to prepare, respond and recover across different phases of the disaster management cycle (Fatemi et al., 2017; Righi et al., 2021). Specifically, participatory skills training is recognized as a strategic priority under the Sendai Framework for DRR to facilitate grassroots awareness, agency and access to specialized knowledge needed for vulnerability reduction (Torani et al., 2019).

As the key findings indicate, TVE enables disaster mitigation through multiple interlinked mechanisms. Firstly, it directly transfers technical capabilities and survival competencies to anticipate, react and cope with adverse events - thereby minimizing loss of life and livelihoods (Karanci et al., 2015; Vaughter et al., 2016). This includes disaster prevention awareness, early warning communication, first aid, evacuation planning, infrastructure reinforcement, climate-resilient farming practices etc.

Furthermore, TVE facilitates access to disaster risk information allowing communities to make informed decisions and follow instructions for preparedness and rehabilitation (Hoffmann & Blecha, 2020). Thereby vocational training boosts cognitive skills, literacy, analytical abilities, problem-solving and social connectivity that induce collective action for resilience-building.

Additionally, specialized technical or entrepreneurial skills open alternative income generation avenues. This absorptive capacity buffers the economic shocks of disasters and crises enabling vulnerable groups to achieve financial stability for recovering losses as well as adapting through enhanced livelihood security over long-term (Braun, 2016).

Analysis of the Asia-Pacific region affirms that community-based TVE has been instrumental in upgrading structural vulnerabilities and evolving climate-smart food systems to manage recurring disaster



risks exacerbated by climate change (Hemstock et al., 2017). Similarly in Africa, technical-vocational training programs focused on women farmers are credited with spreading viable adaptation techniques like drought-tolerant crops, water harvesting, diversified cropping patterns and so on, thereby minimizing livelihood disruption from extreme weather events (Moyo, 2019).

Thus TVE offers adaptive learning for communities to continually modify risk reduction behaviors and infrastructural safeguards based on evolving hazards in their local landscapes. Thereby participatory skills engagement nurtures communal ownership of building bottom-up resilience.

Moreover, the reviewed evidence highlights that TVE plays a vital role in all key stages of disaster management - during and after catastrophic events as well as in non-crisis periods through ongoing mitigation and preparation. Firstly, specialized technical skills allow managing adverse impacts in immediate aftermath of disasters through quick decision-making, survival response and needs assessment to direct relief efforts (Braun, 2016).

Secondly, in non-disaster times, TVE enables systemic rehabilitation and resilient resettlement planning by creating human capital for restoring damaged infrastructure as well as upgrading habitat vulnerabilities (Muttarak & Lutz, 2014). Vocational programs focused on masonry, carpentry, construction, mechanics etc have proven invaluable for reconstructing disaster-resistant buildings and facilities across high-risk communities.

Lastly, over long-term continuum, TVE facilitates breaking inter-generational poverty traps by opening alternate income streams and enhancing employability prospects. Thereby it empowers marginalized groups to invest in durable solutions for minimizing recurring disaster losses e.g disaster-resilient housing, climate-smart farms, off-grid energy systems, climate insurance etc (Mabaya, 2020).

Critically, the Sendai Framework highlights need for inclusive, context-specific TVE models tailored to empower vulnerable sections facing intersecting risk factors like poverty, malnutrition, gender gaps limiting socioeconomic mobility (De Silva & Kawasaki, 2020). In Zimbabwe for instance, semi-arid rural areas dominated by subsistence women farmers require agricultural extension programs delivering hands-on learning about heat/drought-tolerant indigenous crops, water efficient irrigation, integrating disaster forecasts into planting decisions etc (Moyo, 2019). Whereas disaster-prone urban settlements crowded with unemployed youth need entrepreneurial programs on running resilient micro-enterprises in waste recycling, eco-friendly crafts, solar equipment maintenance etc.

Thus customized, localized TVE programs addressing context-typical challenges enable positive transformation by building self-efficacy and hope for change even among profoundly marginalized groups (Ahmed 2019). Additionally, the reviewed analyses found that TVE allows women to access leadership roles in community resilience planning committees hitherto dominated by men - thereby shifting gender power relations in struggling households/districts towards more equitable DRR decision-making (Mabaya, 2020).

Yet despite extensive documentation of TVE's definitive function in resilience-building across high-risk developing countries, the review indicates need for further investments in quality research as well as programming (Righi et al., 2021). More evidence is required examining components of non-formal, skills-focused education models that communities can themselves replicate for cost-effective preparedness. Scaling decentralized TVE also necessitates tackling barriers like lack of trained instructors, gender gaps in participation, financing constraints and coordination issues between government agencies, training centers and local stakeholders (Levin et al., 2020).

Additionally, the unprecedented COVID-19 pandemic has brought to fore urgent need for dynamic TVE policies facilitating rapid livelihood transitions, online platforms expanding reach to remote areas and integrating disaster awareness across educational content of vocational programs (Levin et al., 2020). Thereby underscoring that resilience-building through flexible skills training must continually evolve to address not just existing vulnerabilities but also emergent risks.

In essence, the desktop analysis affirms that training and vocational education is central towards effective disaster risk reduction by equipping individuals and communities with adaptive capacities and competencies to minimize losses across anticipated as well as unforeseen shock events. Hence inclusive, context-specific TVE opportunities enabling participation of systematically marginalized groups is imperative for breaking recurring cycles of deprivation and building grassroots resilience.

## CONCLUSIONS

This paper has reviewed existing literature using desktop analysis to examine the instrumental role of training and vocational education (TVE) in building disaster resilience as well as enhancing capacities for risk reduction among vulnerable communities.

The key conclusions affirm that TVE is indispensable for recurrently disaster-prone developing countries struggling with hazards like droughts, floods, epidemics etc, exacerbated by climate change and lacking institutional capabilities. Specifically, the findings demonstrate TVE's multidimensional outputs

enabling grassroots preparedness, response and recovery across interlinked socioeconomic, infrastructural, environmental and technological domains.

As the analyses consistently indicate, participatory skills training is invaluable for the most high-risk marginalized groups like subsistence farmers, urban slum residents, migrant workers etc facing intersecting deprivation, discrimination and gaps in access to early warning systems or resilience solutions. Thereby inclusive, context-specific TVE platforms serve as adaptive empowerment mechanisms to address not just proximate symptoms but more critically, transform structural root causes perpetuating vulnerability like poverty, gender inequities and lack of capabilities restricting options to cope with recurring shocks.

Through collaborative learning approaches grounded in lived disaster experiences of communities, TVE provides vital specialized knowledge on locally sustainable risk reduction behaviors. This encompasses climate-smart agricultural practices, upgrading weak infrastructure, diversifying income, accessing forecasts/warnings and devising collective survival plans tailored to typical emergency scenarios. Therefore grassroots TVE spaces facilitate agency and leadership vital for evolving contextual resilience frameworks spanning households, villages, cities and nationwide systems.

Additionally, the review found entrepreneurial skills developed through vocational courses enable creating human capital necessary for large-scale rehabilitation by training specialized workforce like masons, construction crew, and equipment operators critical for building disaster-resilient physical assets and essential services. Thereby participatory TVE engagement empowers struggling communities to secure a leading role in visioning and actualizing inclusive, just futures centered on human security.

However, as the key challenges also indicate, translating TVE's extensive benefits into genuine bottom-up transformation necessitates tackling persistent gaps in decentralized training infrastructure, non-formal education models attuned to local risk contexts and tailored inclusion of women as well as other disadvantaged sections. Sustaining grassroots resilience hence requires ongoing investments across these priority domains - spanning instructor capacities, curricula evolution, technological integration and conducive policies broadening equitable access to adaptive TVE platforms open for communities to continually modify based on evolving landscape vulnerabilities.

In sum, the analyses affirm training and vocational education's definitive significance as a multilayered instrument for capability building,

awareness creation, livelihood enablement, infrastructure development and human empowerment surrounding comprehensive disaster risk reduction in developing countries. Thereby TVE bears immense yet underexplored potential to fundamentally overhaul dominant reactive emergency response models by nurturing communal ownership of proactive, ecologically embedded mitigation centered on localized knowledge and decentralized collaboration.

Ultimately participatory TVE offers an adaptive, empowering pathway for vulnerable communities to co-create sustainable futures envisioning collective wellbeing and climate justice - thereby breaking systematic inequality traps exacerbating widespread disaster-poverty-deprivation across disaster-prone societies. Hence grassroots access to inclusive vocational learning spaces merits recognition as an indispensable foundation and catalyst for transformative resilience movements growing from the ground up.

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