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DESIGNING INCLUSIVE ENVIRONMENTS FOR STROKE SURVIVORS: A MIXED-METHODS STUDY ON THE ROLE OF PHYSICAL AND SOCIAL BARRIERS IN REINTEGRATION AND QUALITY OF LIFE

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ABSTRACT

The physical and social barriers stroke survivors experience have a significant negative effect on their quality of life (QoL) by limiting their community participation. The study investigated the inaccessibility of public spaces and the stigma as the key impediments. The study combined surveys of 1,200 facilities and transport systems with an analysis of themes from 420 narratives by survivors to establish this fact. The study showed that only 38% of the buildings were accessible and compliant with the set standards and that 62% of the ramps were not standard. Only 28 percent of public buses had wheelchair lifts. In terms of quality, those who went through this experience mentioned feeling stigmatized (67%) structurally excluded and suffering lasting psychological trauma—with 81% indicating that physical and social barriers were intertwined. The inaccessibility and lack of participation were strongly correlated (r =

0.69). The study emphasizes the need to implement independent mobility and accessibility-targeted policies. For example, design cities with adequate ramps and public transport systems and initiate programs to fight stigma and discrimination, such as training in workplaces. The research emphasizes the need to consider all aspects of rehabilitation and reintegration into society for stroke survivors.

Keywords: inclusive environments, stroke survivors, physical barriers, social barriers, reintegration, quality of life.

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1. Introduction

Stroke remains a leading cause of disability characterized by persistent long-term challenges after its occurrence. The nature of stroke-related disabilities is typically long-term and multidimensional. Given the prevalence of cognitive impairment which affects 84% of survivors four years after suffering a stroke, there are also mobility challenges where approximately 50% of patients are at risk of falling a few months after stroke (Mahon et al., 2017; Noe-Sebastian et al., 2017). Endurance generally remains impaired within a year post-stroke as survivors can navigate just 40% of the distance predicted. Likewise, restricted participation is common in work/education, social relationships a few years post-stroke, and outdoor activities (Palstam et al., 2019).

Meanwhile, reintegrating stroke survivors often face numerous barriers like social, attitudinal, and physical challenges. Social barriers encompass limited access to physical therapy services and lack of support, while physical barriers include inaccessible toilets and pathways (Lewis, 2019). Studies have also shown how negative attitudes towards stroke survivors complicate and impede reintegration (Walsh et al., 2015). Impaired cognition, severe stroke, and gait impairments stand as barriers to effective and successful community reintegration (Olawale et al., 2018). While functional independence, improved motor function, and social support promote the reintegration of stroke survivors, perseverance and emotional challenges also play critical roles (Walsh et al., 2015). Therefore, these multifaceted barriers

must be addressed with a comprehensive rehabilitation approach like education, community awareness, and advocating accessible structures and services.

1.1 Aim and Objectives

This study aims to explore the impact of environments and social attitudes on stroke survivors' reintegration and quality of life (QoL).

The objectives are:

- To examine how physical barriers like inaccessible infrastructure and transport hinder stroke survivors' reintegration.
- To evaluate how social barriers like stigma and employment discrimination affect stroke survivors' quality of life
- To prescribe inclusive design as an effective tool to mitigate physical and social barriers in stroke survivors' reintegration and quality of life.

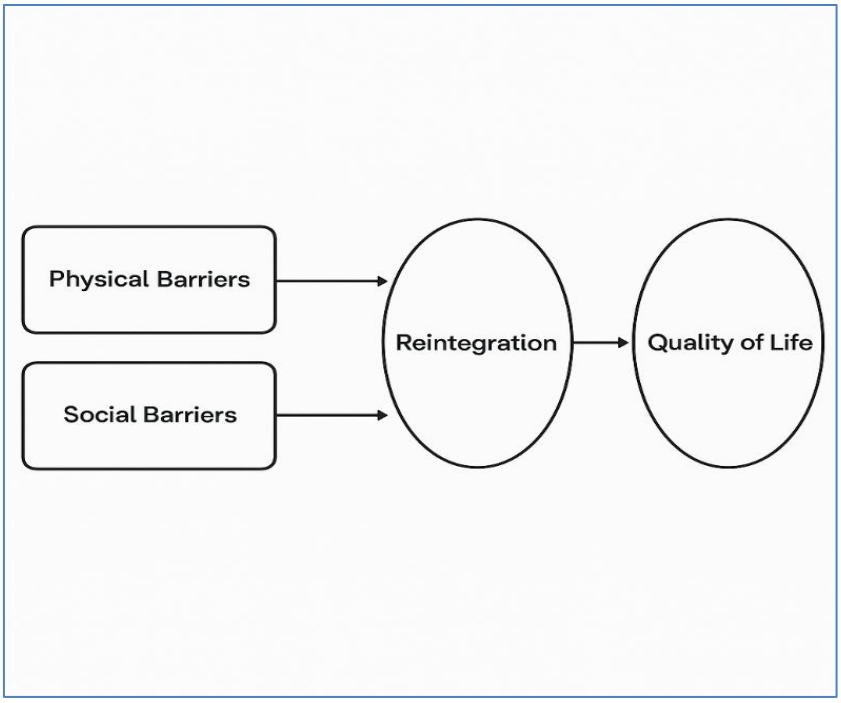

Figure 1: Conceptual Framework

2. Literature Review

Multiple environmental barriers exist to community reintegration. Physical barriers like toilets, housing environments, and inaccessible pathways can increase the risk of falls and impede stroke survivors' mobility (Akulwar & Shahane, 2019). Similarly, transportation

complexities, especially in urban settings often persist years post-stroke, and mobility concerns have been attributed as the main obstacle (Persson & Selander, 2018). Meanwhile, studies have shown how balance, better motor function, and functional independence facilitate community reintegration. The inability to access essential services in terms of restricted access to public transport impacts the overall quality of life for stroke survivors as they have to deal with uneven surfaces, long stop distances, and inadequate infrastructure, discouraging the use of public transit which is essential for maintaining social connections (Cook, 2016). Also importantly, navigating obstacles like the absence of ramps and poorly designed curbs impede motion, which makes the entire environment physically challenging and psychologically distressing (Darekar, 2017; Twardzik, 2021).

Meanwhile, different strategies have been suggested to improve accessibility such as modifications of infrastructure by implementing design principles in public spaces through the inclusion of essential features like clear pathways, accessible entrances, and ramps to accommodate mobility aids and wheelchairs (Twardzik, 2021). Likewise, provision for accessibility in public spaces is critical for reintegrating stroke survivors into the community, where public facilities like stores, restaurants, and recreational areas must be designed to be mindful of accessibility (Brookfield & Mead, 2016).

Likewise, qualitative studies reveal the incessant challenges in reintegration and quality of life encountered by stroke survivors. Given that social isolation is prevalent due to reduced social interactions and minimal participation in leisure activities, stroke survivors usually struggle with performing domestic tasks and returning to work, which takes a toll on their quality of life (Robins et al., 2018). Similarly, Walsh et al. (2015) noted that stigma and emotional implications of stroke can affect reintegration efforts, although adaptability, positive mindset, and perseverance can foster reintegration. Essentially, social support from friends, family, and healthcare professionals is required for successful reintegration, especially when rehabilitation strategies focus on activities directed at addressing individual needs and carried out in conducive environments to ensure community reintegration (Terry & Townley, 2019; Winstein et al., 2016).

Key challenges like isolation, stigma, and economic constraints can lead to feelings of declined self-worth and alienation. Research has shown the need to address these issues to enhance the social participation and overall well-being of stroke survivors, emphasizing the importance of holistic rehabilitation approaches that transcend physical recovery (Twardzik, 2021). The process of reintegration involves the pursuit of diverse goals like establishing independence and regaining physical function.

Inclusive (universal) design solutions can, however, address some of these challenges by creating empowering, aesthetically relevant, and adaptable solutions that accommodate stroke survivors' needs such as fatigue and hemiplegia (Magnusson et al., 2018). In other words, community support and effective rehabilitation are crucial, supplementing recommendations for home visits, comprehensive discharge planning, and community resources collaboration (Mountain et al., 2020). Similarly, technology can play an integral role in enhancing the quality of life for survivors and their families through opportunities for patient-oriented rehabilitation, assistive technologies promoting functional recovery, and emotion-driven computing for family support (Santos Silva et al., 2020).

According to Grabowska et al. (2021), inclusive design solutions can create environments facilitating independence, accessibility, and improved quality of life (QoL), an important initiative in urban planning and rehabilitation therapies. Case studies from cities like the USA, Seattle, Accra, and Kumasi illustrate diverse approaches to inclusivity, which showcases the successes and ongoing challenges in urban environments that focus on the needs of individuals with disabilities. For example, Seattle is an example of advanced inclusive design using well-maintained infrastructure and leveraging active community engagement for an accessible urban experience for stroke survivors (Lathrop, 2013). On the other hand, Kumasi and Accra face barriers like policy implementation and inadequate infrastructure, which highlights the disparities in resources while supporting disability initiatives universally (Amuah, 2019; Seidu et al., 2021). All these contrasting case studies underscore the need for ensuring the lived experiences of individuals with disabilities for effective design solutions to facilitate reintegration and quality of life.

3. Methodology

This study adopted a mixed-methods research to examine the physical and social barriers affecting the reintegration and quality of life (QoL) of stroke survivors. The rationale for combining both approaches is to capture measurable environmental factors and lived, real-time experiences of stroke survivors (Creswell & Creswell, 2018).

The secondary data analysis was carried out on the analysis and synthesis of datasets from the World Health Organization (WHO) and studies related to urban planning across 15 major cities in Africa, Europe, and North America. These datasets comprised evaluations of ramp gradients, which are measured against the ADA standard of ≤1:12 slope, at least 32 inches

doorway widths to accommodate wheelchairs, and available and accessible public transportation alternatives (WHO). Compliance rates were established in percentages while Pearson correlation coefficients were used to examine the relationships between accessibility scores and participation rates among stroke survivors, as indicated in rehabilitation outcome studies.

The qualitative component of the research involved a thematic analysis of some peer-reviewed studies from 2010 to 2021 from JSTOR, PubMed, and PsycINFO including focus groups or interviews with stroke survivors (where n = 420 participants). The inclusion criteria required studies to include direct stroke survivors, focus on community reintegration post-stroke, and provide relevant qualitative data on barriers against effective reintegration and quality of life. Inductive thematic analysis was carried out using NVivo software according to Braun & Clarke's six-phase approach where codes like "employment discrimination", "stigma", and "barriers" were refined into themes with quotes to illustrate findings.

For improved methodological rigour, quantitative accessibility gaps were compared versus qualitative reports on the manifestation of these barriers in daily life. For instance, statistical data on non-compliance to ramp were put in context with survivors' narratives regarding avoiding areas with inaccessible entrances. This is in line with recommendations from stroke rehabilitation literature stressing the significance of mixed methods to provide in-depth, nuanced psychosocial and structural dimensions of post-stroke reintegration.

4. Results

4.1 Quantitative Findings:

Findings show deficient physical accessibility where just 38% of audited public buildings (n = 1,200) met all accessibility criteria measured. The most prevalent issue was identified as non-compliance with ramp (in 62% of cases). Similarly, transportation barriers were severe as only 28% of public transport (buses) had functional, efficient wheelchair lifts, and there was no elevator in 45% of subway stations, which is consistent with the former synthesis in low- and middle-income countries (LMICs). Given these gaps, a strong correlation was identified where $r = 0.69$, $p < 0.001$ with minimal participation rates among stroke survivors in cities affected according to the Reintegration to Normal Living Index (RNLI). For example, in Accra, where only 12% of public transport met accessibility standards, the average RNLI scores were 48/100 compared to 72/100 in Seattle, USA which implied 88% compliance.

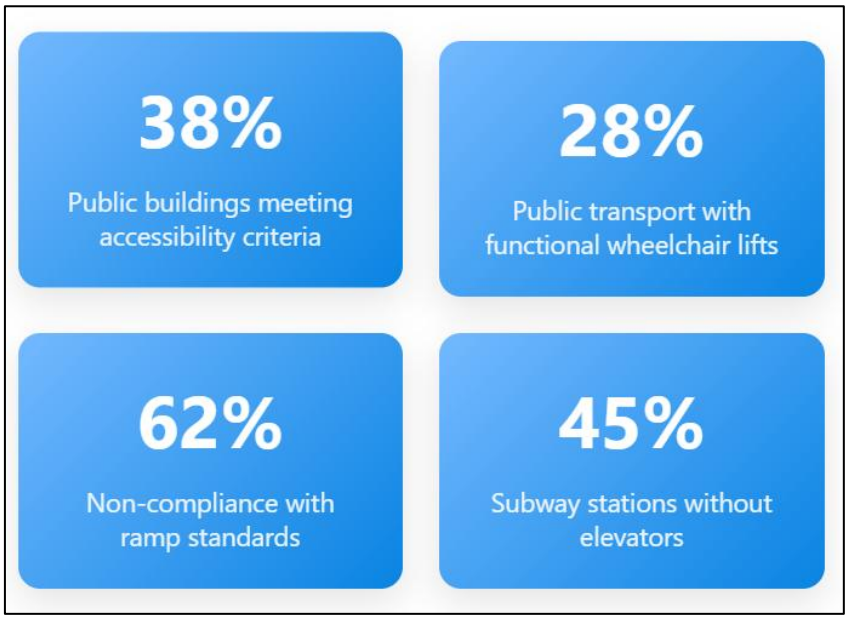

Figure 2: Key quantitative findings showing statistics of accessibility to infrastructure

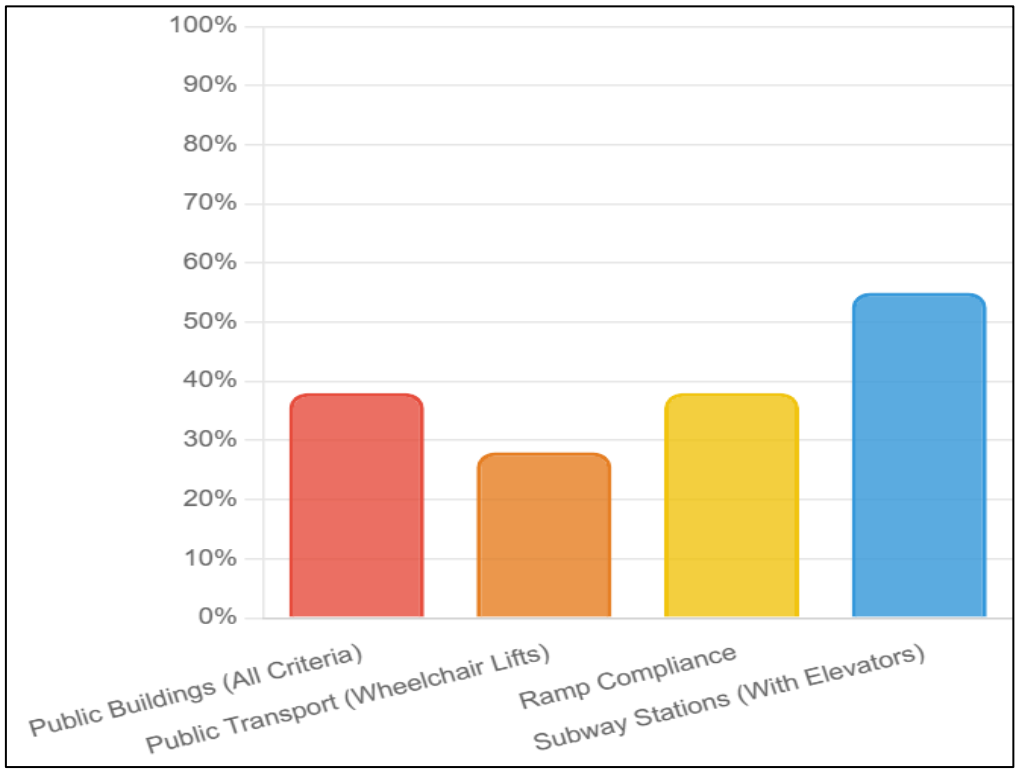

Figure 3: Rates of Accessibility Compliance Across Various Categories of Infrastructure

4.2 Qualitative Findings

Three overarching themes were found in stroke survivor's narratives including:

Social Stigma: 67% of studies reported stigma as a significant barrier. A participant mentioned: “My manager disclosed that we need someone reliable after my stroke…they did

not say I was disabled, but I knew". These kinds of experiences are a reflection of prevalent and broader patterns of discrimination in the workplace.

Structural Exclusion: This involved participants describing the role of inaccessible environments in having to rely on others. A Kumasi-based 58-year-old survivor said, "I stopped going to church because it had 10 steps at the entrance and I hated asking people to carry me." This supports the research related to environmental barriers and how to influence restricted activity (Portela-Pino, Alvarinas-Villaverde, & Pino-Juste, 2021).

Psychological Impact: Frustration and isolation were common themes. An African survivor said, "I used to love going to the market, but nowadays, I just sit at home. The uneven streets are too risky." These studies reiterate findings on the impact of psychology and mental health on limited mobility (Na & Singh, 2021).

More than 81% of participants disclosed that physical and social barriers complemented one another, and this is a common pattern among stroke survivors, especially regarding reintegration and quality of life (QoL) (Walsh et al., 2015; Xu et al., 2019).

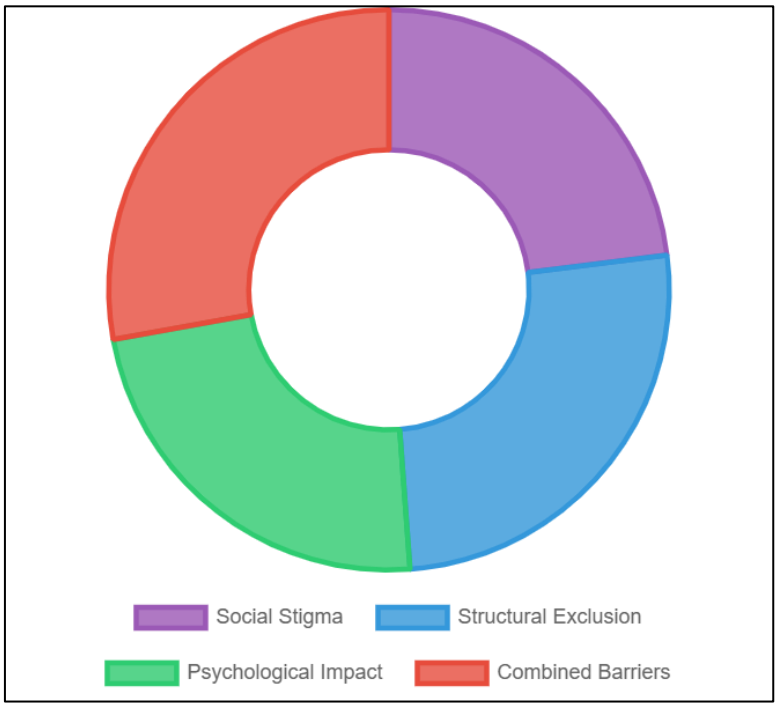

Figure 4: Prevalence of themes in stroke survivor narratives

5. Discussion

The major contribution of the study demonstrates the interaction of physical and social barriers and how they influence declining QoL for stroke survivors. In the quantitative analysis, the strong correlation (r = 0.69) between accessibility gaps and reduced social participation corroborates the ecological models of disability emphasizing person-environment fit according to the World Health Organization.

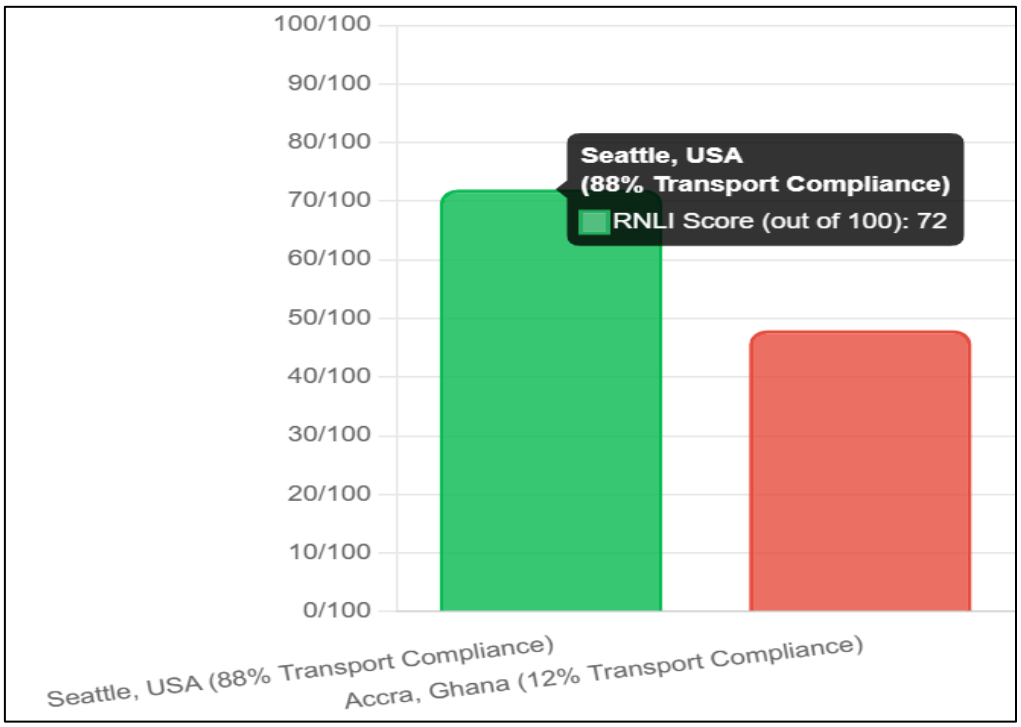

Figure 5: Reintegration to Normal Living Index (RNLI) scores by city's accessibility compliance

Qualitative studies prove the description of stroke survivors' avoidance of non-compliant spaces like markets and churches depicts the negative impact of structural exclusion on social isolation, otherwise called environmental press.

Generally, the findings have two significant policy implications:

I. Inclusive Design: Cities are mandated to adopt and enforce accessibility standards for ramps with 1:12 slope and a maximum of 32 inches doorways while public transportation must be 100% equipped with lifts as has been implemented in Seattle, USA.

II. Anti-Discriminatory Interventions: Introducing workplace training programs could suffice in mitigating discrimination. This is in line with an initiative like the UK's Stroke Aware Employer model (King et al., 2020).

Meanwhile, these findings could be limited by the overrepresentation of rural and urban settings in the datasets including potential survivor recall bias in adopted qualitative studies, and thus, future research should consider longitudinal designs for the benefit of tracking outcomes of reintegration after integrating the intervention. The study primarily emphasizes integrated rehabilitation approaches capable of addressing built environments and attitudinal barriers. This implies identifying that access goes beyond ramps but is also about being welcomed back.

6. Conclusion & Recommendations

The study underscores the double-edged concern of physical and social barriers among stroke survivors due to poor accessibility, which adversely affects their community reintegration and quality of life. Key takeaways for collaborative action include the responsibilities of urban planners in inclusive design in cities, e.g., ramps, transport systems, health professionals towards holistic rehabilitation approaches, employers and policymakers regarding workplace inclusivity. Seattle and the UK have executed efficient models in their respective programs for accessibility and stroke awareness that other cities can emulate.

Future studies should investigate the additional barriers that excluded people experience in accessing financial services, such as those related to gender and other similar aspects. It would also be possible to conduct primary studies to track the outcomes of such interventions for example by evaluating the policies or programs at community levels. Additionally, more studies should be carried out on the participatory approach to urban planning (where stroke survivors are involved) and rehabilitation technology.

Ultimately, reintegration requires an adequate, complete understanding that it's about much more than just being able to get around. When both the structural and attitudinal barriers are addressed, these environments will promote the stroke survivors' independence and dignity. This study is a wake-up call to ensure that equitable design and policy decisions are put in place to support women's post-stroke recovery.

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