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Integrating Disaster Risk Reduction into Indian Higher Education: A Critical Policy Analysis

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ABSTRACT

Disaster risk reduction (DRR) has increasingly shifted from a reactive, relief-oriented approach towards prevention, mitigation, preparedness and resilience, with education and higher education institutions playing an important role in building risk-aware and resilient societies. This study critically examines the alignment between international DRR frameworks, India's disaster-management legislation and the higher-education regulatory system, with particular attention to the extent to which DRR is incorporated into university and professional curricula. A qualitative policy-analysis approach was adopted using three levels of documentary evidence: the Hyogo Framework for Action 2005-2015, Sendai Framework for Disaster Risk Reduction 2015-2030 and Disaster Management Act, 2005; national policies including the National Disaster Management Plan and National Education Policy 2020; and the curricular and regulatory provisions of the UGC, AICTE and MCI. AISHE 2019-20 data were additionally examined to assess the potential demographic reach of mainstreaming DRR in higher education. The findings reveal a significant gap between India's policy commitments and their curricular implementation. Although national policies increasingly recognise prevention, preparedness, research and capacity development, DRR is not uniformly mandatory, credit-bearing or competency-based across higher education. Existing provisions remain fragmented, with greater emphasis on awareness and theoretical knowledge than practical training, assessment and certification. The study concludes that DRR should be mainstreamed as a compulsory, credit-bearing and competency-based component of undergraduate and professional education, supported by practical exercises, simulations, community engagement and interdisciplinary learning. Such integration would strengthen professional capacity, promote risk literacy and enhance India's long-term disaster resilience.

Keywords: Disaster Risk Reduction, Higher Education, Disaster Management Act, Sendai Framework, Disaster Resilience

INTRODUCTION

Disaster risk reduction (DRR) has emerged as a fundamental shift in the understanding and management of disasters, moving beyond traditional approaches centred on relief and post-disaster response towards prevention, mitigation, preparedness and resilience. The Hyogo Framework for Action (HFA) 2005-2015 marked an important milestone in this transition by recognising education, knowledge and public awareness as essential instruments for

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developing a culture of disaster prevention (Kitagawa, 2018). However, assessments of the HFA revealed that, despite improvements in early-warning systems, institutional preparedness and response capacities, underlying drivers of disaster risk including unplanned urbanisation, climate change, environmental degradation and socioeconomic inequalities, continued to increase vulnerability and exposure (Briceño, 2014). The Sendai Framework for Disaster Risk Reduction 2015–2030 subsequently strengthened this preventive orientation by emphasising understanding disaster risk, strengthening governance, investing in resilience and enhancing preparedness. It also assigned an important role to universities, research institutions and scientific communities in generating knowledge, developing professional capacities and connecting scientific evidence with policy and practice (Aitsi-Selmi et al., 2016; Lo et al., 2017). Thus, higher education is increasingly recognised not merely as a recipient of disaster-awareness initiatives but as a strategic institution for building knowledge, skills and resilience.

In India, the Disaster Management Act, 2005 established a comprehensive legal and institutional framework for disaster management and represented a major transition from predominantly relief-oriented arrangements towards prevention, mitigation, preparedness and coordinated response (Bhadra, 2017). Nevertheless, the Act does not explicitly require disaster risk reduction to be incorporated as a compulsory component of higher education curricula. Although the revised National Disaster Management Plan (NDMP), 2019 encourages university networks and multidisciplinary engagement in disaster-related activities, policy recommendations have not yet translated into a uniform, enforceable curricular requirement across higher education institutions. The National Education Policy (NEP) 2020, with its emphasis on multidisciplinary education, flexible and credit-based learning, research, skill development and community engagement, provides a timely opportunity to address this gap. Integrating DRR into higher education can equip students with the knowledge, competencies and preparedness necessary to respond to emerging and complex risks. Against this background, the present paper critically examines the relationship between India's disaster-management legislation and higher education regulatory framework and argues for strengthening the existing legal and policy provisions to make DRR a mandatory, credit-bearing component of higher education, including universities and professional institutions regulated by bodies such as the UGC and AICTE.

LITERATURE REVIEW

The previous findings on disaster risk reduction (DRR) reflect a gradual transition from reactive disaster management towards prevention, preparedness, mitigation and resilience, with increasing recognition of education as a critical instrument for reducing vulnerability. The Hyogo Framework for Action (HFA) 2005-2015 provided an important foundation for this transition by emphasising knowledge, education and public awareness in building a culture of prevention. Kitagawa (2018) observed that education has the potential to transform societal understanding of disasters by strengthening preparedness, awareness and resilience. However, Briceño (2014), in reviewing progress under the HFA, noted that improvements in early-warning systems, institutional preparedness and emergency response had not adequately addressed the structural drivers of disaster risk, particularly rapid urbanisation, environmental degradation, climate change and socioeconomic inequality. The author argued that disaster risk was continuing to evolve faster than institutional capacities to manage it. Briceño (2014) also highlighted that educational interventions had largely concentrated on schools and community awareness, while higher education remained comparatively peripheral to international disaster-risk-reduction strategies. This limitation is significant because universities function not only as educational institutions but also as centres of research, innovation, professional development and knowledge dissemination. Lo et al. (2017), examining the implications of the Sendai Framework, highlighted the importance of integrating disaster-risk awareness into formal and non-formal education and training. They further emphasised the role of academic institutions in strengthening the science-policy interface and promoting evidence-based approaches to disaster risk.

The adoption of the Sendai Framework for Disaster Risk Reduction 2015-2030 further expanded the role of higher education by emphasising multidisciplinary research, scientific knowledge and capacity development. Aitsi-Selmi et al. (2016) argued that effective implementation of the Sendai Framework requires stronger scientific and technical capacities, interdisciplinary research and improved collaboration between researchers, policymakers and practitioners. Their perspective positioned universities as important actors in generating knowledge and developing the professional competencies required for effective DRR. In the Indian context, Bhadra (2017) examined the

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Disaster Management Act, 2005 and regarded it as a significant institutional shift from fragmented, relief-oriented disaster management towards a comprehensive framework incorporating prevention, mitigation, preparedness and response. However, the legislative framework primarily emphasised institutional responsibilities, awareness and training rather than making DRR an obligatory component of higher education curricula. The revised National Disaster Management Plan (NDMP), 2019 subsequently sought greater alignment with the Sendai Framework, the Sustainable Development Goals and the Paris Agreement and encouraged the development of university networks for addressing disaster-related issues. Nevertheless, the literature indicates a continuing gap between India's disaster-management policy commitments and their systematic incorporation into higher education. Scholars therefore increasingly recognised education, research and institutional capacity as essential components of DRR, but relatively limited attention was given to establishing disaster-risk education as a mandatory, credit-bearing curricular requirement across Indian universities and professional institutions. This gap provides an important basis for examining the need to strengthen the interface between disaster legislation and higher education policy.

OBJECTIVES

The study aims to critically examine the alignment between India's disaster-management legislation, national disaster-risk-reduction policies and the higher education regulatory framework, with particular emphasis on the transition from reactive disaster management to anticipatory disaster risk reduction. Specifically, the study seeks to: (i) compare the educational provisions and orientations of the Hyogo and Sendai Frameworks with those of the Disaster Management Act, 2005; (ii) assess the extent to which DRR is incorporated into the curricular and regulatory frameworks of the UGC, AICTE and MCI; (iii) identify gaps in the mandatory, credit-bearing, assessment and certification provisions related to DRR; (iv) examine the potential demographic reach of mainstreaming DRR across India's higher education system; and (v) propose appropriate legislative and curricular reforms to make DRR a compulsory, competency-based component of higher education and professional training in India.

MATERIALS AND METHODS

The study adopts a qualitative policy-analysis approach, supported by quantitative institutional data, to examine the integration of disaster risk reduction (DRR) into India's higher education framework. Documentary evidence was analysed at three levels. The first level comprised primary legislative and international policy instruments, including the Disaster Management Act, 2005, the Hyogo Framework for Action 2005-2015 and the Sendai Framework for Disaster Risk Reduction 2015-2030. These documents were compared in terms of their underlying orientation towards disaster management and risk reduction, treatment of education and academia, and the enforceability of educational provisions. The second level consisted of national policy and regulatory documents, including the National Disaster Management Plan and its 2019 revision, the Prime Minister's Ten-Point Programme for DRR, the National Education Policy 2020, and relevant curricular and credit frameworks of the UGC, AICTE and MCI. Particular attention was given to compulsory DRR content, credit allocation, assessment and certification. The third level used published data from the All-India Survey on Higher Education (AISHE) 2019-20 to assess enrolment, institutional coverage and the potential demographic reach of mainstreaming DRR in higher education.

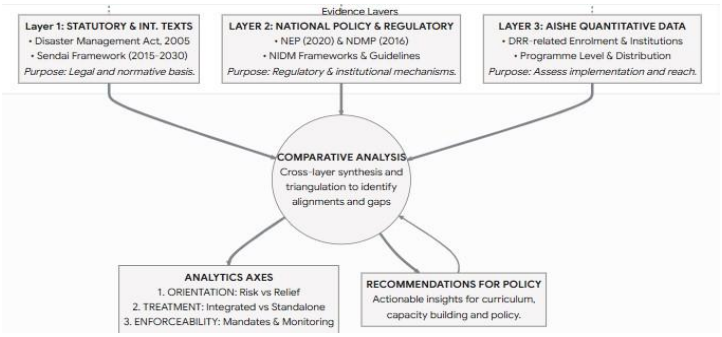


Figure 1: Study Framework: Three-Layer Policy Analysis

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ANALYSIS AND RESULTS

The analysis was undertaken through a three-layer policy framework, as illustrated in Figure 1, integrating international disaster-risk frameworks, Indian legislation and higher-education regulatory instruments, together with institutional data from the All-India Survey on Higher Education (AISHE) 2019-20. The first layer compared the Hyogo Framework for Action (HFA) 2005-2015, the Disaster Management Act (DMA), 2005 and the Sendai Framework 2015-2030 in terms of their conceptual orientation, educational provisions and enforceability. The second layer examined the National Disaster Management Plan (NDMP), its 2019 revision, the Prime Minister's Ten-Point Programme, NEP 2020 and the regulatory frameworks of the UGC, AICTE and MCI. The third layer used higher-education enrolment and institutional indicators to assess the potential reach of mainstreaming DRR through a mandatory curriculum. The analysis demonstrates a clear policy implementation gap: while international frameworks increasingly emphasise anticipatory risk reduction and education, India's statutory and curricular arrangements remain substantially oriented towards awareness, preparedness and response. Figure 2, which traces the progression from Hyogo to NEP 2020, further illustrates this gradual policy evolution and the continuing absence of an enforceable higher-education mandate.

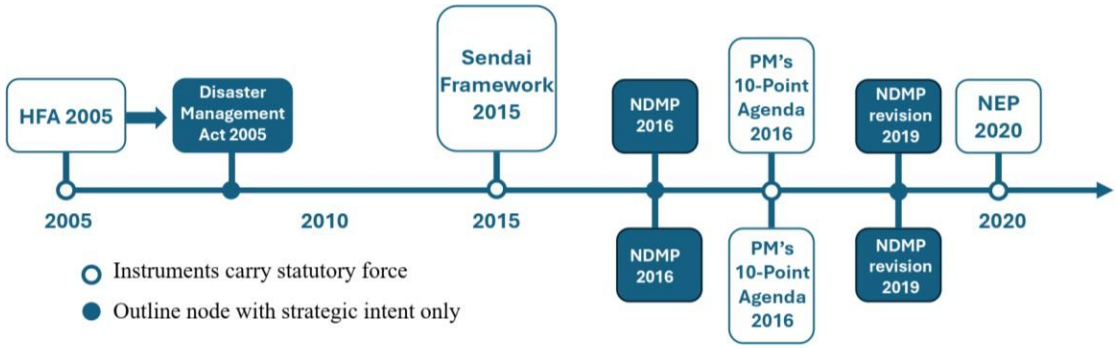


Figure 2: From the Hyogo Framework to the National Education Policy Over 15 Years

The comparative findings presented in Table 1 demonstrate a substantial divergence between the philosophy of the Sendai Framework and India's existing legislative architecture. The HFA promoted prevention, preparedness and resilience and recognised knowledge and education as important components of a culture of safety, although its educational emphasis remained largely school-oriented. In contrast, the DMA, 2005 established a command-and-control institutional structure involving the NDMA, SDMA, DDMA and NDRF, while its educational provisions primarily concern general awareness, training and research. Consequently, the Act does not establish a compulsory curricular requirement for universities or professional institutions. The Sendai Framework represents a more anticipatory approach, focusing on preventing new risks and reducing existing risks and explicitly recognising formal, non-formal and professional education and the role of academia. Although the NDMP 2016 and 2019 revisions and the associated ten-point agenda seek alignment with Sendai and propose university networks for disaster-related activities, Table 1 shows that these measures have strategic rather than statutory force. Thus, as also visualised in Figure 2, India has adopted the language and objectives of contemporary DRR policy at the planning level, but the legal framework has not fully translated these commitments into enforceable educational provisions.

Table 1: Educational mandates across international and Indian disaster policy frameworks

Instrument	Core orientation	Treatment of education	Enforceability
Hyogo Framework (2005–2015)	Prevention and preparedness; building resilience of nations	Knowledge, innovation and education to build a culture of safety; school-level focus	Soft-law; national reporting

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Disaster Management Act, 2005	Command-and-control response; NDMA, SDMA, DDMA, NDRF	NIDM training/research; NEC empowered to promote general education and awareness	Promotional; no curricular mandate
Sendai Framework (2015–2030)	Anticipatory risk reduction; preventing new and reducing existing risk	Risk knowledge in formal, non-formal and professional education; explicit academia role	Soft-law; global targets
NDMP 2016 and 2019	Alignment with Sendai, SDGs and Paris Agreement	Ten-point agenda: network of universities on disaster-related issues	Strategic intent only; no statutory force

Regulator	1. Compulsory Presence in Curriculum(Mandated / Required)	2. Credit–Bearing Integration(Formal Academic Credit)	3. Skill / Certification Outcome(Recognised Competency or Certification)	4. Community Linkage / Experiential Requirement(Field, Service, Outreach)
University Grants Commission (UGC) **(Deshpande, 2011)**	(X) No DRR not compulsory in HE curricula	(X) No Not credit–bearing	(X) No No certification provisions	(–) Limited / Indirect Community engagement encouraged through extension activities
All India Council for Technical Education (AICTE) **(Bhadra, 2017, p. 200)**	(✓) Yes (Knowledge–Level) DRR content mandated at knowledge level in technical education	(–) Partial May be offered as elective / non-credit in some institutions	(–) Partial No universal certification requirement	(–) Partial Industry/institution outreach encouraged but not mandatory
Medical Council of India (MCI) **(MCI, 2019; MoHFW)**	(✓) Yes Disaster preparedness and response competencies included in competencies	(–) Partial Embedded within curriculum; not separately credit–bearing	(X) No Competencies specified but no certification mandate	(✓) Yes Emphasis on community health, field postings and outreach
MSDE / NSDC **(DDU–GKY & Sector Skill Councils)** **(NSDC, 2020; MSDE)**	(✓) Yes DRR included in several skill qualification standards	(✓) Yes Aligned to NSQF levels; credit within skill pathways	(✓) Yes Competency–based certification through QPs / NOS	(✓) Yes Community engagement and practical training inherent in programmes

Figure 3: Curricular penetration of DRR across Indian regulators

The assessment of higher-education regulators reveals that DRR remains unevenly and inadequately integrated across the three major regulatory frameworks, as summarised in Table 2 and illustrated in Figure 3. Under the UGC framework, NEP 2020 provides considerable scope for integrating DRR through multidisciplinary, skill-based, credit-oriented and community-engaged education; however, DRR is not compulsory for all students. Its presence is generally limited to specialised postgraduate programmes, electives or brief components within environmental studies. The AICTE framework provides comparatively greater curricular recognition through a basic disaster-management paper in B.Tech./B.E. programmes, but this remains largely knowledge-oriented and does not systematically develop competencies in hazard assessment, resilient infrastructure, spatial risk analysis or risk-informed planning. The MCI framework incorporates several disaster-management competencies within community medicine, but these are primarily assessed at the knowledge level and do not require certification, simulation or demonstrated practical skills. Thus, Table 2 establishes that none of the three regulatory systems provides a comprehensive, competency-based and uniformly credit-bearing DRR framework. Figure 3 consequently

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highlights the limited curricular penetration of DRR across Indian higher education and the continuing gap between basic awareness and professional preparedness.

Table 2: Status of DRR integration across Indian higher education regulators by 2020

Regulator	Relevant framework	Current treatment of DRR	Principal gaps
UGC	NEP 2020 undergraduate framework	Optional electives; postgraduate diplomas at select institutions; brief coverage under environmental studies	No compulsory credit-bearing DRR component for all undergraduates
AICTE	Model curriculum for B.Tech/B.E.	One mandatory theory paper on basics of disaster management	Knowledge-level only; no cross-disciplinary resilience or risk-analysis competencies
MCI	CBME curriculum	Several disaster management competencies under community medicine	Knowledge-level only; no certification, simulation or skill demonstration required

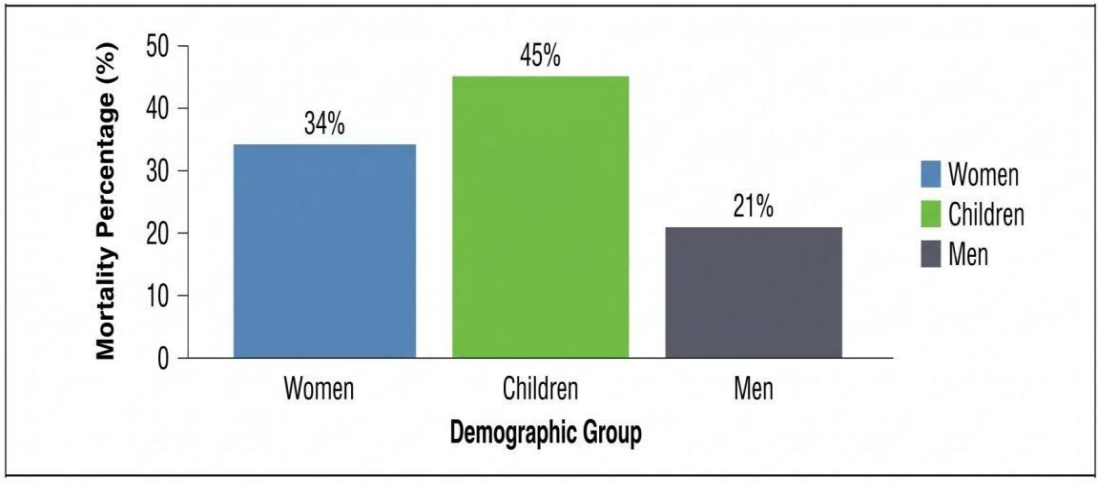


Figure 4: Gender-disaggregated disaster mortality in India, 1977-2002

source: (Báez et al., 2010; Ray-Bennett, 2017)

The demographic analysis further demonstrates the substantial potential of higher education as an instrument for mainstreaming disaster-risk literacy. According to AISHE 2019-20, the Indian higher-education system comprised approximately 38.5 million students, 1,043 universities and 42,343 colleges, with a gross enrolment ratio of about 27.1%. The student population spans diverse disciplines and includes increasing participation of women and socially disadvantaged groups, making universities an important channel for transferring risk knowledge from educational institutions to households and communities. The demographic reach is particularly significant because disaster vulnerability is closely associated with socioeconomic disadvantage and unequal exposure to risk. Figure 4, presenting gender-disaggregated disaster mortality in the broader historical context, reinforces the importance of considering gender and social vulnerability within DRR education. The findings therefore indicate that mainstreaming DRR in higher education could reach a very large and socially diverse population and create a wider base of risk-literate citizens. The present results identify a central structural gap: India has progressively aligned its national disaster policies with the Sendai approach, but its legislation and higher-education curricula have not established a corresponding mandatory mechanism. The evidence supports the need for a coordinated regulatory framework that transforms DRR from an optional or fragmented educational component into a structured, credit-bearing and competency-based element of higher education.

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Table 3: Proposed statutory DRR curriculum architecture by regulator

Regulator	Mandate	Course structure	Credits	Assessment and certification
UGC (all UG disciplines)	Compulsory foundation course in DRR, all students	Hazard identification; vulnerability and exposure assessment; climate adaptation; early-warning literacy; community resilience; supervised local risk-mapping project with panchayat/municipal bodies	2–4	Graded examination + project report; certificate on transcript
AICTE (engineering and technology)	Embed DRR in core curriculum, replacing the single theory paper	Structural resilience and retrofitting; building code adherence; GIS-based spatial risk analytics; economics of risk-informed investment	2 + skill component	Design/simulation-based assessment; capstone linked to resilient design
MCI (medical education)	Upgrade CBME disaster competencies from "knows" to "shows how"	Simulation-based training; tabletop exercises; triage and mass-casualty drills; psychological first aid	Integrated into community medicine	Certified skill demonstration required before licensure
Skill-development regulators (NSC/NCVET)	Compulsory practicum module in all vocational streams	Workplace safety; first response; hazard awareness for construction, transport, sanitation, tourism and local administration	1–2	Competency certification; no theoretical examination requirement

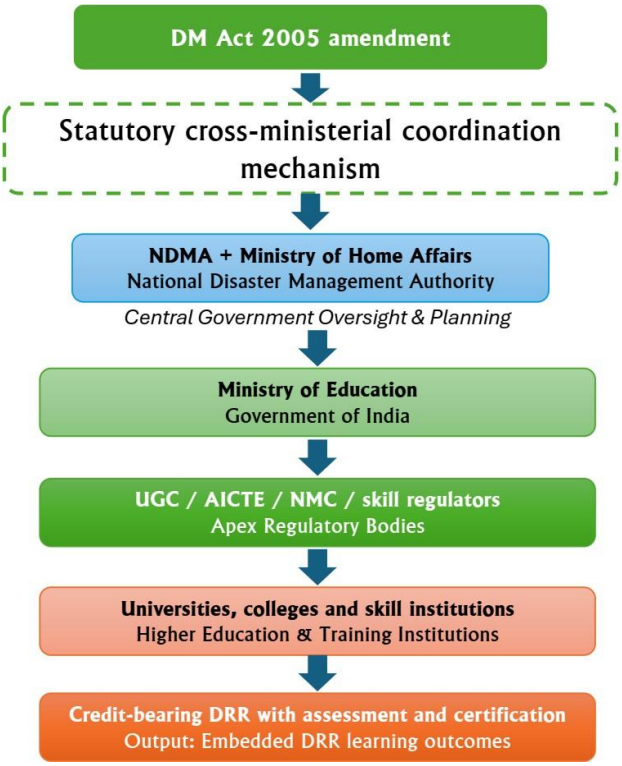


Figure 5: Proposed statutory pathway for mainstreaming DRR in higher education

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DISCUSSION

The findings of the present study indicate that disaster risk reduction (DRR) in India has progressively shifted from a predominantly reactive, relief-centred approach towards prevention, mitigation, preparedness and resilience. This transformation is consistent with the evolution from the Hyogo Framework for Action (HFA) 2005-2015 to the Sendai Framework for Disaster Risk Reduction 2015-2030. Kitagawa (2018) emphasised that education, knowledge and public awareness are essential for developing a culture of disaster prevention, while Briceño (2014) observed that the progress achieved under the HFA in early warning, preparedness and response did not sufficiently address the underlying drivers of disaster risk, including climate change, environmental degradation, unplanned urbanisation and socioeconomic inequalities. The present study supports this observation by demonstrating that although DRR has gained considerable recognition within international and national policy frameworks, its systematic incorporation into higher education remains limited. The Sendai Framework has strengthened the preventive orientation of DRR by prioritising understanding disaster risk, strengthening governance, investing in resilience and enhancing preparedness. Aitsi-Selmi et al. (2016) stressed the importance of scientific and technical capacities for implementing the Sendai priorities, while Lo et al. (2017) highlighted the significant role of universities and research institutions in disaster-related education, research, innovation and the science-policy interface. In the authors' view, universities should therefore be considered strategic institutions for DRR rather than merely recipients of awareness programmes. They have the capacity to generate evidence, develop professional expertise, promote interdisciplinary knowledge and transfer risk-awareness and preparedness skills to wider communities. However, the present findings suggest that this potential has not yet been adequately reflected in India's higher-education system. The continuing emphasis on general awareness, training and response, without a systematic curricular framework, limits the capacity of higher education to contribute fully to long-term disaster resilience.

Table 4: Implementation barriers and mitigation strategies

Barrier	Manifestation	Mitigation
Faculty shortage	Few academics qualified to teach risk-related subjects	National train-the-trainer programme led by NIDM with UGC HRDC missions
Funding gaps	No dedicated budget for new course development, retrofitting or equipment	Open access to mitigation funds established under the DM Act, 2005 for universities, early-warning equipment and translational risk research
Administrative burden	Curriculum reform across ~1,000 autonomous institutions	Phased rollout; NEP 2020 multidisciplinary and skill slots as ready-made vehicles; NIDM model syllabus
Regulatory fragmentation	UGC, AICTE, MCI act independently	Statutory cross-ministerial coordination mechanism plus accreditation (NAAC/NBA/MCI) and ranking criteria

The analysis of India's legislative, policy and regulatory framework further reveal a significant gap between policy commitment and educational implementation. The Disaster Management Act, 2005 established an important institutional foundation for prevention, mitigation, preparedness and coordinated disaster response, representing a major departure from earlier relief-oriented arrangements. Bhadra (2017) similarly regarded the Act as a significant step towards comprehensive disaster governance. Nevertheless, the Act does not explicitly make DRR a compulsory curricular component of higher education. Although the National Disaster Management Plan and its subsequent revisions encourage university networks, research and multidisciplinary participation, these provisions have largely remained strategic rather than enforceable. The National Education Policy (NEP) 2020 provides a favourable opportunity to address this deficiency through its emphasis on multidisciplinary education, flexible

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credit structures, skill development, research and community engagement. Yet DRR continues to be unevenly represented within the frameworks of higher-education and professional regulators, with limited emphasis on uniform credits, competency-based assessment, practical training and certification. The authors argue that this policy, practice gap should be addressed through a coordinated national framework involving the Ministry of Education, Ministry of Home Affairs, NDMA and relevant regulatory bodies. DRR should be introduced as a compulsory, credit-bearing and competency-based component of undergraduate and professional education, while allowing discipline-specific applications in engineering, medicine, management, environmental studies, social sciences and other fields. The curriculum should extend beyond theoretical awareness to include hazard identification, risk assessment, emergency communication, first aid, evacuation procedures, climate-related risks, resilient planning, simulation exercises and community-based preparedness. India's large higher-education system provides an exceptional opportunity to develop a broad population of risk-literate young citizens capable of transferring knowledge and preparedness practices to households and communities. In the authors' assessment, mainstreaming DRR in higher education would therefore constitute not merely a curricular reform but a strategic investment in national resilience. Aligning legislative provisions, higher-education regulations and curricular requirements with the preventive and anticipatory principles of the Sendai Framework would help transform DRR from a fragmented educational activity into a sustained institutional mechanism for disaster prevention, preparedness and resilience.

CONCLUSION

The present study concludes that India has made substantial progress in moving from a predominantly relief- and response-oriented disaster-management system towards a more comprehensive framework centred on prevention, mitigation, preparedness and resilience. The evolution from the Hyogo Framework for Action to the Sendai Framework has strengthened the recognition of education, scientific knowledge, research and capacity development as essential elements of disaster risk reduction (DRR). India's Disaster Management Act, 2005, National Disaster Management Plan and National Education Policy 2020 collectively provide an important policy foundation for advancing this approach. However, the study identifies a persistent gap between policy recognition and curricular implementation in higher education. DRR has not yet been established as a uniformly compulsory, credit-bearing and competency-based component across Indian universities and professional institutions. Its incorporation remains fragmented across regulatory and disciplinary frameworks, with greater emphasis on awareness and theoretical knowledge than on practical preparedness, skills, assessment and certification. The findings therefore suggest that India's disaster-management architecture has progressed considerably at the policy and institutional levels, but the educational dimension of DRR requires further strengthening. Given the expanding scale and diversity of India's higher-education system, universities can play a critical role in developing risk-literate citizens, strengthening professional capacity, generating evidence-based solutions and connecting scientific knowledge with community-level disaster preparedness.

IMPLICATIONS

The major implication of the study is the need for a coordinated national strategy to mainstream DRR throughout higher education. The Ministry of Education, Ministry of Home Affairs, NDMA and relevant regulatory bodies should develop a common minimum framework under which DRR becomes a compulsory, credit-bearing and competency-based component of undergraduate and professional education, while permitting discipline-specific adaptation. Such a framework should include hazard and vulnerability assessment, climate and environmental risks, emergency communication, first aid, evacuation, disaster preparedness, resilient infrastructure, risk-informed planning, simulation exercises and community-based field activities. Assessment should measure both conceptual understanding and demonstrated practical competencies, with appropriate certification where relevant. Universities should also be encouraged to establish disaster-management cells, strengthen interdisciplinary research, conduct regular preparedness drills, develop institutional disaster-management plans and collaborate with government agencies and local communities. Particular attention should be given to gender, socioeconomic inequality and other dimensions of differential vulnerability so that DRR education promotes inclusive resilience. The large population reached through India's higher-education institutions creates an opportunity to extend disaster-risk knowledge beyond campuses to families and communities, thereby multiplying the social impact of

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curricular interventions. In this context, mainstreaming DRR should be viewed not simply as an additional academic requirement but as a long-term investment in human capacity, sustainable development and national resilience. The authors consequently recommend that future legislative and educational reforms explicitly connect disaster-management policy with higher-education regulation and ensure that the preventive and anticipatory principles of the Sendai Framework are translated into measurable educational outcomes. Such integration would help bridge the existing policy, practice gap and establish higher education as a central pillar of India's disaster risk governance and resilience-building strategy.

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