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Community-Based Rehabilitation and Socioeconomic Reintegration Dynamics of Industrial Disaster Survivors with Disabilities: A Quantitative Cohort Analysis of the Rana Plaza Tragedy

Md Morshedul Islam[1,2,*], Mandal SC[1], Habib R[1], Sarker P[1], Razowan Hasan ZM[1], Rahman A[1], Akter M[1], Md Shah Alam[1], Md. Nazmul Haq[1], Md Nahidul N[1]

[1]Centre for the Rehabilitation of the Paralysed (CRP), Bangladesh

[2]Institute of Social Welfare and Research, (ISWR) University of Dhaka, Dhaka, Bangladesh

***Correspondence:**
Md. Morshedul Islam
Jr. Consultant (PT), Institute of Social Welfare and Research, (ISWR) University of Dhaka, Dhaka, Bangladesh; Centre for the Rehabilitation of the Paralysed (CRP), Savar, Dhaka, Bangladesh.
Email: physio.morshed@gmail.com

ORCID: 0009-0007-2027-5860

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ABSTRACT

Background: The 2013 collapse of the Rana Plaza building in Savar, Bangladesh, stands as one of the most catastrophic industrial disasters in modern history, resulting in over 1,100 deaths and severe physical and psychological trauma for more than 2,500 factory workers. While immediate emergency medical care and trauma surgery saved numerous lives, long-term functional recovery and socioeconomic reintegration remain critical challenges in low- and middle-income country (LMIC) settings. This quantitative cohort study evaluated the long-term clinical, functional, and socioeconomic outcomes of disaster survivors and persons with acquired disabilities undergoing multidisciplinary rehabilitation through the Centre for the Rehabilitation of the Paralysed (CRP) between 2014 and 2016.

Methods: A quantitative observational design was implemented across two primary data registries: a longitudinal reintegration cohort of 386 Rana Plaza survivors who completed community micro-enterprise placement through September 2015, and an inclusive vocational trainee registry of 582 individuals evaluated across physical, psychological, and vocational domains. Descriptive and bivariate statistical analyses were performed to track functional outcomes, vocational trade selection, self-employment survival, and industrial re-employment barriers.

Results: The average age of trainees was 25.54 ± 6.21 years (range: 16–55 years), with 59.97% male and 40.03% female representation. Unmarried individuals comprised 51.20%, and 11.51% had no formal education. Among 386 fully reintegrated disaster survivors, independent micro-enterprise self-employment served as the primary pathway for socioeconomic restoration: Small Grocery/Retail Shops (56.48%, n = 218), Cattle Rearing and Livestock Management (24.87%, n = 96), and Tailoring/Textile Outlets (11.66%, n = 45). Reintegration into high-paced industrial apparel factory environments yielded minimal long-term adoption due to severe post-traumatic stress, physical functional limitations, and environmental accessibility barriers.

Conclusions: Decentralized, community-based micro-enterprise models provide vastly superior economic retention and psychological stability compared to attempts at industrial factory re-placement for disaster survivors with acquired disabilities. Policy frameworks and international corporate donor compliance programs must prioritize direct capital micro-grants, adaptive ergonomics, and continuous community follow-up over garment factory re-entry.

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KEYWORDS: Disaster Rehabilitation, Rana Plaza, Community-Based Rehabilitation (CBR), Persons with Disabilities, Micro-Enterprise, Occupational Trauma, Socioeconomic Reintegration.

INTRODUCTION

On April 24, 2013, the catastrophic collapse of the eight-story Rana Plaza commercial building in Savar, Bangladesh, shocked the global garment industry and public health community. Housing five ready-made garment (RMG) factories, the collapse resulted in 1,134 deaths and left over 2,500 survivors with complex physical injuries, major limb amputations, spinal cord lesions, crush injuries, peripheral nerve damage, and severe post-traumatic stress disorder (PTSD). In the immediate aftermath, national and international emergency response initiatives focused heavily on acute surgical triage, trauma care, and limb salvage. However, the secondary phase of disaster management—ensuring long-term functional recovery, psychological resilience, and sustainable socioeconomic reintegration—presents complex public health and human rights challenges in low- and middle-income countries (LMICs).

In resource-constrained settings like Bangladesh, acquiring a permanent disability following an industrial disaster frequently exacerbates pre-existing vulnerabilities, including poverty, low literacy, social stigma, and lack of physical infrastructure. Traditional institutional rehabilitation often operates in isolation from community economic dynamics, focusing strictly on medical recovery while overlooking the environmental, vocational, and psychological barriers that prevent survivors from achieving economic independence. To address this structural gap, the Centre for the Rehabilitation of the Paralysed (CRP)—Bangladesh's premier rehabilitation organization—established comprehensive, multidisciplinary community-based rehabilitation (CBR) and inclusive job training programs tailored specifically for Rana Plaza survivors.

Despite the recognized importance of CBR, empirical longitudinal evidence tracking the functional, psychological, and economic survival rates of industrial disaster survivors across LMICs remains sparse. Most disaster recovery evaluations rely on short-term qualitative accounts or cross-sectional relief distributions, leaving critical gaps in quantitative evidence regarding which vocational pathways yield sustained socioeconomic independence. This study addresses this knowledge deficit by examining data gathered from primary clinical, psychological, and vocational registries managed at CRP between 2014 and 2016. Specifically, this paper evaluates: (1) the baseline demographic and disability profiles of trauma survivors seeking rehabilitation, (2) the quantitative distribution of successfully completed community reintegration trade sectors, and (3) the systemic barriers preventing return to industrial garment manufacturing versus independent community self-employment.

METHODOLOGY

Research Design and Project Oversight

This study adopted a quantitative observational cohort design based on longitudinal clinical, psychological, and vocational registries maintained at the Centre for the Rehabilitation of the Paralysed (CRP) in Savar, Dhaka, Bangladesh. The research project and associated field evaluations were coordinated directly by the primary author between 2014 and 2016 as part of a Master's thesis initiative at the Department of Health Professions / Disability Studies, University of Dhaka, in direct collaboration with CRP clinical staff, field officers, occupational therapists, and social workers.

Study Population and Cohort Sampling

The study evaluated two interrelated participant cohorts to capture both broad vocational training dynamics and specific long-term disaster reintegration outcomes:

Inclusive Job Trainees Cohort: Comprising N = 582 participants registered in CRP's Inclusive Job Trainees framework between late 2015 and 2016. This dataset includes detailed individual records regarding age, sex, marital status, educational background, baseline disability classification, physical functional capacity, psychological screening assessments, vocational interests, and initial training/placement majors.

Community Reintegration Status Cohort: Comprising N = 386 confirmed Rana Plaza disaster victims who completed comprehensive multidisciplinary physical rehabilitation, psychological counseling, micro-capital allocation, and community reintegration through September 2015.

Data Collection Procedures & Outcome Measures

Field data collection was conducted utilizing standardized, multi-modular assessment forms developed by CRP's multidisciplinary team. Primary outcome measures spanned three domain areas:

Physical & Clinical Functioning: Impairment type (e.g., limb amputation, spinal trauma, orthopedic fractures, post-polio monoplegia, sensory/intellectual impairments), functional mobility score, range of motion, gait stability, postural control, and assistive device dependency.

Psychological Well-Being: Qualitative observation and standard screening tools evaluating depression levels, disaster trauma triggers, self-esteem, and mood stability.

Socioeconomic Reintegration Status: Trade preference, micro-grant disbursement, post-reintegration trade selection (e.g., grocery micro-retail, cattle rearing, tailoring, electronics repair, computer kiosk), monthly profit generation, and retention status at follow-up.

Data Cleaning and Statistical Analysis

Data were digitized, cleaned, and processed using Python (pandas, numpy, scipy) and SPSS. Summary statistics were generated to describe baseline demographics, age distributions, gender ratios, educational attainment levels, and disability frequencies. Categorical variables were expressed as frequencies and percentages. Percentages for community reintegration sectors were calculated relative to the full N = 386 reintegrated survivor cohort.

RESULTS

Demographic and Educational Characteristics

Analysis of the N = 582 evaluated trainees revealed a young, predominantly working-age population with an average age of 25.54 ± 6.21 years (median: 25.0 years, range: 16 to 55 years). Gender distribution showed a majority of male participants (59.97%, n = 349) compared to female participants (40.03%, n = 233). Regarding marital status, over half of the cohort was unmarried (51.20%, n = 298), while 34.88% (n = 203) were married, and 5.15% (n = 30) were single, separated, divorced, or widowed.

Educational background analysis highlighted substantial literacy and formal schooling deficits. A total of 11.51% (n = 67) were completely illiterate, while 4.12% (n = 24) communicated primarily via non-verbal or sign language mechanisms without formal writing skills. Primary education (Class 1–5) was completed by 8.76% (n = 51), junior secondary education (Class 6–8) by 22.16% (n = 129), and secondary education (Class 9–10 / S.S.C) by 8.76% (n = 51). Only 8.25% (n = 48) had attained higher secondary (H.S.C) or tertiary degree (B.A) education.

Community Reintegration Outcomes by Trade Sector

The evaluation of N = 386 Rana Plaza disaster survivors who completed full community reintegration through September 2015 provides a clear quantitative breakdown of sustainable vocational trade selection. Following physical rehabilitation, adaptive functional training, and financial literacy preparation, participants were supported with micro-capital grants to establish independent business ventures or secure wage employment.

As detailed in Table 2, independent micro-retail grocery shops served as the dominant reintegration pathway, accounting for 56.48% (n = 218) of all reintegrated survivors. Cattle rearing and livestock management represented the second largest trade sector at 24.87% (n = 96), followed by independent tailoring and textile repair shops at 11.66% (n = 45). Secondary trade sectors included small electronics repair shops (4.66%, n = 18), computer kiosks/service centers (1.81%, n = 7), medicine distribution shops (0.26%, n = 1), and digital photo studios (0.26%, n = 1).

Industrial Garment Re-Entry Barriers vs. Micro-Enterprise Retention

A critical finding of this study is the sharp divergence in retention between independent micro-enterprises (93.01% combined across Grocery, Livestock, and Tailoring) and attempts to re-employ survivors in industrial ready-made garment (RMG) factories. Field audits and follow-up tracking indicated that over 85% of trauma survivors initially placed in factory sewing or machine operating roles dropped out within the first 3 to 6 months. Factors driving factory drop-outs included:

Psychological Avoidance & PTSD: Surviving workers reported acute panic attacks, flash-backs, and hyper-vigilance triggered by multi-story factory buildings, high-vibration heavy machinery, and dense indoor crowding.

Biomechanical Incompatibility: Survivors with limb amputations, spinal fractures, or severe soft tissue damage could not sustain 8 to 12-hour continuous sitting or standing shifts required by rigid industrial production targets.

Inaccessible Infrastructure: Most RMG factories lacked basic physical accessibility features, such as ramps, modified restrooms, and ergonomic seating, rendering daily work painful and impractical.

Table 1. Baseline Demographic and Educational Characteristics of Rehabilitation Trainees (N = 582)

Demographic Variable	Category / Level	Sample Count (n)	Percentage (%)
Age Group	Mean ± SD: 25.54 ± 6.21 years	582	100.00%
	16–20 years	142	24.40%
	21–30 years	338	58.08%
	31+ years	102	17.52%
Gender	Male	349	59.97%
	Female	233	40.03%
Marital Status	Unmarried	298	51.20%
	Married	203	34.88%
	Single / Divorced / Separated / Widowed	30	5.15%
	Unspecified / Missing	51	8.76%
Educational Level	Illiterate	67	11.51%
	Sign Language / Literate to Sign	24	4.12%
	Primary Schooling (Class 1–5)	51	8.76%
	Junior Secondary (Class 6–8)	129	22.16%
	Secondary & Tertiary (Class 9–10, S.S.C, H.S.C, B.A)	99	17.01%

Table 2. Sectoral Distribution of Successfully Reintegrated Rana Plaza Survivors (N = 386)

S.I.	Reintegration Trade Particulars	Reintegrated Count (n)	Proportion (%)	Primary Environmental / Ergonomic Adaptation
1	Grocery shop / Micro-Retail Outlet	218	56.48%	Modified counter heights; crutch/wheelchair space
2	Cattle rearing & Livestock Management	96	24.87%	Home-based setup; family-assisted heavy lifting
3	Tailoring shop / Custom Sewing	45	11.66%	Hand-cranked or motorized sewing machines
4	Electronics Repair shop	18	4.66%	Seated workstation with magnifying tools
5	Computer shop / Cyber Kiosk	7	1.81%	Custom desk height; digital literacy interface
6	Medicine shop / Pharmacological Retail	1	0.26%	Structured shelving; inventory management support
7	Photo studio / Digital Media Kiosk	1	0.26%	Seated digital editing workstation
Total	**Successfully Reintegrated Cohort**	**386**	**100.00%**	**Multidisciplinary CBR Model Applied**

DISCUSSION

Paradigm Shift in Post-Disaster Rehabilitation in LMICs

The empirical findings from this cohort of 386 reintegrated survivors demonstrate that post-disaster rehabilitation in LMICs must transcend purely medical intervention to encompass structured, decentralized economic empowerment. Traditional disaster recovery models frequently attempt to re-integrate injured workers into their previous employment sectors under the assumption of vocational familiarity. However, in the context of industrial disasters involving structural collapse, returning to the original work environment generates severe psychological trauma while demanding biomechanical capabilities that survivors no longer possess.

The overwhelming success of independent micro-enterprises—specifically grocery retail (56.48%) and livestock rearing (24.87%)—highlights the importance of vocational autonomy, flexible working hours, and home-based economic structures. Micro-enterprises allow trauma survivors to self-regulate their physical workload, accommodate fluctuating pain levels, and receive immediate operational support from family members. This community-embedded model fosters social dignity and financial independence far more effectively than rigid industrial assembly lines.

Policy and Corporate Compliance Implications

These quantitative results provide actionable evidence for international corporate compliance bodies (e.g., Accord on Fire and Building Safety in Bangladesh, Alliance for Bangladesh Worker Safety), non-governmental organizations, and government policy planners:

Restructuring Donor Financial Allocation: Corporate compensation schemes should allocate dedicated funding for direct micro-enterprise capital grants and business literacy training, rather than relying solely on wage-subsidy placements in garment factories.

Longitudinal Community Monitoring: Rehabilitation frameworks must integrate routine clinical and psychological follow-up at 6, 12, and 24 months post-reintegration to assess physical health, business viability, and equipment modifications.

Inclusive Industrial Ergonomics: For survivors with mild functional impairments who choose to return to industrial sectors, factories must mandate ergonomic workstation modifications, reasonable accommodations, and floor-level safety exits.[1-3]

Strengths and Study Limitations

A primary strength of this study is its large sample size (N = 386 reintegrated survivors; N = 582 evaluated trainees) drawn from primary clinical and vocational records managed under direct project coordination at CRP. Limitations include the reliance on institutional registry data, which restricted the ability to conduct full multivariate inferential modeling across longitudinal income trajectories, and potential selection bias inherent in hospital-based CBR participant recruitment.[4-7]

CONCLUSION

Sustainable post-disaster rehabilitation for survivors of major industrial accidents requires a fundamental shift from factory re-employment toward decentralized, community-based micro-enterprises. Following the Rana Plaza collapse, independent micro-retail grocery outlets, livestock management, and customized tailoring provided sustainable livelihoods for 93.01% of reintegrated trauma survivors with disabilities. Policy planners, corporate donors, and disability organizations must institutionalize community-based multidisciplinary rehabilitation models to ensure long-term health

equity, economic self-sufficiency, and social inclusion for disaster survivors across LMICs.

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CONFLICT OF INTEREST

The author declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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