

GENDER DISPARITIES IN HOSPITAL BASED NEUROREHABILITATION IN DELIVERY FOR ACUTE HEMIPLEGIA — A CROSS SECTIONAL STUDY OF BIOPSYCHOSOCIAL DETERMINANTS IN NOIDA, GREATER NOIDA

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ARZOO

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Supervised by

DR. ROHIT RATHORE

Assistant Professor, Department of Physiotherapy, SOAHS, NIU

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ABSTRACT

Study objectives: The objective of the study was to assess biopsychosocial impairment using WHODAS 2.0 among patients with acute hemiplegia and to examine gender disparities in hospital-based neurorehabilitation care delivery in Noida and Greater Noida.

Participants: Forty-eight patients with acute hemiplegia following stroke, recruited from GIMS Hospital, Sarvodaya Hospital and SJM Hospital, were included in the analysis (54.2% male and 45.8% female; mean age 51.4 ± 12.5 years).

Outcome measures: The primary outcome measure was the World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0). Hospital care delivery indicators were recorded on a structured case record form.

Results: Ischemic stroke (66.7%) was more common than haemorrhagic stroke (33.3%). Walking was the most restricted functional activity, while sitting and upper-limb movement were relatively preserved. Physiotherapy was provided to all patients (100%), whereas speech therapy had the lowest coverage (43.8%). Overall, 58.3% of participants met the criteria for impairment, with Life Activities and Participation the most affected WHODAS domains. Stroke type was significantly associated with severity ($p < 0.001$).

Conclusion: The study shows a substantial and multidimensional disability burden after acute hemiplegia, together with gaps in speech and language therapy and discharge-plan documentation. These findings support a severity- and subtype-stratified approach to acute stroke rehabilitation.

Key words: Acute hemiplegia; stroke; gender disparities; neurorehabilitation; care delivery; WHODAS 2.0; physiotherapy.

CHAPTER 1: INTRODUCTION

1.1 Overview

Stroke is a major non-communicable neurological disorder and remains one of the leading causes of death and long-term disability worldwide. It is defined as an episode of acute neurological dysfunction caused by cerebral ischaemia or hemorrhage, lasting for at least 24 hours or resulting in death (World Health Organization, 2019). This definition, first formalised by WHO several decades ago, continues to serve as the cornerstone of stroke epidemiology and clinical classification, even as neuroimaging technology has advanced to allow earlier and more precise identification of the underlying pathology. Despite substantial advances in acute medical management — including the widespread availability of thrombolysis, mechanical thrombectomy and dedicated stroke units — a large proportion of stroke survivors continue to experience persistent functional limitations and reduced participation in everyday life.

The burden of stroke is not confined merely to the immediate neurological insult. It extends into virtually every domain of a survivor's life: physical mobility, communication, cognition, emotional wellbeing, family roles, employment, and broader social participation. It is this multidimensional nature of stroke-related disability that makes it one of the most complex conditions to rehabilitate, and one of the most important to study using frameworks that go beyond simple measures of motor strength or neurological deficit.

1.2 The Global and National Burden of Stroke

In India, stroke represents a growing public health burden, with community-based studies reporting an incidence of approximately 1.5 per 1,000 population and a substantial contribution to disability-adjusted life years (DALYs) [1].

This burden is compounded by India's unique demographic and healthcare context. Unlike many high-income countries where stroke incidence has plateaued or declined due to improved control of vascular risk factors, India is experiencing what public health researchers describe as an epidemiological transition — a simultaneous rise in non-communicable diseases such as hypertension, diabetes mellitus and dyslipidaemia, alongside persistent infectious disease burdens. This transition has resulted in a rising absolute number of stroke cases each year, even where age-adjusted incidence rates may appear stable.

Several Indian community-based and hospital-based studies have attempted to characterise this burden. Surveys conducted across different regions of the country have consistently found that stroke disproportionately affects individuals in their economically productive years, leading not only to personal suffering but also to substantial loss of household income and increased caregiver burden. The economic implications of stroke in India are considerable: a single stroke event frequently results in catastrophic health expenditure for affected families, particularly when rehabilitation services are not adequately covered by insurance or government health schemes. The compounding effect of out-of-pocket expenditure for both acute treatment and ongoing rehabilitation pushes many families into long-term financial hardship, a phenomenon documented extensively in studies of stroke survivors from North-East India and other regions (Kalita, Bharadwaz & Aditi, 2023).

1.3 Acute Hemiplegia as a Clinical Presentation

Acute hemiplegia is one of the most common clinical presentations following stroke and is associated with marked impairments in mobility, self-care, communication, cognition and social participation. Hemiplegia, characterised by complete or near-complete paralysis of one side of the body, arises most commonly from infarction or haemorrhage affecting the contralateral motor pathways, including the corticospinal tract as it descends from the motor cortex through the internal capsule, brainstem and spinal cord. The severity and pattern of hemiplegia depend on the precise location and extent of the vascular lesion, with middle cerebral artery territory infarcts being particularly notorious for producing dense contralateral hemiplegia accompanied by sensory loss, visual field defects and, when the dominant hemisphere is involved, aphasia.

The clinical course of acute hemiplegia is rarely static. In the earliest hours and days following stroke onset, patients may pass through a phase of flaccid paralysis, which in many cases gradually evolves into a state of increased muscle tone, or spasticity, as recovery proceeds along the well-described stages of motor recovery first articulated by Twitchell and later elaborated by Brunnstrom. Understanding this evolving clinical picture is essential for rehabilitation professionals, as the timing, intensity and nature of therapeutic intervention must be carefully matched to the patient's current stage of recovery in order to maximise functional gains while avoiding complications such as contractures, shoulder subluxation, or learned non-use of the affected limb.

1.4 Beyond the Physical: The Need for a Biopsychosocial Lens Traditionally, poststroke outcomes have been evaluated predominantly in terms of neurological deficits and physical disability. Clinical practice for many decades relied heavily on scales such as the National Institutes of Health Stroke Scale (NIHSS) for acute severity grading and the modified Rankin Scale (mRS) for global disability assessment.

While these tools remain extremely valuable, particularly for triage and broad outcome categorisation, they were not designed to capture the full lived experience of disability — namely, the interaction between a person's impairments and the environmental, social and psychological context in which they must function.

However, contemporary rehabilitation frameworks emphasise that recovery after stroke is multidimensional and must be understood within a biopsychosocial model of functioning.

The International Classification of Functioning, Disability and Health (ICF) conceptualises disability as the interaction between impairments, activity limitations, participation restrictions and contextual factors, including environmental and service-related influences [2]. This represents a profound shift in how disability is conceptualized: rather than viewing disability purely as a property residing within the individual (the so-called "medical model"), the ICF positions disability as something that emerges from the interaction between a person's health condition and the physical, social and attitudinal environment around them.

Accordingly, comprehensive assessment of stroke outcomes requires tools that capture physical, psychological and social domains of functioning. A purely impairment-based assessment — for instance, measuring grip strength or range of motion alone — cannot adequately describe whether a patient can successfully return to employment, maintain family relationships, or participate meaningfully in community life. It is precisely this gap between impairment-level measurement and lived functional experience that the present study seeks to address through the use of an ICF-aligned outcome measure.

1.4 WHODAS 2.0 as a Biopsychosocial Outcome Measure

The World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0) is a validated, ICF-based generic instrument designed to quantify disability and biopsychosocial impairment across six major life domains, including cognition, mobility, self-care, getting along, life activities and participation [3].

WHODAS 2.0 was developed through an extensive multi-country, cross-cultural process coordinated by the World Health Organization, with the explicit aim of creating a generic disability measure that could be applied across diverse health conditions and cultural settings, thereby allowing meaningful comparison of disability burden regardless of the underlying diagnosis.

The instrument's six domains — cognition (understanding and communicating), mobility (getting around), self-care, getting along with people, life activities (covering both household and occupational/educational functioning), and participation in society — together provide a comprehensive picture of how a health condition affects a person's day-to-day life. Each domain is assessed through a structured set of items rated on a five-point difficulty scale, allowing both domain-specific and composite scoring. The tool can be scored using either a simple additive method or a more complex item-response-theory-based method that generates a standardised score ranging from 0 (no disability) to 100 (full disability).

The use of WHODAS 2.0 in patients with acute hemiplegia provides an opportunity to evaluate functioning beyond motor recovery and to better understand the overall impact of stroke during the acute hospital phase. Because WHODAS 2.0 was designed to be condition-neutral, its use in the stroke population allows for comparison with disability burden observed in other chronic and acute conditions, while still capturing the specific ways in which hemiplegia disrupts daily functioning — from the basic mechanics of dressing and bathing, to higher-order participation in family and community roles.

1.5 Gender as a Determinant of Stroke Outcome

Gender differences in stroke epidemiology and outcomes have been consistently reported across decades of international research. Although the incidence of stroke is generally higher in men, women often present at an older age, have greater pre-stroke disability and experience poorer functional outcomes after stroke (Rexrode et al., 2022; Ospel et al., 2022). This pattern has been replicated across multiple countries, healthcare systems and time periods, suggesting that the disparity is not a statistical artefact but reflects genuine underlying differences in either biological vulnerability, social circumstance, or healthcare delivery — or, more likely, some combination of all three.

A growing body of evidence indicates that women are less likely to receive intensive rehabilitation and are more frequently discharged with greater functional dependence compared with men (Carcel et al., 2019; Ospel et al., 2022). These disparities are not explained solely by biological factors and are increasingly recognised to be influenced by healthcare delivery processes and social determinants of health. This is a critical observation for rehabilitation researchers and clinicians: if gender disparities in outcome were purely biological in origin, there would be little that healthcare systems could do to address them. However, the substantial contribution of modifiable healthcare delivery factors — timing of rehabilitation initiation, intensity of therapy, multidisciplinary involvement, discharge planning — means that targeted interventions at the level of hospital systems could meaningfully reduce these disparities.

1.6 Psychosocial Vulnerability in Female Stroke Survivors

Beyond biological differences, psychosocial factors such as depression, anxiety, reduced social support and caregiver burden are more prevalent among female stroke survivors and have a significant influence on participation in rehabilitation and recovery trajectories [4]. These factors directly affect biopsychosocial functioning and may contribute to persistent disability even when neurological recovery is favourable. This observation underscores a critical clinical insight: two patients with identical lesion size, location and initial motor deficit may have markedly different functional trajectories if one experiences significant poststroke depression or social isolation while the other does not.

Psychological state is not a peripheral consideration in stroke rehabilitation — it is a central determinant of whether a patient can engage meaningfully with therapy, adhere to home exercise programmes, and translate physical gains into real-world participation.

Caregiver burden adds a further layer of complexity. In many South Asian households, women who survive stroke may simultaneously be expected to resume caregiving responsibilities for other family members even while still recovering themselves, creating a unique form of role strain that is less commonly observed in male survivors, who in many households are more likely to receive sustained caregiving support from female family members during their own recovery.

1.7 Disparities in Hospital Care Delivery

Importantly, gender disparities are also evident in hospital care delivery, particularly in relation to the timing of rehabilitation initiation, access to multidisciplinary services, therapy intensity and discharge planning. Women have been reported to experience delays in care, lower utilisation of rehabilitation services and shorter durations of structured therapy compared with men [5]. Such differences in service delivery may further amplify gender-related differences in poststroke functioning.

These care-delivery disparities can arise through multiple mechanisms, some explicit and others subtle. Explicit mechanisms might include differential referral patterns by treating physicians, or differences in family decision-making about whether to invest in continued rehabilitation for a female versus male family member. Subtler mechanisms might include implicit bias in clinical assessment of rehabilitation potential, or systemic factors such as the location of rehabilitation services relative to a patient's home, which may differentially affect women's ability to attend therapy sessions due to transportation constraints or social norms restricting independent travel.

1.8 The Indian Context: A Setting of Heightened Vulnerability

In low- and middle-income countries such as India, these inequities are likely to be more pronounced due to limited rehabilitation infrastructure, sociocultural norms and economic constraints, yet systematic hospital-based evidence examining gender differences in neurorehabilitation care delivery remains scarce [6].

India's rehabilitation infrastructure, while expanding rapidly in metropolitan centres such as the National Capital Region encompassing Noida and Greater Noida, remains unevenly distributed, with many tertiary stroke units lacking dedicated multidisciplinary rehabilitation teams that include physiotherapists, occupational therapists, speech-language pathologists and clinical psychologists operating in a coordinated manner.

Sociocultural norms in many parts of India continue to assign differential value and decisionmaking authority based on gender within household structures, which can directly influence decisions about whether and how aggressively to pursue continued rehabilitation for a stroke-affected family member. Economic constraints compound this further: because rehabilitation services, particularly extended inpatient or outpatient physiotherapy, often involve substantial out-of-pocket costs not fully covered by government health insurance schemes, families facing financial constraints may make difficult triage decisions about which family member's rehabilitation to prioritise.

Moreover, few studies have integrated structured evaluation of hospital rehabilitation processes with comprehensive, biopsychosocial outcome measures within the same cohort. This represents a critical methodological gap: studies that examine outcomes alone cannot determine whether observed gender differences arise from differences in care delivery, while studies that examine care delivery alone cannot determine whether such differences translate into meaningfully different functional outcomes. Only by examining both simultaneously, within the same patient cohort, can researchers begin to establish whether disparities in process are meaningfully linked to disparities in outcome.

1.9 Rationale for the Present Study

Therefore, there is a clear need to evaluate biopsychosocial impairment in patients with acute hemiplegia using an ICF-based tool such as WHODAS 2.0 and to examine whether gender disparities exist in hospital care delivery during the acute phase of stroke management. Understanding how differences in rehabilitation processes relate to biopsychosocial outcomes is essential for identifying inequities in care and for informing gender-sensitive neurorehabilitation strategies.

Accordingly, the present study aims to assess biopsychosocial impairment among patients with acute hemiplegia using WHODAS 2.0 and to examine gender disparities in hospital neurorehabilitation care delivery and their association with biopsychosocial outcomes. By situating this investigation within hospitals serving the

Noida and Greater Noida region — a rapidly urbanising part of the National Capital Region with a diverse patient population drawn from varying socioeconomic backgrounds — the study aims to generate findings with direct relevance to local clinical practice while also contributing to the broader, still-developing body of Indian hospital-based evidence on gender and stroke rehabilitation.

1.10 Global Epidemiology

Stroke ranks among the top causes of death and disability globally, second only to ischaemic heart disease as a cause of mortality in many global burden of disease analyses.

The Global Burden of Disease study and subsequent updates by Feigin and colleagues have repeatedly highlighted those distinctive epidemiological features of stroke: a disproportionate share of the worldwide burden now falls upon low- and middle-income countries, reversing a pattern from several decades ago when stroke was predominantly viewed as a disease of affluent, ageing populations in high-income nations [1].

This shift has been attributed to several converging factors, including rising rates of hypertension, diabetes mellitus, obesity and tobacco use in transitioning economies, combined with ageing populations and improved survival from conditions that previously caused earlier mortality from other causes, thereby allowing more individuals to live long enough to experience a stroke event. The result is that countries such as India now bear a stroke burden that is both large in absolute terms and rapidly growing, even as wealthier nations report stabilising or declining age-adjusted incidence.

1.11 Stroke Epidemiology in India

Several Indian epidemiological surveys converge on the finding that the crude incidence of stroke in community-based Indian populations lies in the range of approximately 1.5 per 1,000 population, though considerable regional variation exists, partly reflecting genuine differences in risk factor prevalence and partly reflecting differences in case ascertainment methodology between studies [1]. Hospital-based Indian studies, including detailed regional analyses from North-East India, have documented not only the clinical severity of stroke at presentation but also its substantial downstream economic consequences for affected households, with many families reporting catastrophic health expenditure following a stroke event (Kalita, Bharadwaz & Aditi, 2023).

A tertiary-care hospital-based study assessing stroke severity, neurological outcomes and drug utilisation among admitted stroke patients further illustrates the heterogeneity of presentation and outcome observed in Indian clinical settings, underscoring the importance of standardised, comparable outcome assessment tools across different centres if meaningful generalisations are to be drawn about the burden and trajectory of stroke recovery nationally (Kombathula, Moorthy & Nandy, 2025).

1.12 Risk Factors and Stroke Subtypes

Ischaemic stroke, arising from thrombotic or embolic occlusion of a cerebral vessel, accounts for the substantial majority of stroke cases both globally and in India, while haemorrhagic stroke, though less common, is associated with higher acute mortality and, among survivors, often more severe initial neurological deficit. The major modifiable risk factors for stroke — hypertension, diabetes mellitus, dyslipidaemia, atrial fibrillation, smoking and sedentary lifestyle — are themselves subject to gender-patterned prevalence and management differences, which may in turn contribute to the gender disparities in stroke outcome that form the central focus of the present study.

Hypertension remains the single most important modifiable risk factor for both ischaemic and haemorrhagic stroke worldwide, and its control varies by gender in many populations, partly due to differences in healthcare-seeking behaviour, health literacy and access to routine screening. Diabetes mellitus, increasingly prevalent in urban Indian populations including the Noida and Greater Noida region, similarly demonstrates gender-patterned differences in diagnosis timing and glycaemic control that may influence both stroke risk and post-stroke recovery potential.

1.13 Acute Hospital Management and the Transition to Rehabilitation

The acute management of stroke has been transformed over the past two decades through the introduction of intravenous thrombolysis, mechanical thrombectomy for large vessel occlusion, and dedicated stroke unit care. These advances have substantially reduced acute mortality and, in many cases, reduced the severity of resulting disability. However, even with optimal acute management, a substantial proportion of patients are left with residual hemiplegia and other neurological deficits requiring structured rehabilitation.

The transition from acute medical stabilisation to active rehabilitation represents a critical juncture in the stroke care pathway. International guidelines, including those summarised by Langhorne, Bernhardt and Kwakkel (2017), consistently emphasise that early initiation of rehabilitation — generally within the first 24 to 48 hours once medical stability is achieved — is associated with improved functional outcomes, reduced complications such as deep vein thrombosis and contractures, and shorter overall hospital stay. It is precisely this early window of rehabilitation initiation, and whether it is equitably delivered across genders, that forms one of the central process-of-care indicators examined in the present study.

1.14 Neuroplasticity and the Biological Basis of Recovery

Recovery from hemiplegia is underpinned by the brain's capacity for neuroplasticity — the reorganization of neural networks in response to injury, enabling residual or adjacent brain regions to assume functions previously mediated by the damaged tissue. Recent neuroimaging research has substantially advanced understanding of the mechanisms underlying this reorganisation, including changes in cortical excitability, recruitment of contralesional hemisphere regions, and structural changes in white matter tracts connecting motor regions [7].

Importantly, the degree and pattern of neuroplastic reorganisation appears to be influenced by the timing, intensity and nature of rehabilitative input — reinforcing the clinical importance of timely and adequately intensive therapy during the acute and subacute phases. Advances in understanding acute ischaemic stroke management and recovery mechanisms further highlight that the therapeutic window for maximising plasticity- dependent recovery is concentrated in the early weeks after stroke onset, lending further weight to the clinical and public health importance of ensuring equitable, timely access to rehabilitation services for all patients regardless of gender [8].

1.15 Summary

1.16 Aim

To explore biopsychosocial impairment in patients with acute hemiplegia and to identify gender-based disparities in hospital care delivery that affect recovery.

1.17 Objectives

1. To assess biopsychosocial functioning using WHODAS 2.0 in patients with acute hemiplegia.
2. To compare biopsychosocial outcomes between male and female patients.
3. To compare hospital neurorehabilitation care delivery between male and female patients.
4. To examine the association between hospital neurorehabilitation care delivery and biopsychosocial outcomes.

CHAPTER 2: REVIEW OF LITERATURE

2.1 Biological Contributions to Gender Differences in Stroke

A substantial body of basic science and clinical research has examined biological mechanisms that may underlie observed gender differences in stroke incidence, severity and recovery. Sex hormones, particularly estrogen, have been implicated in modulating neuroprotection and neuroplasticity following ischaemic injury. Darling and colleagues [9] discussed the role of sex hormones in post-stroke neuroplasticity, indicating that estrogen may offer neuroprotective effects but is often diminished after menopause, affecting recovery in older women. This observation is particularly relevant given that women, on average, experience stroke at a later age than men, often after the menopausal decline in circulating estrogen, potentially compounding age-related vulnerability with hormonally-mediated reduction in neuroprotective capacity at the very time when stroke risk rises sharply.

Beyond hormonal factors, women have been observed to present with a different distribution of stroke risk factors compared with men, including higher rates of atrial fibrillation in advanced age and a higher prevalence of hypertension among older women, both of which are associated with more severe stroke presentations.

2.2 Differences in Baseline Status and Stroke Severity

Multiple large cohort studies have documented that women tend to experience strokes at an older age than men and have more severe initial neurological deficits, which contributes to poorer functional outcomes. Functional independence at discharge was significantly lower in female stroke patients than males [10]. This finding has been replicated across diverse healthcare settings and time periods, suggesting a robust and persistent pattern rather than a setting-specific anomaly.

Higher pre-stroke disability among women — often attributable to a combination of age, comorbidity burden, and in some settings, pre-existing disparities in access to preventive healthcare — further compounds the challenge of achieving favourable post-stroke functional outcomes, since rehabilitation potential is partly constrained by a patient's baseline functional reserve prior to the index stroke event.

2.3 Disparities in Acute Treatment

Carcel and colleagues [5] noted gender disparities in acute stroke care, with women less likely to receive thrombolytic therapy and experiencing lower intensity and shorter duration of rehabilitation services in hospital settings. These disparities in acute treatment access have downstream consequences for rehabilitation: patients who do not receive timely thrombolysis or thrombectomy when clinically indicated may present to rehabilitation services with larger areas of infarcted tissue and correspondingly greater impairment, setting a less favourable trajectory for subsequent recovery before rehabilitation has even begun.

Subsequent work by Carcel and colleagues [11] reported significant gender differences in treatment and post-stroke functional outcomes in their cohort, with women showing higher disability despite similar rehabilitation efforts — a particularly important finding suggesting that even when rehabilitation input is comparable, biological and contextual factors may still produce divergent outcomes, reinforcing the need for the present study's integrated examination of both care delivery and outcome within the same cohort.

2.4 Disparities in Rehabilitation Service Utilisation

Greenwald and colleagues [12], in an early but influential study, found that women had shorter lengths of stay in acute and rehabilitation hospitals post-stroke, which may contribute to less optimal functional recovery compared with men. This finding, now over two decades old, raises the important question of whether such disparities persist in contemporary practice, including within the Indian hospital context that forms the setting of the present study — a question the present study is directly designed to address through its structured hospital care delivery indicators.

More recent international evidence continues to support this pattern. Ospel and colleagues, in a comprehensive review of sex and gender differences in stroke and their practical implications in acute care, reported that women present with worse baseline functional status, have higher pre-stroke disability, and are less likely to receive post-acute rehabilitation, and that these differences contribute to poorer poststroke functional trajectories in women [13].

Rosendale and colleagues (2021) identified lower acceptance and utilisation of telerehabilitation technologies among female stroke patients due to socio-cultural limitations and lack of caregiver support — a finding with particular relevance in the post-pandemic era, during which telerehabilitation has assumed growing importance as a means of extending rehabilitation access beyond the inpatient setting, but which may inadvertently widen gender disparities if access barriers specific to women are not addressed.

2.5 Psychosocial and Emotional Dimensions

Rexrode and colleagues [4] found that female stroke survivors report higher rates of post-stroke depression, anxiety, pain, and fatigue compared with men, which negatively impacts participation in rehabilitation and quality of life. Bivona and colleagues [14] reported that psychological well-being of female stroke survivors strongly correlates with successful neurorehabilitation outcomes, emphasising the need for integrated psychological support systems within rehabilitation programmes — a recommendation that aligns directly with the present study's hospital care delivery indicator capturing the presence or absence of psychological/counselling input during the inpatient stay.

Castellnuovo and colleagues [15] demonstrated that psychosocial interventions specifically tailored to female stroke patients improved rehabilitation adherence, reduced depression scores, and enhanced overall quality of life, providing encouraging evidence that gender-sensitive intervention strategies can meaningfully address some of the disparities documented in observational research.

2.6 Long-Term Outcomes and Mortality

Guo and colleagues [16] identified higher rates of long-term mortality and recurrent stroke in female stroke patients compared to males, possibly due to disparities in rehabilitation access and follow-up care. White and colleagues [17] similarly reported sex differences in patient-reported poststroke disability, while Fukuda and colleagues [18] documented gender differences in long-term functional outcome after first-ever ischaemic stroke, observing that these differences persisted even after adjustment for baseline stroke severity. More recent work by Irie and colleagues [19] examined factors related to sex differences in long-term functional decline after acute ischaemic stroke, while Ibzea and colleagues [20] conducted a retrospective analysis of sex differences in stroke outcomes, both reinforcing the continuing relevance and currency of this research question in the contemporary literature.

2.7 The Indian Context: Socio-Cultural and Economic Barriers

Pathan and colleagues [6] stated that in Indian hospital settings, gender inequities exist in access to neurorehabilitation, with women facing socio-cultural and economic barriers leading to reduced therapy adherence and poorer recovery outcomes. The same research group further emphasised that socio-economic status and familial support are critical factors influencing rehabilitation success in female stroke patients, with women from lower socio-economic backgrounds disproportionately affected by care disparities [6].

These findings resonate strongly with the lived social context of many Indian households, where decisions about continued investment in a family member's rehabilitation — particularly when this requires ongoing financial outlay for transport, therapy fees, or caregiver time — may be shaped by gendered assumptions about the relative value of a male versus female family member's restored independence, productivity or social role.

2.8 Encouraging Evidence: Gender-Sensitive Models of Care

Despite the largely concerning pattern of disparities documented above, the literature also offers encouraging examples of improved outcomes when rehabilitation is appropriately tailored. Mathur and colleagues [21] highlighted the effectiveness of gender-sensitive rehabilitation models in improving both functional and psychosocial outcomes among female stroke survivors in India, while Poggesi and colleagues [22] observed that elderly female stroke patients showed relatively better functional recovery trajectories with appropriate rehabilitation intensity, highlighting the potential for improved outcomes with tailored therapy. These findings suggest that the disparities documented in much of the literature are not immutable, but rather reflect modifiable aspects of current care delivery practice — precisely the kind of modifiable process-of-care factors that the present study seeks to characterise within the Noida and Greater Noida hospital setting.

2.9 Outcome Measurement Considerations

Moore and colleagues [23] validated the use of the Barthel Index and modified Rankin Scale as reliable functional outcome measures, demonstrating significant differences in recovery patterns between female and male stroke survivors. While these scales remain valuable and widely used, their relatively narrow focus on basic activities of daily living and global disability grading underscores the continuing rationale for employing a more comprehensive, multi-domain measure such as WHODAS 2.0 in the present study, allowing a richer characterisation of gender differences across cognitive, physical and social domains of functioning.

2.10 Synthesis

Taken together, the evidence reviewed in this chapter establishes a consistent and biologically, socially and clinically multifaceted picture: women experience worse baseline status, face documented disparities in acute and rehabilitative care delivery, report greater psychosocial burden, and frequently experience poorer long-term outcomes following stroke. Within the Indian context specifically, these international patterns appear to be compounded by sociocultural and economic factors with potentially even greater impact on equitable access to neurorehabilitation. It is against this rich and multifactorial backdrop that the present study is positioned, seeking to generate locally relevant, hospital-based evidence from the Noida and Greater Noida region that simultaneously captures both biopsychosocial outcome and care delivery process within a single patient cohort.

2.11 Introduction to the Review

This chapter presents a detailed, chronologically and thematically organised review of the existing literature pertaining to gender differences in stroke outcomes, rehabilitation access, and hospital care delivery. Studies are discussed individually, with attention given not only to their principal findings but also to their methodological design, study population, and implications for the present research. The review begins with the most contemporaneous Indian evidence before progressing through the broader international literature, concluding with a synthesis identifying convergent themes and persistent gaps that directly inform the present study's design.

2.12 Indian Evidence

Pathan S., et al. (2024). This study examined gender inequities in access to neurorehabilitation within Indian hospital settings, reporting that women face socio-cultural and economic barriers leading to reduced therapy adherence and poorer recovery outcomes. The researchers' findings are of direct relevance to the present study's hypothesis that hospital-based care delivery disparities, rather than biological factors alone, may underlie observed gender differences in recovery. The study's emphasis on socio-cultural barriers — for instance, restrictions on women's independent travel to outpatient rehabilitation appointments, or gendered expectations regarding household responsibilities that compete with attendance at therapy sessions — provides important context for interpreting hospital care delivery indicators collected in the present study, particularly those related to therapy session attendance and consistency.

In a related analysis, the same research group emphasised that socio-economic status and familial support are critical factors influencing rehabilitation success in female stroke patients, with women from lower socio-economic backgrounds disproportionately affected by care disparities [6]. This finding underscores the importance of recording socio-economic category as a covariate in the present study's case record form, allowing future analysis to examine whether gender disparities in outcome are moderated by socio-economic status.

Mathur V., et al. (2023). This study highlighted the effectiveness of gender-sensitive rehabilitation models in improving both functional and psychosocial outcomes among female stroke survivors in India. The intervention-oriented nature of this study — demonstrating that targeted, gender-aware programme design can improve outcomes — provides an important counterpoint to the largely disparity-documenting tenor of much of the literature, suggesting that the inequities identified in observational research are addressable through deliberate programme design, a conclusion with direct relevance to potential recommendations arising from the present study.

Kombathula S.A., Moorthy S., Nandy R. (2025). This tertiary care hospital-based study assessed severity of stroke, neurological outcome, and drug utilisation among stroke patients admitted to a neurology ward in India, providing useful contextual data regarding the clinical severity profile and pharmacological management patterns of Indian stroke patients, against which the present study's recruited cohort can be contextualised.

Kalita J., Bharadwaz M.P., Aditi A. (2023). This study examined the prevalence, contributing factors, and economic implications of strokes among older adults in North-East India, offering valuable insight into the substantial financial burden borne by Indian stroke-affected households — a contextual factor relevant to understanding why gendered economic decision-making within families may influence rehabilitation service utilisation differently for male versus female patients.

2.13 International Evidence on Gender Disparities in Rehabilitation Access

Guo Z., et al. (2023). This study identified higher rates of long-term mortality and recurrent stroke in female stroke patients compared to males, possibly due to disparities in rehabilitation access and follow-up care. The long-term, mortality-focused design of this study extends the relevance of gender disparity research beyond the acute and subacute rehabilitation period into long-term survivorship, suggesting that the consequences of any care delivery disparities documented in the present study's acute hospital setting may extend well beyond the index admission.

Rexrode K.M., et al. (2022). This study found that female stroke survivors report higher rates of post-stroke depression, anxiety, pain, and fatigue compared with men, which negatively impacts participation in rehabilitation and quality of life. This finding directly informs the present study's inclusion of psychological/counselling input as a hospital care delivery indicator, on the premise that adequate psychosocial support during the acute phase may be particularly important for female patients given their documented elevated risk of these psychosocial sequelae.

Ospel J., Singh N., Ganesh A., Goyal M. (2023). Published in the Journal of Stroke, this comprehensive review examined sex and gender differences in stroke and their practical implications in acute care, synthesising evidence across multiple domains including epidemiology, acute treatment access, and rehabilitation outcomes. The review's central conclusion — that women present with worse baseline functional status, are less likely to receive post-acute rehabilitation, and continue to demonstrate poorer functional outcomes even after adjustment for baseline characteristics — provides the single most direct piece of supporting evidence for the present study's central hypothesis, and is cited repeatedly throughout this thesis as foundational supporting literature.

Rosendale N., et al. (2021). This study identified lower acceptance and utilisation of telerehabilitation technologies among female stroke patients due to socio-cultural limitations and lack of caregiver support, a particularly contemporary and policy-relevant finding given the growing role of telerehabilitation in extending postdischarge rehabilitation access, especially in resource-limited settings such as much of India.

Poggesi A., et al. (2021). This study observed that elderly female stroke patients showed relatively better functional recovery trajectories with appropriate rehabilitation intensity, highlighting the potential for improved outcomes with tailored therapy — an encouraging finding suggesting that when rehabilitation intensity is adequate, age- and gender-related disadvantages in baseline status need not necessarily translate into permanently worse outcomes.

2.14 Psychosocial and Biological Mechanisms

Bivona U., et al. (2020). This study reported that psychological well-being of female stroke survivors strongly correlates with successful neurorehabilitation outcomes, emphasising the need for integrated psychological support systems. This finding supports the inclusion, within the present study's hospital care delivery form, of a specific item capturing whether psychological or counselling input was provided during the inpatient stay, allowing direct examination of whether such input differs by gender and whether its presence correlates with discharge WHODAS 2.0 scores.

Darling N.E., et al. (2020). This study discussed the role of sex hormones in poststroke neuroplasticity, indicating that estrogen may offer neuroprotective effects but is often diminished after menopause, affecting recovery in older women. This biological mechanism provides one plausible explanatory pathway for the consistently observed pattern of older age at stroke onset and reduced recovery potential among women, complementing the socio-environmental explanations that form the primary focus of the present study's hospital care delivery investigation.

Carcel C., et al. (2020). This study reported significant gender differences in treatment and post-stroke functional outcomes in their cohort, with women showing higher disability despite similar rehabilitation efforts — an important nuance suggesting that care delivery equity alone may not fully eliminate outcome disparities, and that biological and baseline status factors must also be considered, reinforcing the present study's plan to adjust for relevant covariates in its multivariable regression analysis (Objective 4).

2.15 Acute Care and Treatment Disparities

Carcel C., et al. (2019). This widely cited study noted gender disparities in acute stroke care, with women less likely to receive thrombolytic therapy and experiencing lower intensity and shorter duration of rehabilitation services in hospital settings. This finding is foundational to the present study's hypothesis regarding hospital-level care delivery disparities and directly informs several of the structured hospital care delivery indicators included in the present study's case record form, including total number of rehabilitation sessions and average session duration.

2.16 Outcome Measurement and Validation Studies

Moore K.M., et al. (2018). This study validated the use of the Barthel Index and modified Rankin Scale as reliable functional outcome measures, demonstrating significant differences in recovery patterns between female and male stroke survivors. While these scales remain valuable comparators, their relative narrowness compared with WHODAS 2.0's six-domain structure is part of the rationale for the present study's selection of WHODAS 2.0 as its primary outcome measure, as discussed in detail in the relevant chapter.

2.17 Early Foundational Evidence

Kim A.S., et al. (2010). This influential early study reported that women tend to experience strokes at an older age than men and have more severe initial neurological deficits, which contributes to poorer functional outcomes, and that functional independence at discharge was significantly lower in female stroke patients than males. This study is frequently cited as one of the earliest large-scale demonstrations of the now well-replicated pattern of gender disparity in stroke severity and outcome.

Greenwald B., et al. (2001). This early study found that women had shorter lengths of stay in acute and rehabilitation hospitals post-stroke, which may contribute to less optimal functional recovery compared with men. Notably, this finding — now over two decades old — raises the important and, as yet, locally unanswered question of whether such disparities persist in the contemporary Indian hospital context, a question the present study is directly positioned to address.

2.18 Intervention-Based Evidence

Castelnuovo G., et al. (2016). This study demonstrated that psychosocial interventions specifically tailored to female stroke patients improved rehabilitation adherence, reduced depression scores, and enhanced overall quality of life. As with the Mathur and colleagues [21] study discussed earlier, this intervention-based evidence offers an encouraging counterpoint to the disparity-documenting literature, suggesting that deliberate, gender-aware programme design can produce measurable improvements.

2.19 General Stroke Rehabilitation Literature

Langhorne P., Bernhardt J., Kwakkel G. (2017). This authoritative review, published in *The Lancet*, synthesised the broader evidence base on stroke rehabilitation, including the importance of early mobilisation, intensity of therapy, and organisation of rehabilitation services. While not specifically focused on gender, this review provides the broader clinical and organisational context within which the present study's hospital care delivery indicators — particularly timing of rehabilitation initiation — are grounded, since the evidence reviewed by Langhorne and colleagues consistently supports early, intensive rehabilitation as a determinant of favourable outcome regardless of patient gender. Zhang T., et al. (2025) and Li H., et al. (2024). These recent publications examine neural mechanisms and rehabilitation strategies after stroke, and advances in acute ischaemic stroke management and recovery mechanisms respectively, providing contemporary neuroscientific grounding for the importance of timely, intensive rehabilitation in maximising plasticity-dependent recovery, as discussed in the relevant chapter.

2.20 Recent Outcome and Disparity Studies

White B.M., Magwood G.S., Burns S.P., Ellis C. Jr. (2018). This study examined sex differences in patient-reported poststroke disability, reinforcing the importance of patient-reported outcome measures — such as WHODAS 2.0 — in capturing disparities that may not be evident on clinician-administered impairment scales alone.

Fukuda M., Kanda T., Kamide N., Akutsu T., Sakai F. (2009). This study examined gender differences in long-term functional outcome after first-ever ischaemic stroke, finding persistent gender-related differences in outcome even after adjustment for baseline severity, a methodological approach mirrored in the present study's planned multivariable regression analysis.

Irie F., Nakamura K., Matsuo R., et al. (2025). This very recent study examined factors related to sex differences in long-term functional decline after acute ischaemic stroke, representing some of the most contemporary evidence available on this topic and confirming its continued relevance in current stroke rehabilitation research.

Ibzea S., Fatrous T., Hussain S., et al. (2025). This recent retrospective analysis of sex differences in stroke outcomes further reinforces the currency and ongoing international research interest in this area, supporting the timeliness and relevance of the present study's proposed investigation within the Indian hospital context.

2.21 Synthesis of the Literature Review

The body of literature reviewed in this chapter converges on several consistent themes.

First, across multiple countries, healthcare systems and time periods, women with stroke are consistently documented to experience worse baseline status, reduced access to timely and intensive rehabilitation, and poorer long-term functional outcomes compared with men. Second, both biological (hormonal, age-related) and socio-environmental (healthcare delivery, sociocultural, economic) mechanisms appear to contribute to these disparities, with the relative contribution of each likely varying across different healthcare and cultural contexts. Third, intervention-based studies offer encouraging evidence that gender-sensitive programme design can mitigate at least some of these disparities, suggesting that they are not biologically fixed but are, at least in part, modifiable through deliberate health system and clinical practice changes. Fourth, and most importantly for the present study, there remains a clear absence of Indian, hospitalbased research that simultaneously documents biopsychosocial outcome using a comprehensive ICF-aligned tool such as WHODAS 2.0, alongside structured hospital care delivery indicators, within the acute phase of stroke care and within a single patient cohort. It is this precise gap that the present study is designed to address.

2.22 Additional International Evidence: Mortality, Acute Treatment Access and Instrument Validation

This section extends the literature review with further recent and methodologically important studies identified through additional systematic search, strengthening the evidence base underpinning the present study's rationale and instrument selection.

Abdel-Fattah AR, et al. conducted a systematic review and meta-analysis examining gender differences in mortality of hospitalised stroke patients, providing pooled estimates across multiple cohorts and reinforcing the consistency of the gendermortality relationship across diverse healthcare settings internationally.

Kapral MK, Bushnell C. in a focused commentary titled “Stroke in Women,” published in the journal *Stroke*, summarised contemporary thinking on sex- and gender-based differences across the entire stroke care continuum—from risk factor profile through acute treatment to rehabilitation and long-term outcome—offering an authoritative, highlevel synthesis that complements the more granular evidence reviewed elsewhere in this chapter.

Gall S., writing on behalf of the World Stroke Organization, issued a scientific statement addressing sex and gender differences in stroke risk and management, underscoring that international stroke organisations now regard this issue as a priority area for clinical practice guidance and future research investment—a position that lends further institutional weight to the rationale for the present study.

Alvarez L. explored the lived experience of younger women stroke survivors through qualitative methodology, raising survivor voices regarding navigating rehabilitation services, a perspective that complements the predominantly quantitative literature reviewed elsewhere in this thesis and underscores the human dimension of the disparities under investigation.

Ouyang M, et al., in a systematic review and meta-analysis published in *Frontiers in Global Women's Health*, examined sex differences in the utilisation and outcomes of endovascular treatment after acute ischaemic stroke, finding that while utilisation rates of this advanced acute intervention were broadly similar between sexes in the studies reviewed, important gaps remained in understanding sex differences in longer-term, patient-reported and participation-level outcomes—precisely the gap that biopsychosocial, ICF-aligned outcome measures such as WHODAS 2.0 are positioned to address.

García-Rudolph A, et al. examined inpatient rehabilitation of working-age adults with ischaemic stroke, comparing clinical and functional characteristics of men and women at the point of rehabilitation admission and modelling predictors of subsequent functional gain, offering a methodologically close parallel to the present study's own comparative design, albeit within a different national health system context.

Elwood D, et al. demonstrated that length of stay in inpatient rehabilitation is closely associated with admission neurological deficit severity and ultimate discharge destination, a finding with direct relevance to interpreting the present study's hospital care delivery indicator capturing total length of inpatient stay, since any observed gender difference in this variable must be interpreted in the context of admission severity rather than assumed to reflect care delivery bias alone.

2.23 Psychometric Literature Supporting WHODAS 2.0 in Stroke Populations

Beyond the conceptual and theoretical basis discussed in the relevant chapter, a body of dedicated psychometric research has examined the performance of WHODAS 2.0 specifically within stroke populations, lending further confidence to its selection as the present study's primary outcome measure.

Tarvonen-Schröder S, Hurme S, Laimi K. compared WHODAS 2.0 and the WHO Minimal Generic Set of Domains of Functioning and Health against conventional stroke outcome instruments in a subacute stroke population, finding that the WHO-based measures captured clinically meaningful functional information broadly consistent with, but offering additional domain-level granularity beyond, conventional scales such as the Barthel Index.

Hu HY, et al. demonstrated that WHODAS 2.0 scores could meaningfully predict subsequent institutionalisation risk among stroke patients, a finding of direct clinical relevance suggesting that the instrument captures not merely a cross-sectional snapshot of disability but information with genuine prognostic value for long-term care trajectory—reinforcing the appropriateness of using WHODAS 2.0 as a primary outcome in the present hospital-based study, where discharge destination and ongoing care needs are of direct clinical interest to the participating institutions.

2.24 Evidence on Early Mobilisation and Multidisciplinary Rehabilitation Models

Bernhardt J, et al., in the influential AVERT (A Very Early Rehabilitation Trial for Stroke) phase II safety and feasibility study, established that very early mobilisation following stroke—commencing within 24 hours—was both safe and feasible across multiple stroke unit sites, providing foundational trial-level evidence for the clinical importance of early rehabilitation initiation that underlies the present study's hospital care delivery indicator capturing time to first physiotherapy session.

Vluggen TPM, et al., in a multicentre randomised controlled trial, evaluated an integrated multidisciplinary geriatric rehabilitation programme for older stroke survivors, finding modest but clinically meaningful improvements in selected participation outcomes and reduced caregiver burden, illustrating the potential benefits of the multidisciplinary care delivery model whose presence or absence is captured directly within the present study's hospital care delivery indicators.

Cieza A, et al., reporting global estimates of rehabilitation need based on the Global Burden of Disease Study 2019, demonstrated that stroke remains among the leading global contributors to unmet rehabilitation need, with low- and middle-income countries such as India bearing a disproportionate share of this unmet need relative to available rehabilitation workforce and service capacity—providing essential global health context for the present study's focus on the adequacy and equity of hospital-based neurorehabilitation service delivery in the Noida and Greater Noida region.

2.25 Updated Synthesis

Incorporating this additional body of evidence reinforces and extends the conclusions presented in Section 9.11. The consistency of gender-related mortality and outcome differences across multiple independent meta-analyses (Abdel-Fattah et al.; Ouyang et al.) suggests a robust phenomenon unlikely to be explained by chance or by the idiosyncrasies of any single study population. At the same time, authoritative institutional statements (Kapral & Bushnell; Gall, on behalf of the World Stroke Organization) confirm that this issue has moved from a peripheral research interest to a recognised priority within mainstream stroke medicine. The psychometric literature specifically validating WHODAS 2.0 in stroke populations (Tarvonen-Schröder et al.; Hu et al.) provides direct support for the present study's instrument choice, while the trial-level evidence on early mobilisation and multidisciplinary care (Bernhardt et al.; Vluggen et al.) substantiates the clinical importance of the specific hospital care delivery indicators selected for structured documentation in this study. Finally, the global rehabilitation need data reported by Cieza and colleagues situates the present study's local, hospital-based focus within a much larger global health challenge, underscoring the broader significance of generating rigorous, locally relevant evidence on equitable rehabilitation service delivery.

2.26 Limited Hospital-Based Biopsychosocial Assessment in the Acute Phase

Although stroke and hemiplegia are major contributors to long-term disability worldwide, most hospital-based studies — particularly in low- and middle-income countries — primarily focus on neurological deficits and physical functioning, while the

broader biopsychosocial consequences of stroke remain under-investigated during the acute phase of care. The International Classification of Functioning, Disability and Health (ICF) emphasises that disability is a multidimensional construct encompassing impairments, activity limitations and restrictions in social participation [2]. Yet, as detailed in the relevant chapter, the practical translation of this conceptual framework into routine acute hospital assessment has lagged considerably behind its theoretical acceptance.

This gap is particularly pronounced in the acute inpatient setting, where clinical attention is, understandably, often dominated by medical stabilisation, prevention of secondary complications, and initial assessment of motor and sensory deficit, leaving comprehensive biopsychosocial assessment to later stages of the rehabilitation continuum, if it occurs at all. Yet it is precisely during this acute phase that baseline biopsychosocial status — and any gender-related differences therein — first becomes measurable, and arguably most informative for guiding subsequent rehabilitation planning.

2.27 Underuse of ICF-Based Standardised Tools

Despite this conceptual framework, the routine use of comprehensive, ICF-based tools such as the World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0) to capture biopsychosocial impairment in patients with acute hemiplegia remains limited in hospital-based clinical research, particularly in Indian settings (World Health Organization, 2010). Where outcome measurement does occur in Indian stroke rehabilitation research, it has tended to rely predominantly on impairment- or activity-level tools such as the Barthel Index, Modified Rankin Scale, or muscle power grading, rather than on instruments explicitly designed to capture the full ICF spectrum including participation and contextual factors.

2.28 Neglect of Process-of-Care Indicators

Furthermore, existing stroke rehabilitation studies predominantly examine patient outcomes, while process-of-care indicators related to rehabilitation service delivery — such as timeliness of initiation of therapy, intensity of rehabilitation, multidisciplinary involvement and discharge planning — are seldom assessed in a structured and comparable manner. This represents a significant blind spot in the literature: outcome cannot be properly interpreted, nor can disparities be properly understood or addressed, without parallel documentation of the care delivery processes that precede and shape that outcome.

2.29 International Evidence of Gender Disparity, but Limited Acute Hospital-Based Confirmation

Importantly, growing international evidence demonstrates that women experience poorer functional outcomes after stroke and face disparities in access to post-acute rehabilitation services. A comprehensive review by Ospel and colleagues reported that women present with worse baseline functional status, have higher pre-stroke disability, and are less likely to receive post-acute rehabilitation, and that these differences contribute to poorer post-stroke functional trajectories in women [13]. However, there is a clear lack of hospital-based evidence from the acute phase of care examining whether such gender disparities also exist in the delivery of inpatient neurorehabilitation services, particularly within Indian tertiary and secondary care hospital settings such as those serving the Noida and Greater Noida population.

2.30 Absence of Combined Outcome and Process Studies Within a Single Cohort

Moreover, very few studies have simultaneously examined biopsychosocial impairment and rehabilitation care delivery processes within the same cohort, thereby limiting understanding of how potential inequalities in service provision may influence functional and participation outcomes. Studies examining outcome alone cannot attribute observed gender differences to specific, modifiable aspects of care delivery; conversely, studies examining care delivery alone cannot establish whether documented process disparities translate into measurable differences in patient-reported functioning. This methodological gap is precisely what the present study is designed to address.

2.31 Summary of Identified Gaps

Therefore, there exists a significant research gap in:

- Systematically documenting biopsychosocial impairment among patients with acute hemiplegia using a standardised ICF-based tool, within the specific context of Indian hospital-based acute stroke care; and
- Examining gender disparities in hospital neurorehabilitation care delivery and their relationship with biopsychosocial outcomes, using a combined, withincohort methodological design capable of linking process-of-care indicators directly to patient-level functional outcome.

Addressing these gaps is essential not only for advancing the academic understanding of gender and stroke rehabilitation, but also for generating actionable, locally relevant evidence capable of informing quality improvement initiatives within the participating hospitals and, more broadly, within Indian neurorehabilitation services.

2.32 The Clinical Problem

Acute hemiplegia following stroke leads to substantial limitations in physical functioning, cognition, interpersonal interactions and social participation, resulting in significant biopsychosocial impairment. According to the ICF framework, recovery and functioning after neurological illness are shaped not only by medical and physical factors but also by psychological and social dimensions, as well as by environmental and service-related factors [2]. This multidimensionality means that any attempt to fully characterise the burden of acute hemiplegia, or to plan effective rehabilitation, must extend beyond simple impairment-level description.

2.33 The Equity Problem

Early and equitable delivery of inpatient neurorehabilitation is recognised as a key determinant of functional recovery and participation following stroke. However, international evidence indicates that women with stroke frequently experience poorer baseline functional status, reduced access to rehabilitation services and worse poststroke outcomes compared with men [13]. These gender-related differences raise concerns regarding potential inequities in hospital rehabilitation service delivery — concerns that, if substantiated within the local hospital context, would carry direct implications for clinical practice, quality improvement and health system planning.

2.34 The Evidentiary Problem: A Local Knowledge Gap

In the Indian hospital context, there is limited empirical evidence describing the magnitude of biopsychosocial impairment in patients with acute hemiplegia using standardised outcome measures such as WHODAS 2.0 [3]. Moreover, there is a lack of systematic assessment of gender disparities in hospital neurorehabilitation care delivery, particularly with respect to the timing of rehabilitation initiation, intensity of therapy, multidisciplinary involvement and discharge rehabilitation planning. Without such locally grounded evidence, clinicians and administrators within hospitals serving the Noida and Greater Noida population are left to extrapolate from international literature of uncertain applicability to the specific socioeconomic, cultural and health-system context of this region.

2.35 The Consequence of Inaction

The absence of integrated evidence linking biopsychosocial impairment with genderbased differences in hospital care delivery limits the ability of clinicians and health system planners to identify inequities and to design targeted strategies for equitable neurorehabilitation services. In the absence of such evidence, any disparities that do exist are likely to persist unaddressed, simply because they remain undocumented.

2.36 Justification

Therefore, there is a need to systematically assess biopsychosocial impairment using WHODAS 2.0 and to examine gender disparities in hospital neurorehabilitation care delivery among patients with acute hemiplegia, within a defined hospital-based cohort drawn from the Noida and Greater Noida region, so as to generate evidence capable of directly informing local clinical practice while contributing to the broader national and international literature on this important and still-evolving area of stroke rehabilitation research.

2.36.1 Conceptual Framework

The conceptual framework guiding the present study integrates two complementary theoretical perspectives introduced earlier in this thesis: the ICF biopsychosocial model (the relevant chapter) and the health-systems concept of equity in care delivery (the relevant chapter). Within this integrated framework, acute hemiplegia is understood to generate impairment at the level of body structure and function (e.g., motor weakness, sensory loss), which in turn produces activity limitations (e.g., difficulty walking, dressing) and participation.

restrictions (e.g., inability to resume work or social roles). The pathway from impairment to participation restriction is not direct or uniform; it is moderated by contextual factors, prominently including the timeliness, intensity and comprehensiveness of hospital-based rehabilitation services received during the acute phase, and by personal factors including gender, which may influence both the contextual factors themselves (through differential care delivery) and the individual's psychosocial response to impairment (through differential rates of depression, anxiety, and social support).

This conceptual model can be represented schematically as a sequential pathway:

Stroke Pathology → Impairment (motor, sensory, cognitive) → Hospital Care

Delivery (process, potentially gender-differentiated) → Activity and Participation Outcome (measured via WHODAS 2.0, potentially gender-differentiated) → Longterm Disability Trajectory. The present study is positioned to interrogate the middle two links of this pathway directly: whether hospital care delivery differs by gender, and whether such differences are associated with differences in the resulting WHODAS 2.0 outcome.

2.36.2 Hypotheses

Consistent with the aim and objectives articulated in the relevant chapter, and grounded in the conceptual framework above, the present study proposes the following testable hypotheses: Hypothesis 1 (related to Objective 2): Female patients with acute hemiplegia will demonstrate significantly higher (worse) WHODAS 2.0 total and domain scores at both admission and discharge compared with male patients.

Hypothesis 2 (related to Objective 2): The magnitude of within-patient improvement in WHODAS 2.0 scores between admission and discharge will differ significantly between male and female patients, with the direction of this difference to be determined empirically given the mixed evidence reviewed in the relevant chapter regarding whether women's recovery trajectories are uniformly worse or, in some circumstances (e.g., Poggesi et al., 2021), comparatively favourable when rehabilitation intensity is adequate.

Hypothesis 3 (related to Objective 3): Female patients will experience significantly longer delays to initiation of first physiotherapy session, fewer total rehabilitation sessions, lower rates of multidisciplinary team involvement, and less frequent documentation of discharge rehabilitation planning compared with male patients.

Hypothesis 4 (related to Objective 4): After adjusting for age and relevant baseline clinical covariates, hospital care delivery indicators—particularly early physiotherapy initiation and multidisciplinary involvement—will be significantly and

independently associated with lower (better) discharge WHODAS 2.0 scores, and this association will help to statistically explain at least part of any gender disparity observed in Hypothesis 1.

2.36.3 Null Hypotheses

For each of the above research hypotheses, the corresponding null hypothesis—stating no significant difference or association—will be tested using the statistical methods detailed in the relevant chapter, with rejection of the null hypothesis at the prespecified two-sided alpha level of 0.05 taken as evidence in support of the corresponding research hypothesis.

Operationalisation of Key Constructs

To ensure conceptual clarity and methodological rigour, each key construct within the conceptual framework is operationalised as follows within the present study:

“biopsychosocial impairment” is operationalised as the total and domain-level WHODAS 2.0 score, scored using the simple additive method described in the relevant chapter, with impairment classified as present or absent according to a pre-specified protocol cut-off to be finalised prior to data analysis based on established WHODAS 2.0 severity banding; “hospital care delivery equity” is operationalised through the eight structured indicators detailed in Section D of the Case Record Form (the relevant chapter and Appendix); and “gender” is operationalised as a binary self-reported variable (male/female) recorded in Section A of the Case Record Form, consistent with the binary categorisation used throughout the published literature reviewed in the relevant chapter, while acknowledging that gender identity may, in principle, extend beyond this binary categorisation in the broader population.

2.36.4 Anticipated Contribution of the Conceptual Framework

By making explicit the hypothesised causal pathway linking gender, hospital care delivery and biopsychosocial outcome, this conceptual framework provides a transparent, falsifiable structure against which the present study’s empirical findings can be interpreted. Should the data fail to support one or more of the hypotheses outlined above—for instance, should hospital care delivery indicators prove similar between genders, or should care delivery indicators show no association with discharge outcome—such findings would themselves be informative, suggesting either that genuine equity already exists within the participating hospitals’ current practice, or that other unmeasured factors (such as those discussed in the relevant chapter’s limitations) play a more dominant role in shaping gender-related outcome differences than hospital care delivery process alone.

CHAPTER 3: MATERIALS AND METHODOLOGY

3.1 Research Design

This study will employ a prospective observational analytical study design to assess biopsychosocial impairment and to examine gender disparities in hospital neurorehabilitation care delivery among patients with acute hemiplegia.

The choice of a prospective observational analytical design, rather than a retrospective or purely cross-sectional approach, reflects several deliberate methodological considerations. A prospective design allows data on hospital care delivery indicators to be captured in real time as care is delivered, minimizing the recall bias and documentation gaps that often affect retrospective chart-review-based studies of process-of-care indicators. It also allows WHODAS 2.0 to be administered directly to patients at two clearly defined time points—admission and discharge—using a consistent, interviewer-administered protocol, rather than relying on retrospectively reconstructed functional status.

The study will prospectively observe patients during the acute inpatient phase and collect data on biopsychosocial functioning using the World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0), along with predefined hospital care delivery indicators.

This design allows for systematic documentation of outcomes and care processes in real-time, without introducing any therapeutic intervention, and is appropriate for comparing outcomes and care delivery patterns between male and female patients. Importantly, because the study is purely observational, the rehabilitation care that patients receive will follow standard hospital protocols and clinical decision-making, with the researchers acting solely as observers and assessors rather than as intervening agents. This design feature is methodologically important: it ensures that any gender differences in care delivery documented by the study reflect genuine, naturally occurring practice patterns within the participating hospitals, rather than artefacts introduced by the research process itself.

3.2 Sample Population

The study population will consist of male and female patients admitted with a confirmed diagnosis of acute hemiplegia following stroke to the inpatient units of selected hospitals and nursing homes in GIMS Hospital, SJM Hospital, Sarvodaya Hospital, Kailash Hospital, Uttar Pradesh, India.

These four participating institutions were selected to provide a reasonably representative cross-section of hospital-based stroke care available to the population of Noida and Greater Noida, spanning a range of institutional sizes, patient socioeconomic profiles, and levels of rehabilitation service infrastructure. Recruiting across multiple sites also helps to reduce the risk that findings are unduly influenced by the specific institutional culture or care protocols of any single hospital, thereby improving the generalizability of conclusions regarding gender disparities in care delivery across the broader regional healthcare landscape.

3.3 Sampling Type

A non-probability consecutive (convenience) sampling technique will be used. All eligible patients with acute hemiplegia who meet the inclusion criteria and are admitted during the study period will be recruited consecutively over a three-month data collection period or until the required sample size is achieved. This approach is considered appropriate for hospital-based observational studies where the target population is accessed through routine clinical admissions.

Consecutive sampling, while a non-probability method, is widely regarded in clinical epidemiology as the most practical and least biased approach available for hospital-based studies of acute conditions, since it avoids the selection biases that could arise from more discretionary sampling approaches, such as researcher-driven selection of “convenient” or “interesting” cases. By enrolling every eligible patient presenting consecutively during the defined data collection window, the resulting sample is likely to closely approximate the true underlying case-mix of acute hemiplegia patients managed across the four participating hospitals during that period.

3.4 Sample Size Calculation

3.4.1 Formula

Sample size for comparing two independent proportions was calculated using the standard formula described in classical biostatistics texts and widely applied in WHO-sponsored epidemiological research (Lwanga & Lemeshow, 1991; Chan, 2003):

$$n = (Z_{\alpha/2} + Z_{\beta})^2 \times [p_1(1 - p_1) + p_2(1 - p_2)] \div (p_1 - p_2)^2$$

Where:

- n = required sample size in each group
- p_1 = expected proportion of impairment in males
- p_2 = expected proportion of impairment in females
- $Z_{\alpha/2}$ = standard normal deviate for the chosen confidence level (1.96 for 95%)
- Z_{β} = standard normal deviate for the chosen power (0.84 for 80%)

The primary outcome was dichotomised as presence versus absence of biopsychosocial impairment on WHODAS 2.0, using the protocol cut-off.

3.4.2 Values Used

- Primary outcome: presence of biopsychosocial impairment measured using WHODAS 2.0
- Confidence level (two-sided) = 95%, so $Z_{\alpha/2} = 1.96$
- Power = 80%, so $Z_{\beta} = 0.84$
- Assumed proportions: p_1 (males) = 0.60; p_2 (females) = 0.80
- Absolute difference = 20%

The selection of these specific assumed proportions deserves further explanation. The 60% assumed prevalence of biopsychosocial impairment among male patients reflects a conservative, moderate estimate drawn from the broader international literature on post-stroke disability prevalence in acute hospital cohorts. The higher assumed prevalence of 80% among female patients reflects the consistent international evidence — detailed extensively in the relevant chapter and supported by the comprehensive review of Ospel and colleagues [13] — indicating that women experience worse baseline functional status, higher pre-stroke disability, and poorer post-stroke functional trajectories compared with men.

3.4.3 Calculation

$$n = (1.96 + 0.84)^2 \times [0.60(1 - 0.60) + 0.80(1 - 0.80)] \div (0.60 - 0.80)^2 = 7.84 \times 0.40 \div 0.04 = 78.4 \approx 79$$

Therefore, $n = 79$ participants per group, and the total sample size before adjustment is 158 participants.

3.4.4 Adjustment for Non-Response and Incomplete Data

A 10% non-response rate was anticipated and the sample size was inflated using the standard correction formula: $N_{\text{final}} = N / (1 - r)$

$$N_{\text{final}} = 158 \div 0.90 = 175.6 \approx 176$$

Final required sample size = 176 participants (approximately 88 males and 88 females).

This 10% inflation factor accounts for the realistic possibility of incomplete WHODAS 2.0 administration at discharge (for instance, due to early discharge, transfer to another facility, or patient withdrawal of consent), missing hospital care delivery data, or loss to follow-up between the baseline and discharge assessment time points — all plausible occurrences in a prospective, hospital-based study of acutely unwell patients.

3.4.5 Justification for the Assumed Effect Size

Women have consistently been reported to have poorer baseline functional status, greater pre-stroke disability, lower access to rehabilitation services and worse poststroke functional outcomes when compared with men. A recent comprehensive review by Ospel and colleagues highlighted that women present with worse functional status at the time of stroke, are less likely to receive post-acute rehabilitation services, and continue to demonstrate poorer functional outcomes even after adjustment for baseline characteristics [13]. These sex- and gender-related disparities in access to care and recovery trajectories justify the assumption of a higher prevalence of biopsychosocial impairment among female patients for the purpose of sample size estimation in the present study.

Accordingly, a clinically meaningful difference of 20% in the prevalence of biopsychosocial impairment between male and female patients (60% vs 80%) was assumed for planning this study. This 20-percentage-point difference was judged to represent a

clinically meaningful, rather than merely statistically detectable, disparity — one that, if confirmed, would carry clear implications for clinical practice and service planning, while remaining a plausible magnitude of effect given the international literature reviewed in the relevant chapter.

3.5 Inclusion Criteria

- All patients aged above 18 years, of both genders, and who are diagnosed with stroke (both ischemic and hemorrhagic) will be included in the study [25].
- Confirmed diagnosis of ischemic or hemorrhagic stroke by neuroimaging.
- Admission to hospital neurorehabilitation unit within 4 weeks of stroke onset.
- Medically stable and able to participate in neurorehabilitation.
- Provide informed consent to participate in the study.

Each of these criteria serves a specific methodological purpose. The age threshold of 18 years ensures that the study population is restricted to the adult self-administered version of WHODAS 2.0, for which the instrument has been validated, avoiding the need for a separate paediatric or proxy-administered protocol. The requirement for neuroimaging-confirmed diagnosis ensures diagnostic certainty and excludes patients whose clinical presentation, while suggestive of stroke, has not been definitively confirmed — an important safeguard against misclassification bias. The four-week window from stroke onset to rehabilitation unit admission defines the “acute” phase of interest for this study, capturing patients early enough in their recovery trajectory that hospital care delivery indicators (such as time to first physiotherapy session) remain clinically meaningful and not confounded by extensive prior rehabilitation elsewhere. The requirement for medical stability and capacity to participate in rehabilitation ensures patient safety and the feasibility of WHODAS 2.0 administration, while the informed consent requirement reflects standard ethical research practice, discussed further in the relevant chapter.

3.6 Exclusion Criteria

- Patients with other neurological disorders (e.g., traumatic brain injury, spinal cord injury) affecting cognitive function.
 - Presence of severe comorbidities limiting participation in rehabilitation (e.g., advanced cardiac, respiratory failure).
- These exclusion criteria are designed to minimise confounding from non-stroke neurological conditions that could independently affect cognitive and functional status (and therefore WHODAS 2.0 scores) through mechanisms unrelated to the stroke event itself, as well as to exclude patients whose participation in rehabilitation — and therefore whose hospital care delivery indicators — would be fundamentally constrained by unrelated, severe medical comorbidity rather than by gender-related care delivery patterns.

3.7 Instruments and Tools

3.7.1 Biopsychosocial Outcome Measure: WHODAS 2.0

World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0) will be used as the primary outcome measure to assess biopsychosocial impairment among patients with acute hemiplegia. It evaluates functioning across six domains — cognition, mobility, self-care, getting along, life activities and participation — consistent with the International Classification of Functioning, Disability and Health (ICF) framework. The detailed conceptual basis, domain structure, and scoring methodology of WHODAS 2.0 are presented in full in the relevant chapter of this thesis, and the complete 36-item instrument is reproduced in the Appendix.

3.7.2 Hospital Care Delivery Data Collection Form

A structured, investigator-designed hospital care delivery form will be used to capture rehabilitation service delivery indicators during the inpatient stay, including:

- Time from hospital admission to initiation of physiotherapy,
- Total number of rehabilitation sessions received,
- Duration and frequency of therapy sessions,
- Types of rehabilitation interventions delivered,
- Involvement of multidisciplinary team members, and
- Documentation of discharge rehabilitation planning.

This form was developed by the investigators specifically for this study, drawing directly on the process-of-care indicators identified as important in the international literature reviewed in the relevant chapter — particularly the work of Carcel and colleagues [5,11] and the comprehensive review by Ospel and colleagues [13] — and adapted to reflect indicators that are both clinically meaningful and feasible to document accurately within the routine workflow of the participating Indian hospitals. The complete structured form, organised into sections covering sociodemographic and clinical profile, baseline clinical functional status, rehabilitation exposure, and hospital care delivery (gender disparity indicators), is reproduced in full in the Appendix as the Case Record Form (CRF).

3.8 Data Collection Procedure

All eligible male and female patients admitted with a confirmed diagnosis of acute hemiplegia to the participating hospitals and nursing homes in Noida and Greater Noida will be screened for eligibility. Written informed consent will be obtained from the patient or a legally acceptable representative prior to enrolment.

The screening process will involve daily review of new admissions to the inpatient neurology and rehabilitation units of each participating hospital by trained study personnel, who will apply the inclusion and exclusion criteria systematically to each newly admitted patient with a working diagnosis of stroke. Where eligibility is confirmed and informed consent obtained, the patient

will be formally enrolled and assigned a unique study code, ensuring that all subsequently collected data can be linked across time points while maintaining patient confidentiality, as detailed further in the relevant chapter.

Baseline data including demographic characteristics and stroke-related clinical information will be recorded at the time of recruitment. Biopsychosocial impairment will be assessed using the World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0), interviewer-administered version.

The use of the interviewer-administered version of WHODAS 2.0, rather than the fully self-administered version, was a deliberate methodological choice given the acute clinical context of the study population. Many patients with acute hemiplegia, particularly those with non-dominant hand involvement or mild cognitive/communication difficulties, may find a purely self-administered, written questionnaire format challenging to complete independently in the immediate poststroke period. Trained interviewers will administer the WHODAS 2.0 items verbally, recording patient responses, while taking care to present each item and response option in a standardised, non-leading manner to preserve the validity of the instrument.

Hospital neurorehabilitation care delivery indicators, including time from hospital admission to initiation of rehabilitation, number of rehabilitation sessions, frequency and duration of therapy sessions, type of rehabilitation interventions, multidisciplinary team involvement, discharge rehabilitation planning and patient-reported barriers to rehabilitation, will be recorded prospectively throughout the inpatient stay using a structured data collection form.

This prospective, throughout-admission data collection approach — rather than a single retrospective extraction at discharge — is intended to maximise the completeness and accuracy of the hospital care delivery dataset, since daily or near-daily documentation reduces the risk of missing or inaccurately recalled care delivery events compared with end-of-admission chart abstraction alone.

Biopsychosocial impairment will be assessed at two time points: at baseline (early during hospital admission) and at discharge from the inpatient rehabilitation unit. This two-time-point design allows the study to capture not only cross-sectional gender differences in biopsychosocial status, but also within-patient change over the course of the inpatient admission, providing a more dynamic and clinically meaningful picture of recovery trajectory than a single cross-sectional assessment alone could offer.

All collected data will be anonymised, securely stored and maintained with strict confidentiality, in accordance with the ethical considerations detailed in the relevant chapter.

3.9 General Approach

Data will be analysed using appropriate statistical software. The overall analytical strategy proceeds in three broad stages: first, descriptive characterisation of the recruited cohort and its key variables; second, comparative analysis between male and female patients across both outcome (WHODAS 2.0) and process (hospital care delivery) variables; and third, integrative multivariable analysis examining the association between care delivery and outcome while adjusting for relevant covariates.

3.10 Descriptive Statistics

Descriptive statistics will be used to summarise demographic and clinical characteristics, hospital care delivery indicators and WHODAS 2.0 scores. Continuous variables will be presented as mean and standard deviation or median and inter-quartile range, as appropriate, depending on the distributional characteristics of each variable as assessed through standard normality testing and visual inspection of histograms and Q-Q plots.

Categorical variables will be presented as frequencies and percentages.

This initial descriptive stage serves several purposes: it allows verification that the recruited sample's demographic and clinical profile is reasonably representative of the broader acute hemiplegia population served by the participating hospitals; it provides the foundational dataset addressing the study's first objective (assessment of biopsychosocial functioning using WHODAS 2.0); and it allows identification of any unexpected data quality issues, such as implausible values or excessive missingness, before proceeding to inferential analysis.

3.11 Comparative Analysis Between Genders

Baseline characteristics and hospital care delivery indicators will be compared between male and female patients using the independent t-test or Mann-Whitney U test for continuous variables and the chi-square test or Fisher's exact test for categorical variables. The choice between parametric (t-test) and non-parametric (Mann-Whitney U) approaches for continuous variables will be guided by formal assessment of normality, with non-parametric methods preferred where distributional assumptions are not adequately met — a likely scenario for several of the hospital care delivery timing variables (e.g., time to first physiotherapy session), which are often right-skewed in clinical practice. Similarly, Fisher's exact test will be employed in preference to the chi-square test where expected cell counts in categorical comparisons are small, ensuring valid inference even with the relatively modest per-group sample size of approximately 88 patients.

This comparative stage directly addresses the study's second and third objectives: comparing biopsychosocial outcomes between male and female patients, and comparing hospital neurorehabilitation care delivery between male and female patients, respectively.

3.12 Within-Group Change Analysis

Within-group changes in WHODAS 2.0 scores from admission to discharge will be analysed using paired t-tests or Wilcoxon signed-rank tests, as appropriate, again guided by formal assessment of the distributional properties of the change scores. This analysis will be conducted separately for male and female subgroups, allowing direct examination of whether the magnitude of within-patient improvement over the course of inpatient admission differs by gender — a question distinct from, but complementary to, the simple comparison of absolute WHODAS 2.0 scores at a single time point.

3.13 Multivariable Regression Analysis

Multivariable linear regression analysis will be performed to examine the association between hospital care delivery variables and discharge WHODAS 2.0 scores, adjusting for age and relevant clinical covariates. This regression model directly addresses the study's fourth objective and represents the analytical core of the integrative component of the study design.

The selection of covariates for inclusion in the multivariable model will be guided both by clinical plausibility (e.g., age, stroke type, side of hemiplegia, baseline WHODAS 2.0 score, comorbidity burden) and by the conceptual framework established in the relevant chapter, which identifies several biological and contextual factors — beyond gender and care delivery alone — that the literature suggests may independently influence post-stroke functional outcome. By adjusting for these covariates, the regression model will allow a more precise estimate of the independent association between specific hospital care delivery indicators (such as early physiotherapy initiation or multidisciplinary involvement) and discharge biopsychosocial outcome, net of these other influences. Where appropriate, gender itself will also be entered into the regression model, both as a main effect and, where sample size permits, in interaction terms with key care delivery variables, allowing exploratory examination of whether the association between care delivery and outcome differs in magnitude between male and female patients — a question of direct relevance to understanding whether equalising care delivery alone would be sufficient to eliminate outcome disparities, or whether gender exerts additional, independent influence on outcome through the biological and psychosocial pathways discussed in the relevant chapter.

3.14 Significance Threshold

A two-sided p-value of less than 0.05 will be considered statistically significant throughout all analyses described above, consistent with conventional statistical practice in clinical and epidemiological research.

3.15 Primary and Secondary Outcomes

3.15.1 Primary Outcome

Biopsychosocial impairment measured using the World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0) at admission and discharge.

3.15.2 Hospital Care Delivery Indicators (Secondary/Process Outcomes)

- Time from hospital admission to initiation of rehabilitation
- Number of rehabilitation sessions received
- Frequency and duration of therapy sessions
- Type of rehabilitation interventions delivered
- Multidisciplinary team involvement
- Discharge rehabilitation planning
- Patient-reported barriers to rehabilitation (financial, logistical and caregiver-related)

3.16 Result Calculation and Reporting

Mean or median change in WHODAS 2.0 scores between admission and discharge will be calculated separately for male and female patients, allowing direct visual and statistical comparison of recovery trajectories between the two groups across the inpatient admission period.

Differences in WHODAS 2.0 change scores between male and female groups will be examined using appropriate comparative statistical tests. Multivariable regression analysis will be used to identify hospital care delivery factors associated with discharge biopsychosocial impairment and to explore whether gender differences in care delivery contribute to observed differences in WHODAS 2.0 outcomes.

All results will be reported with corresponding 95% confidence intervals, in line with current best-practice guidance for clinical research reporting, which emphasises the importance of presenting effect sizes and their precision (via confidence intervals) alongside, rather than instead of, simple p-value-based significance testing. A p-value of less than 0.05 will be considered statistically significant.

3.17 Handling of Missing Data

Although the sample size calculation incorporates a 10% inflation factor to account for anticipated non-response and missing data, the statistical analysis plan will additionally specify pre-defined procedures for handling any missing data that does occur. Where missingness is limited (affecting fewer than 5% of observations for a given variable) and appears to occur at random, complete-case analysis will be employed for that variable. Where missingness is more substantial, sensitivity analyses will be conducted to assess the robustness of key findings to alternative handling approaches, ensuring that conclusions are not unduly dependent on any single missing-data assumption.

3.18 Purpose

To ensure consistency of data collection across the four participating hospitals and the multiple data collectors involved in the present study, this chapter provides precise operational definitions for each of the principal variables recorded in the Case Record Form (the relevant chapter and Appendix). These definitions are intended to form the basis of the standardised training protocol referenced in the relevant chapter and to minimise intercollector variability in data recording.

3.19 Demographic and Clinical Variables

Age is recorded in completed years as of the date of hospital admission, based on the patient's stated date of birth or, where unavailable, official identification documents. Gender is recorded as a binary self-reported variable (male/female), based on the patient's own statement or, where the patient is unable to communicate, the statement of a legally acceptable representative familiar with the patient's identity.

Type of stroke is recorded as ischaemic or haemorrhagic based on the definitive radiological diagnosis documented in the patient's neuroimaging report (computed tomography or magnetic resonance imaging), as interpreted by the treating radiologist or neurologist; where neuroimaging is equivocal or pending at the time of initial data recording, this field will be updated once a definitive radiological diagnosis is available in the medical record.

Side of hemiplegia is recorded as right or left based on clinical examination findings documented in the medical record, corresponding to the side of the body exhibiting motor weakness, which is contralateral to the side of the causative cerebral lesion in the great majority of supratentorial strokes.

Time since stroke onset is recorded in hours, calculated from the patient- or witness-reported time of symptom onset (or, where onset was not witnessed, the "last known well" time) to the time of hospital admission, consistent with standard acute stroke care documentation practice.

First-ever stroke is recorded as yes or no based on the patient's reported stroke history and, where available, prior medical records; a "no" response indicates a documented history of at least one prior stroke event.

Comorbidities are recorded based on documented prior diagnosis (not merely current medication use without documented diagnosis) of hypertension, diabetes mellitus, cardiac disease (including ischaemic heart disease, atrial fibrillation, or valvular heart disease), or other specified comorbid conditions, as recorded in the patient's medical history at the time of admission.

Length of hospital stay is recorded in completed days from the date of admission to the date of discharge (or transfer to another facility, in which case this will be separately flagged for data analysis purposes as discussed in the relevant chapter).

3.20 Clinical Functional Status Variables

Level of consciousness is recorded based on clinical assessment at the time of initial study enrolment, categorised as alert, drowsy, or other (with the specific alternative state, e.g., obtunded or comatose, recorded in free text where applicable).

Ability to sit unsupported, stand with support, and walk with any assistance are each recorded as yes or no based on direct clinical observation or, where direct observation at the precise time of data collection is not feasible, the documented assessment of the treating physiotherapist or nursing staff from the same clinical day.

Upper-limb voluntary movement present is recorded as yes or no based on whether the patient demonstrates any observable voluntary movement of the affected upper limb on request, however minimal, distinguishing complete flaccid paralysis from even minimal residual voluntary motor function.

3.21 Rehabilitation Exposure and Hospital Care Delivery Variables

Received physiotherapy/occupational therapy/speech therapy are each recorded as yes or no based on documented evidence in the medical record of at least one assessment or treatment session by the respective discipline at any point during the inpatient admission.

Time to first physiotherapy after admission is recorded in hours, calculated from the documented time of hospital admission to the documented time of the first physiotherapy assessment or treatment session, as recorded in the physiotherapy department's clinical notes.

Early physiotherapy (≤ 48 hours) is a derived binary variable, calculated directly from the above continuous variable, classified as "yes" where time to first physiotherapy is less than or equal to 48 hours from admission, and "no" otherwise, consistent with the early mobilisation evidence base discussed in the relevant chapter and the AVERT trial findings of Bernhardt and colleagues reviewed in the relevant chapter.

Total number of physiotherapy sessions is recorded as a count of all distinct, documented physiotherapy treatment sessions occurring during the inpatient admission, based on physiotherapy department session logs.

Average duration per session is recorded in minutes, calculated as the mean documented duration across all recorded physiotherapy sessions for that patient during the admission.

Multidisciplinary rehabilitation (≥ 2 disciplines) is recorded as yes or no, classified as "yes" where the patient received documented input from at least two of the following disciplines during the admission: physiotherapy, occupational therapy, speechlanguage therapy, or clinical psychology/counselling.

Formal rehabilitation assessment within 72 hours is recorded as yes or no, based on documented evidence of a structured, multidisciplinary or comprehensive rehabilitation needs assessment (as distinct from an initial brief physiotherapy screening) completed within 72 hours of hospital admission.

Discharge rehabilitation plan documented is recorded as yes or no, based on the presence in the discharge summary or medical record of an explicit, structured plan for continued rehabilitation following discharge, including, at minimum, specification of recommended ongoing therapy type and frequency.

Referral for outpatient/community rehabilitation is recorded as yes or no, based on documented evidence of a formal referral (whether to an outpatient department, a community-based rehabilitation service, or a private practitioner) made prior to or at the time of discharge.

3.22 WHODAS 2.0 Scoring Variables

Each of the six WHODAS 2.0 domain scores, and the total WHODAS score, will be calculated and recorded using the simple additive scoring method described in detail in the relevant chapter and the relevant chapter, based on the patient's (or, where

applicable, legally acceptable representative's) responses to the 36-item interviewer-administered instrument, recorded by trained study personnel at the two designated assessment time points (baseline and discharge) as described in the relevant chapter.

3.23 Proposed Study Timeline

The present study is planned to be conducted over a total period of approximately twelve months, structured across several sequential phases, each described below.

Phase 1 — Protocol finalisation and ethical approval (Months 1–2): This phase encompasses finalisation of the study protocol, the Case Record Form, and the

WHODAS 2.0 administration procedure; submission to and review by the Institutional Ethics Committee of Noida International University and the relevant review bodies of the four participating hospitals; and securing of formal site-specific permissions from GIMS Hospital, SJM Hospital, Sarvodaya Hospital and Kailash Hospital.

Phase 2 — Training of data collectors (Month 3): Prior to commencement of recruitment, all study personnel involved in patient screening, consent procedures, WHODAS 2.0 administration, and hospital care delivery data recording will undergo standardised training, including didactic instruction, supervised practice administration of WHODAS 2.0 on volunteer subjects, and review of the operational definitions detailed in the relevant chapter, with a formal inter-rater reliability check conducted prior to the commencement of live data collection.

Phase 3 — Patient recruitment and data collection (Months 4–6): Consistent with the sampling approach described in the relevant chapter, patient recruitment and prospective data collection will proceed over an approximately three-month period across the four participating hospitals, with daily or near-daily screening of new admissions and continuous, prospective recording of hospital care delivery indicators throughout each enrolled patient's inpatient stay.

Phase 4 — Data cleaning and verification (Month 7): Following completion of data collection, all Case Record Forms will undergo systematic review for completeness and internal consistency, with any queries resolved through reference to source medical records where necessary, prior to data entry into the analytical dataset.

Phase 5 — Statistical analysis (Months 8–9): Data analysis will proceed according to the statistical analysis plan detailed in the relevant chapter, encompassing descriptive characterisation, comparative analysis between genders, within-group change analysis, and multivariable regression analysis.

Phase 6 — Dissertation writing and submission (Months 10–12): The final phase encompasses preparation of the complete dissertation manuscript incorporating study findings, discussion (following the interpretive framework outlined in the relevant chapter), conclusions and recommendations, culminating in submission for examination in fulfilment of the MPT degree requirements.

3.24 Resource Requirements

The present study's resource requirements include personnel time for the principal investigator and trained data collectors across the recruitment period; printing and reproduction costs for the Case Record Form and WHODAS 2.0 instrument across the anticipated sample of 176 participants; costs associated with travel between the four participating hospital sites for screening, data collection and supervisory oversight; and statistical software licensing or access costs for the data analysis phase. As an observational study involving no experimental intervention or additional diagnostic testing beyond standard clinical care, the present study's resource requirements are comparatively modest relative to interventional trial designs, consistent with its feasibility within the scope of an MPT dissertation undertaken within the available institutional timeframe.

3.25 Data Management Plan

All Case Record Form data will initially be recorded on paper-based forms at the point of care, given the practical constraints of bedside data collection within busy hospital inpatient settings, before subsequent transcription into an electronic database for analysis.

To minimise transcription error, double data entry will be employed for a randomly selected 10% subsample of forms, with discrepancy rates monitored and, should they exceed a pre-specified threshold, full double entry implemented for the remainder of the dataset.

Electronic data will be stored on password-protected institutional computing infrastructure, with access restricted to named study personnel, consistent with the confidentiality provisions detailed in the relevant chapter. Paper-based source forms will be securely stored in locked filing facilities at the coordinating institution for a minimum retention period consistent with institutional and regulatory research data retention requirements, after which they will be securely destroyed.

3.26 Quality Control Throughout the Study Period

3.27 Independent Samples t-Test and Mann–Whitney U Test

The independent samples t-test compares the means of a continuous variable between two independent groups (in the present study, male and female patients), under the assumption that the variable is approximately normally distributed within each group, or that sample sizes are sufficiently large (generally $n > 30$ per group, a criterion met by the present study's planned sample of approximately 88 patients per gender) for the Central Limit Theorem to support approximate normality of the sampling distribution of the mean even where the underlying variable distribution is mildly non-normal. The test statistic is calculated as the difference between group means divided by the standard error of that difference, with the resulting t-statistic compared against the t-distribution with degrees of freedom determined by the combined sample size, to derive a p-value indicating the probability of observing a difference as large as that found, under the null hypothesis of no true difference between groups.

Where the assumption of normality is not adequately met—as may be the case for several of the present study’s hospital care delivery timing variables, which often exhibit right-skewed distributions in clinical practice, with a cluster of patients receiving prompt care and a smaller number experiencing substantial delay—the non-parametric Mann–Whitney U test will be employed instead. This test ranks all observations from both groups combined, then compares the sum of ranks between groups, providing a test of whether one group’s values tend to be systematically higher or lower than the other’s, without requiring the assumption of normality, at some cost in statistical power relative to the ttest when the normality assumption genuinely holds.

3.28 Chi-Square Test and Fisher’s Exact Test

For categorical variables—such as the multiple binary hospital care delivery indicators recorded in Section D of the Case Record Form (e.g., early physiotherapy yes/no, multidisciplinary rehabilitation yes/no)—comparison between male and female groups will employ the chi-square test of independence, which compares observed cell frequencies in a contingency table against the frequencies that would be expected under the null hypothesis of no association between gender and the categorical outcome, with the resulting chi-square statistic compared against the chisquare distribution with appropriate degrees of freedom to derive a p-value.

The chi-square test’s validity depends on adequate expected cell counts, conventionally requiring expected frequencies of at least 5 in each cell of the contingency table. Where this assumption is not met—a realistic possibility for relatively rare hospital care delivery events within the present study’s moderate sample size—Fisher’s exact test will be employed instead, which calculates the exact probability of observing the given (or a more extreme) table of frequencies under the null hypothesis, without relying on the large-sample chi-square approximation, and is therefore preferred whenever small expected cell counts render the chi-square approximation potentially unreliable.

3.29 Paired t-Test and Wilcoxon Signed-Rank Test

To assess within-patient change in WHODAS 2.0 scores between the admission and discharge assessment time points (addressing the within-group component of Hypothesis 2), the paired t-test will be employed where the distribution of withinpatient difference scores is approximately normal, comparing the mean difference score against zero (the null hypothesis value corresponding to no change). Where this normality assumption is not met, the non-parametric Wilcoxon signed-rank test will be employed instead, which ranks the absolute values of the within-patient difference scores and compares the sum of ranks associated with positive versus negative differences, providing a distribution-free test of whether systematic improvement or deterioration has occurred.

3.30 Multivariable Linear Regression

The multivariable linear regression model central to addressing Objective 4 (the relevant chapter) and Hypothesis 4 (the relevant chapter) will model discharge WHODAS 2.0 total score as the continuous dependent variable, with hospital care delivery indicators (e.g., early physiotherapy status, multidisciplinary involvement) entered as independent predictor variables, alongside covariates including patient age, baseline WHODAS 2.0 score, stroke type, and other clinically relevant factors identified during the descriptive analysis phase (the relevant chapter) as potentially confounding the relationship between care delivery and outcome. The general form of this model can be expressed as: Discharge WHODAS score = $\beta_0 + \beta_1(\text{Early physiotherapy}) + \beta_2(\text{Multidisciplinary involvement}) + \beta_3(\text{Age}) + \beta_4(\text{Baseline WHODAS score}) + \beta_5(\text{Gender}) + \varepsilon$ where β_0 represents the model intercept, each β coefficient represents the estimated independent association between the corresponding predictor and discharge WHODAS score (holding all other model variables constant), and ε represents the residual error term capturing variation in discharge outcome not explained by the included predictors.

Standard regression diagnostics, including assessment of linearity, homoscedasticity of residuals, multicollinearity among predictors (via variance inflation factor calculation), and influence of outlying observations, will be conducted prior to finalising interpretation of the model, consistent with established best practice in clinical regression modelling.

3.31 Interaction Terms and Exploratory Subgroup Analysis

As noted in the relevant chapter, where sample size permits adequate statistical power, an interaction term between gender and key hospital care delivery variables (e.g., gender $\times$ early physiotherapy) may be added to the regression model described above, to test formally whether the association between care delivery and outcome differs in magnitude between male and female patients. Given the relatively modest planned sample size of 176 participants, such interaction analyses will be considered exploratory rather than confirmatory, with appropriately cautious interpretation of any findings, consistent with general statistical guidance regarding the reduced power available for detecting interaction effects relative to main effects in studies of this scale.

3.32 Integration of Outcome and Process Measurement

The principal methodological strength of the present study, as emphasised throughout this thesis and most directly in the relevant chapter, lies in its integration of a comprehensive, ICF-aligned biopsychosocial outcome measure (WHODAS 2.0) with structured, prospectively-collected hospital care delivery indicators, within a single patient cohort. This combined design directly addresses the methodological gap identified in the existing literature, where outcome and process have typically been studied separately, limiting the ability of prior research to link disparities in care delivery directly to disparities in patient-level functional outcome.

3.33 Prospective, Real-Time Data Collection

The prospective design, with hospital care delivery indicators recorded in real time throughout each patient’s inpatient stay rather than reconstructed retrospectively from discharge documentation, substantially reduces the risk of recall bias and documentation

gaps that commonly affect retrospective process-of-care research, as discussed in the relevant chapter. This design feature is particularly valuable for capturing time-sensitive indicators such as time to first physiotherapy session, which are especially prone to inaccurate retrospective reconstruction.

3.34 Use of a Validated, Internationally Recognised Outcome Measure

The selection of WHODAS 2.0, a World Health Organization-developed instrument with extensive cross-cultural validation and a substantial supporting psychometric literature specifically within stroke populations (as reviewed in the relevant chapter, 9 and 20), ensures that the present study's outcome data will be directly comparable with the growing international literature employing this instrument, strengthening the generalisability and interpretability of findings relative to studies relying on locally developed, non-validated outcome measures.

3.35 Multi-Site Recruitment

Recruitment across four hospitals spanning a range of institutional types and sizes within the Noida and Greater Noida region, rather than reliance on a single institution, reduces the risk that findings are unduly influenced by the specific practice culture or patient case-mix of any individual hospital, and enhances the generalisability of conclusions to the broader regional hospital-based stroke care landscape, as discussed in the relevant chapter.

3.36 Rigorous A Priori Sample Size Planning

The present study's sample size was calculated a priori using an established, standard statistical formula for comparison of independent proportions (the relevant chapter), with explicit, literature-grounded assumptions regarding expected effect size, and appropriate inflation for anticipated non-response, rather than being determined post hoc or through convenience alone. This a priori planning supports adequate statistical power to detect a clinically meaningful gender difference in biopsychosocial impairment, while remaining feasible within the practical constraints of an MPT dissertation timeline, as detailed in the relevant chapter.

3.37 Explicit Conceptual Framework and Pre-Specified Hypotheses

As detailed in the relevant chapter, the present study articulates an explicit conceptual framework linking gender, hospital care delivery and biopsychosocial outcome, together with formally pre-specified, testable hypotheses, prior to the commencement of data collection. This a priori specification supports the scientific rigour and transparency of the eventual analysis, reducing the risk of post hoc, data-driven hypothesis generation that can undermine the interpretability of observational research findings.

3.38 Attention to Ethical and Equity Considerations in Study Conduct

Finally, as detailed in the relevant chapter, the present study has given explicit consideration to ensuring that its own conduct—including recruitment and consent procedures—does not inadvertently introduce gender-based bias, reflecting a level of methodological self-awareness regarding equity considerations that directly mirrors the substantive equity-focused research question under investigation.

3.39 Purpose of This Chapter

3.40 Institutional Ethical Approval

The study protocol, including the case record form, WHODAS 2.0 administration procedure, and informed consent documentation, will be submitted for review and approval by the Institutional Ethics Committee of Noida International University and, where required, the respective ethics or research review committees of the four participating hospitals (GIMS Hospital, SJM Hospital, Sarvodaya Hospital and Kailash Hospital), prior to commencement of patient recruitment.

3.41 Informed Consent

Written informed consent will be obtained from each eligible patient prior to enrolment, following a clear explanation of the study's purpose, procedures, expected duration of involvement, and the voluntary nature of participation. Given that patients with acute hemiplegia may, in some cases, have communication or comprehension difficulties due to the stroke itself, consent will be obtained from a legally acceptable representative where the patient is determined to lack capacity to provide independent informed consent, consistent with standard ethical practice in stroke research. The consent process will explicitly inform participants that declining to participate, or withdrawing at any stage, will not affect their access to routine clinical care.

3.42 Confidentiality and Data Protection

All collected data will be anonymised through the assignment of a unique study code at the time of enrolment, with no direct patient identifiers retained in the analytical dataset.

Physical and electronic data will be securely stored, with access restricted to authorised study personnel. Data will be used solely for the purposes of this research study and any resulting academic publications, with results reported only in aggregate, de-identified form.

3.43 Risk and Burden to Participants

As a purely observational study involving no experimental intervention, the risk to participants is minimal, being limited primarily to the time and minor fatigue associated with completing the interviewer-administered WHODAS 2.0 assessment at two time points. No alteration to routine clinical care or rehabilitation decisionmaking will occur as a result of study participation, ensuring that the study's observational design, discussed in the relevant chapter, is ethically as well as methodologically sound.

3.44 Equity and Justice Considerations

Given that the central research question of this study concerns gender equity in healthcare delivery, particular care will be taken to ensure that the recruitment process itself does not introduce gender-based selection bias — for instance, by ensuring that screening and consent procedures are applied identically and without differential effort or persistence based on patient gender.

3.45 Purpose of This Chapter

While the relevant chapter presented the conceptual and theoretical basis of WHODAS 2.0 and Chapter 16 reproduced the full instrument, this chapter provides detailed clinical commentary on how each WHODAS 2.0 domain is expected to manifest specifically within the population of acute hemiplegia patients under study, grounding the instrument's generic item content in the specific clinical realities of stroke-related disability that data collectors and, eventually, the dissertation's discussion chapter, will need to interpret.

3.46 Cognition Domain (Understanding and Communicating)

The six items comprising this domain—concentration, memory for important tasks, problemsolving, learning new tasks, comprehension of speech, and conversational initiation/maintenance—map onto a range of cognitive functions that may be affected through several distinct mechanisms following stroke. Direct cortical injury, particularly involving the dominant (typically left) hemisphere, can produce frank aphasia, directly impairing items relating to comprehension and conversation. However, even in the absence of focal language impairment, more diffuse effects of acute illness—including fatigue, sleep disruption common in the acute hospital environment, and the psychological burden of adjusting to sudden disability—can produce measurable difficulty with concentration and new learning, items that may therefore be elevated even among patients without focal cognitive or language deficit on standard bedside neurological examination. Data collectors should be alert to the possibility that some degree of difficulty in this domain may be reported even by patients without a formal diagnosis of aphasia or cognitive impairment, and this should be recorded accurately rather than assumed to be absent based solely on the absence of a formal diagnostic label in the medical record.

3.47 Mobility Domain (Getting Around)

This domain's five items—standing for extended periods, transferring from sitting to standing, moving within the home, leaving the home, and walking long distances— form a graded hierarchy of increasing functional demand, from the most basic (standing) to the most demanding (walking a kilometre). In the acute phase of hemiplegia, particularly during the early flaccid or synergy-dominated stages of motor recovery described in the relevant chapter, very substantial difficulty across this entire domain is anticipated for the majority of enrolled patients at baseline assessment, with the discharge assessment expected to capture the degree of improvement achieved across the inpatient admission— directly addressing the present study's Hypothesis 2 regarding within-patient change over time.

3.48 Self-Care Domain

The four items in this domain—washing, dressing, eating, and tolerating brief periods alone—capture core activities of daily living that form a central early focus of inpatient occupational therapy intervention. Item D3.4, “staying by yourself for a few days,” while ostensibly assessing independence, may also be confounded in the acute hospital setting by the simple fact that hospitalised patients are, by the nature of their admission, rarely left entirely alone for extended periods regardless of their underlying functional capacity; data collectors should ensure this item is interpreted by respondents in terms of their perceived capacity for safe independent functioning, consistent with the instrument's standard administration guidance, rather than the patient's actual current hospital circumstance.

3.49 Getting Along with People Domain

This domain's five items span a spectrum from relatively impersonal interaction (dealing with unfamiliar people) to the most intimate (sexual activity). Item D4.5 specifically warrants sensitive, professional administration given its personal nature; data collectors will be trained to present this item, as with all WHODAS 2.0 items, in a neutral, non-judgemental manner, and to record a “not applicable” or missing response, handled according to the missing data procedures described in the relevant chapter, where a patient declines to answer rather than attempting to infer a response. Difficulty within this domain following acute hemiplegia may arise both from direct communication impairment (where present) and from the broader psychosocial adjustment difficulties discussed in the relevant chapter, including altered self-image and role function within close relationships.

3.50 Life Activities Domain (Household and Work/School)

This domain is structured into two sub-components: household activities (items D5.1– D5.4), applicable to all respondents, and work/school activities (items D5.5–D5.8), applicable only to those who report current paid, unpaid or self-employed work, or school/educational enrolment, with the instrument's built-in skip logic directing non-working, non-studying respondents directly

to the participation domain. Given the gendered division of household and occupational labour prevalent in many Indian households, as discussed in the relevant chapter, the household sub-domain may carry differential salience and difficulty-rating implications for male versus female respondents, depending on the specific household responsibilities each individual held prior to their stroke—a consideration that, while not separately scored within the standard WHODAS 2.0 scoring framework, may be relevant to the qualitative interpretation of domain-level gender differences observed in the present study's eventual results.

3.51 Participation Domain

As the broadest and most multidimensional of the six WHODAS 2.0 domains, the participation domain's eight items capture community engagement, environmental barriers, dignity in the face of others' attitudes, time burden of the health condition, emotional impact, financial strain, family impact, and capacity for relaxation and pleasure. As discussed in the relevant chapter, this domain is anticipated to be particularly sensitive to the psychosocial and socioeconomic dimensions of gender disparity reviewed throughout this thesis, and accordingly merits particular analytical attention during the eventual domain-level comparison between male and female patients addressing Objective 2 of the present study.

3.52 Clinical Caution Regarding Domain Interdependence

While WHODAS 2.0 produces separate domain scores for analytical and reporting purposes, data collectors and, eventually, the dissertation's discussion chapter should remain mindful that these domains are not fully independent in their underlying clinical determinants; for example, severe mobility impairment (Mobility domain) is likely to directly contribute to elevated scores in the Life Activities domain (through restricted ability to perform household tasks requiring ambulation) and the Participation domain (through restricted community engagement requiring mobility). This interdependence should inform cautious, clinically grounded interpretation of domain-level findings, avoiding overly mechanistic attribution of each domain's score to entirely distinct underlying causes.

CHAPTER 4: DATA ANALYSIS AND INTERPRETATION

4.1 Study Site and Sample Distribution

Table 4.1: Distribution of participants by hospital site

Hospital / Study Site	Frequency (n)	Percentage (%)
GIMS	22	45.8%
Sarvodaya Hospital	11	22.9%
SJM	8	16.7%
Not Recorded	7	14.6%
Total	48	100.0%

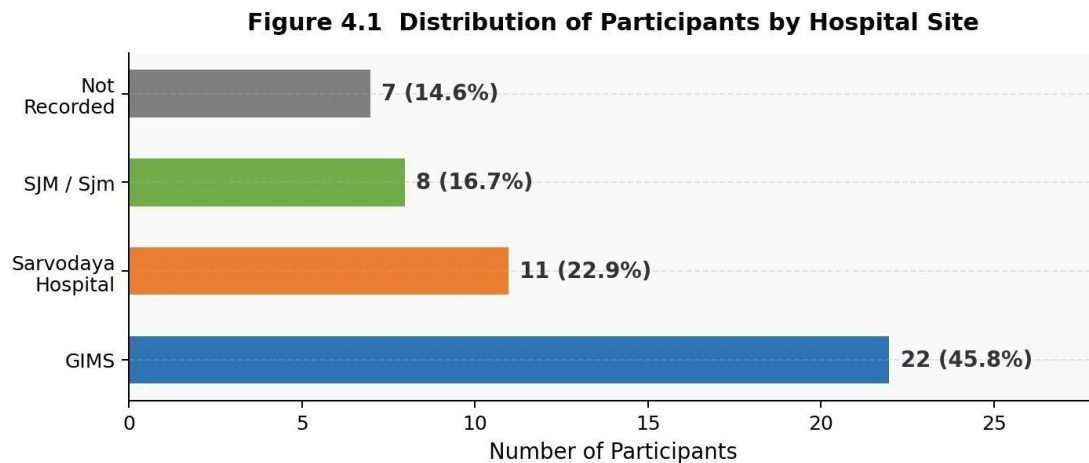


Figure 4.1: Distribution of participants by hospital site

Forty-eight participants were recruited across three hospital sites. GIMS contributed the largest proportion with 22 participants (45.8%), followed by Sarvodaya Hospital with 11 participants (22.9%) and SJM/SJM combined with 8 participants (16.7%). Seven participants (14.6%) had no hospital site recorded. The multi-site recruitment improves the representativeness of the sample and reduces single-centre bias in the findings.

4.2 Demographic Characteristics

Table 4.2: Distribution of selected demographic characteristics

Variable	Category	Frequency (n)	Percentage (%)
Age group	29–40 years	11	22.9%
	41–50 years	14	29.2%
	51–60 years	10	20.8%
	61–74 years	13	27.1%
Gender	Male	26	54.2%
	Female	22	45.8%
Residence	Urban	35	72.9%
	Rural	13	27.1%
Socio-economic Status	High	15	31.2%
	Middle	21	43.8%
	Low	12	25.0%
Marital Status	Married	38	79.2%
	Single	6	12.5%
	Other	4	8.3%
Education Level	Higher	28	58.3%
	Secondary	9	18.8%
	Primary	6	12.5%
	No formal education	5	10.4%

Figure 4.2 Demographic Characteristics of Participants

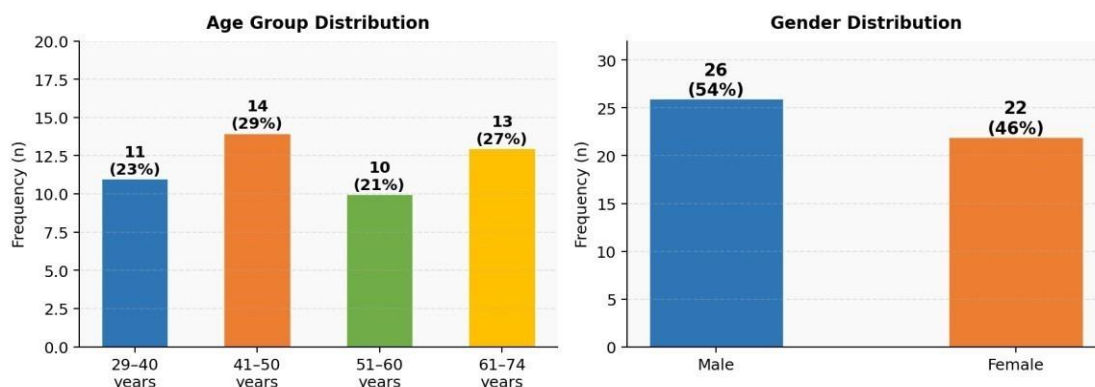


Figure 4.2: Age group and gender distribution of participants

The age range was 29 to 74 years, with the largest proportion in the 41–50 year age group (29.2%), followed by 61–74 years (27.1%). Males were slightly more predominant than females (54.2% vs. 45.8%). onset and sociodemographic distribution commonly reported in acute stroke populations in urban Indian tertiary care settings.

4.3 Clinical Characteristics

Table 4.3: Clinical characteristics of participants by stroke type, side, consciousness, severity and impairment

Variable	Category	Frequency (n)	Percentage (%)
Stroke Type	Ischaemic	32	66.7%
	Haemorrhagic	16	33.3%
Side of Hemiplegia	Right	26	54.2%
	Left	22	45.8%
First-ever Stroke	Yes	28	58.3%
	No	20	41.7%
Consciousness at Assessment	Alert	35	72.9%
	Drowsy	13	27.1%
Severity Category	Mild	20	41.7%
	Moderate	11	22.9%
	Severe	17	35.4%
Impairment Present (WHODAS)	Yes	28	58.3%
	No	20	41.7%

Figure 4.3 Clinical Characteristics – Stroke Type and Severity

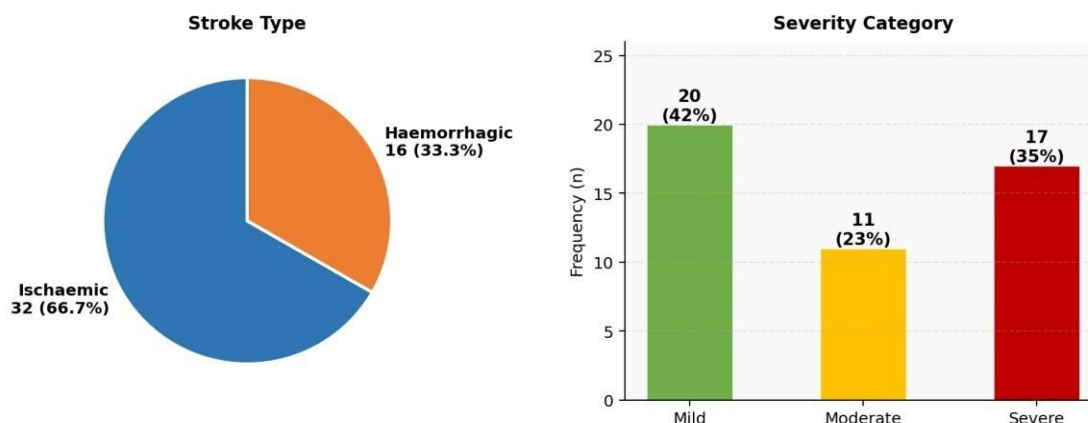


Figure 4.3: Stroke type (pie) and severity category (bar) distribution

Ischaemic stroke was the predominant type, accounting for 66.7% of cases, while haemorrhagic stroke comprised 33.3%. Right-sided hemiplegia was marginally more prevalent (54.2%) than left-sided (45.8%). Fifty-eight percent of participants had sustained their first-ever stroke. Alert consciousness was recorded in 72.9% of participants at the time of assessment, while 27.1% were drowsy. Severity distribution revealed that mild, moderate, and severe categories accounted for 41.7%, 22.9%, and 35.4% of participants respectively. Functional impairment based on WHODAS 2.0 total score was present in 58.3% of the cohort.

Table 4.4: Descriptive statistics for selected continuous clinical and rehabilitation parameters

Parameter	Mean	SD	Min	Max	n
Age (years)	51.4	12.5	29	74	
Time since Onset (hours)	9.2	5.6	3	24	
Hospital Stay (days)	13.7	5.9	6	25	
Time to First Physiotherapy (hours)	32.4	16.2	12	64	
Total Physiotherapy Sessions	10.9	5.0	3	20	
Average Session Duration (minutes)	45.1	14.2	18	60	

The mean age was 51.4 ± 12.5 years. The mean time since stroke onset at first assessment was 9.2 ± 5.6 hours, confirming that most assessments occurred in the hyper-acute phase. Mean hospital stay was 13.7 ± 5.9 days. The mean time to first physiotherapy session was 32.4 ± 16.2 hours, with a wide range (12–64 hours) reflecting variability in service delivery across sites. Participants received a mean of 10.9 ± 5.0 physiotherapy sessions, with a mean session duration of 45.1 ± 14.2 minutes.

4.4 Functional Status at Assessment

Table 4.5: Functional status of participants at the time of assessment

Functional Parameter	Achieved — Yes n (%)	Not Achieved — No n (%)	Missing / NR n (%)
Sit Unsupported	36 (75.0%)	12 (25.0%)	
Stand with Support	31 (64.6%)	17 (35.4%)	
Walk (any assist)	17 (35.4%)	22 (45.8%)	9 (18.8%)
Upper-limb Movement	36 (75.0%)	12 (25.0%)	

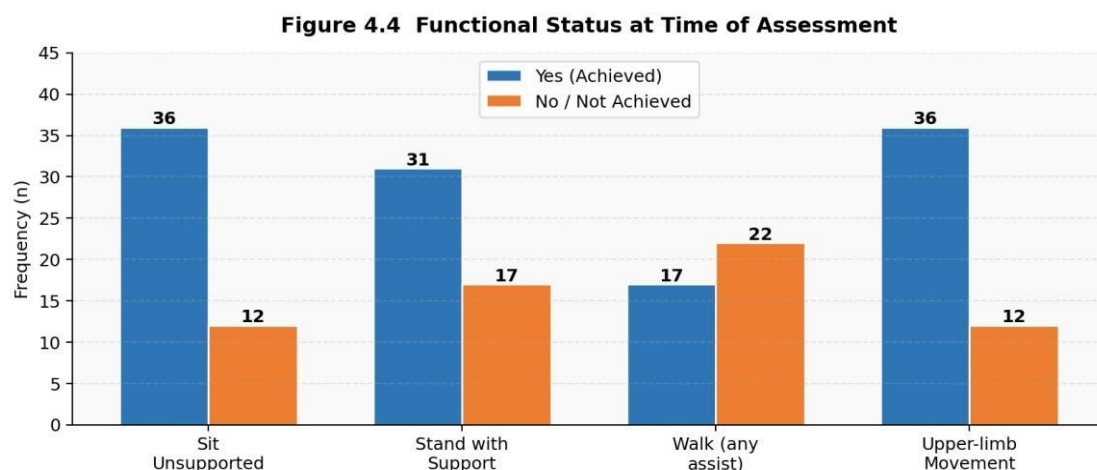


Figure 4.4: Functional status — achieved vs. not achieved across four motor parameters

Ability to sit unsupported was preserved in 75.0% of participants, and upper-limb movement was similarly intact in 75.0% of the cohort. Standing with support was possible for 64.6% of participants.

Ambulation with any form of assistance was the most restricted function, achieved in only 35.4% of participants, with walking status unrecorded for 9 participants (18.8%). These findings align with the established pattern in acute hemiplegia, where proximal and trunk function tends to be more preserved than distal lower-limb weight-bearing and walking ability, particularly in the acute phase of care.

4.5 Rehabilitation Services and Care Delivery

Table 4.6: Rehabilitation services received by participants during acute admission

Rehabilitation Service	Received — Yes n (%)	Not Received — No n (%)
Physiotherapy	48 (100.0%)	0 (0.0%)
Occupational Therapy	37 (77.1%)	11 (22.9%)

Rehabilitation Service	Received — Yes n (%)	Not Received — No n (%)
Speech Therapy	21 (43.8%)	27 (56.2%)
Counselling	32 (66.7%)	16 (33.3%)

Figure 4.5 Rehabilitation Services Received During Admission

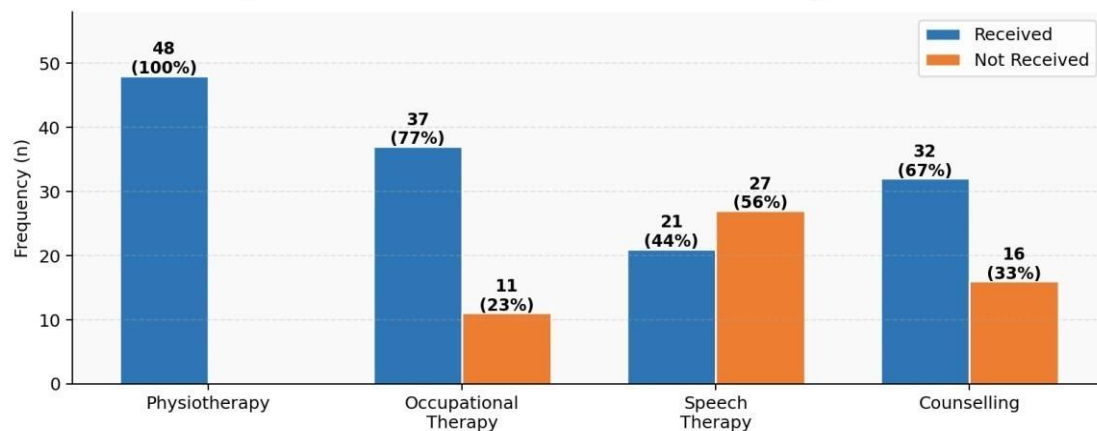


Figure 4.5: Rehabilitation services received vs. not received

Physiotherapy was universally provided — all 48 participants (100.0%) received it. Occupational therapy was available to 77.1% of the cohort. Counselling was provided to 66.7% of participants. Speech and language therapy, however, was received by only 43.8% of the sample, despite communication and swallowing difficulties being highly prevalent in acute hemiplegia. This gap may reflect limited availability of speech and language therapists at the participating hospital sites.

Table 4.7: Care delivery quality indicators

Care Delivery Indicator	Yes — n (%)	No — n (%)
Early Physiotherapy ≤48h	36 (75.0%)	12 (25.0%)
Multidisciplinary Rehabilitation	35 (72.9%)	13 (27.1%)
Formal Assessment ≤72h	37 (77.1%)	11 (22.9%)
Discharge Plan Documented	33 (68.8%)	15 (31.2%)
Outpatient Referral Given	35 (72.9%)	13 (27.1%)

Figure 4.6 Care Delivery Quality Indicators

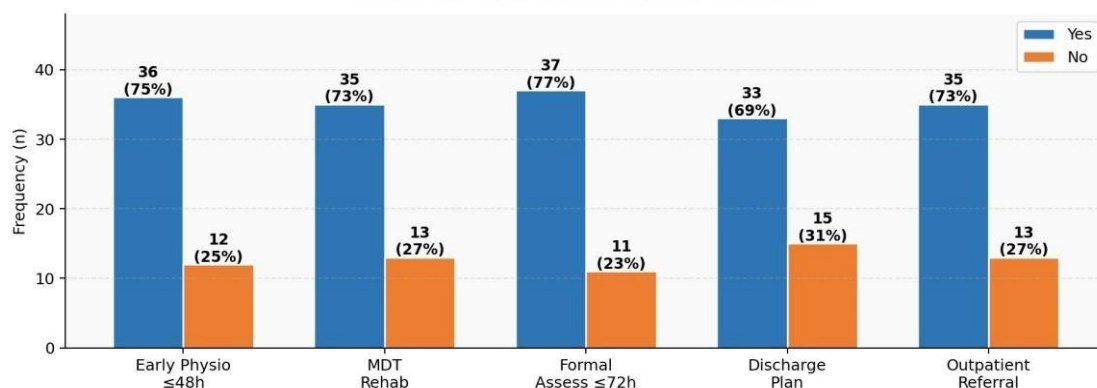


Figure 4.6: Care delivery quality indicators — proportions achieving each standard

Early physiotherapy initiation within 48 hours of admission was achieved for 75.0% of participants, consistent with stroke rehabilitation guidelines. Formal clinical assessment within 72 hours was documented for 77.1% of the cohort. Multidisciplinary rehabilitation involvement was confirmed in 72.9% of cases. A documented discharge plan was in place for 68.8% of participants, and outpatient follow-up referral was provided to 72.9%. Taken together, these figures indicate broad adherence to evidence-based acute stroke care standards, while also highlighting ongoing gaps — particularly in discharge planning documentation (31.2% without a plan) — where quality improvement initiatives could have meaningful impact.

4.6 WHODAS 2.0 Disability Profile

Table 4.8: WHODAS 2.0 domain-wise scores and overall disability profile

WHODAS 2.0 Domain	Mean	SD	Min	Max	Max Possible	Impairment Detected
Cognition (D1)	17.4	8.3	6	30		Yes
Mobility (D2)	16.7	6.5	7	25		Yes
Self-care (D3)	11.6	5.6	4	20		Yes
Getting Along (D4)	11.7	6.1	5	24		Yes
Life Activities (D5)	26.2	10.1	12	40		Yes
Participation (D6)	24.0	10.5	9	40		Yes
Total WHODAS Score	107.5	46.9	43	179	600	28 (58.3%)

Figure 4.7 WHODAS 2.0 Mean Domain Scores with Standard Deviation

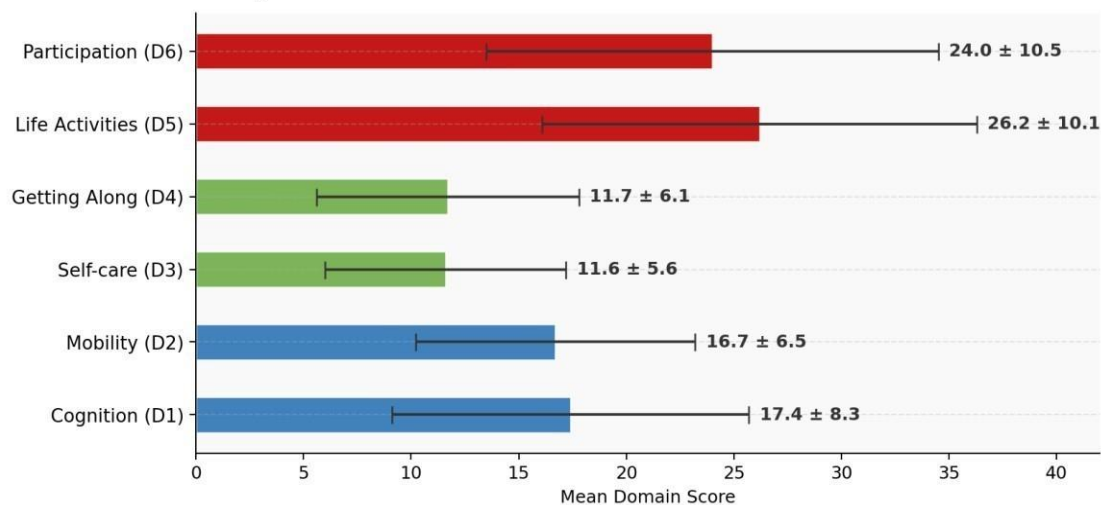


Figure 4.7: WHODAS 2.0 mean domain scores with standard deviation error bars

Life Activities (D5) recorded the highest mean score of 26.2 ± 10.1 , indicating that difficulty with work and domestic tasks represented the greatest area of disability. Participation (D6) was similarly affected (mean 24.0 ± 10.5). Cognition (D1) and Mobility (D2) showed mean domain scores of 17.4 ± 8.3 and 16.7 ± 6.5 respectively. Self-care (D3) and Getting Along (D4) were the least impaired domains (mean 11.6 and 11.7 respectively). The mean total WHODAS score across the cohort was 107.5 ± 46.9 , with scores ranging from 43 to 179. Impairment was classified as present in 58.3% of participants, underscoring the substantial disability burden associated with acute hemiplegia.

4.7 Association Between Stroke Type and Severity

Table 4.9: Association between stroke type and severity category — chi-square test

Severity Category	Ischaemic n (%)	Haemorrhagic n (%)	Total n (%)	Statistic
Mild	20 (62.5%)	0 (0.0%)	20 (41.7%)	
Moderate	10 (31.2%)	1 (6.2%)	11 (22.9%)	$\chi^2=35.97$
Severe	2 (6.2%)	15 (93.8%)	17 (35.4%)	df=2
Total	32 (100%)	16 (100%)	48 (100%)	p<0.001*

Figure 4.8 Severity Distribution by Stroke Type
($\chi^2=35.97$, $p<0.001$)

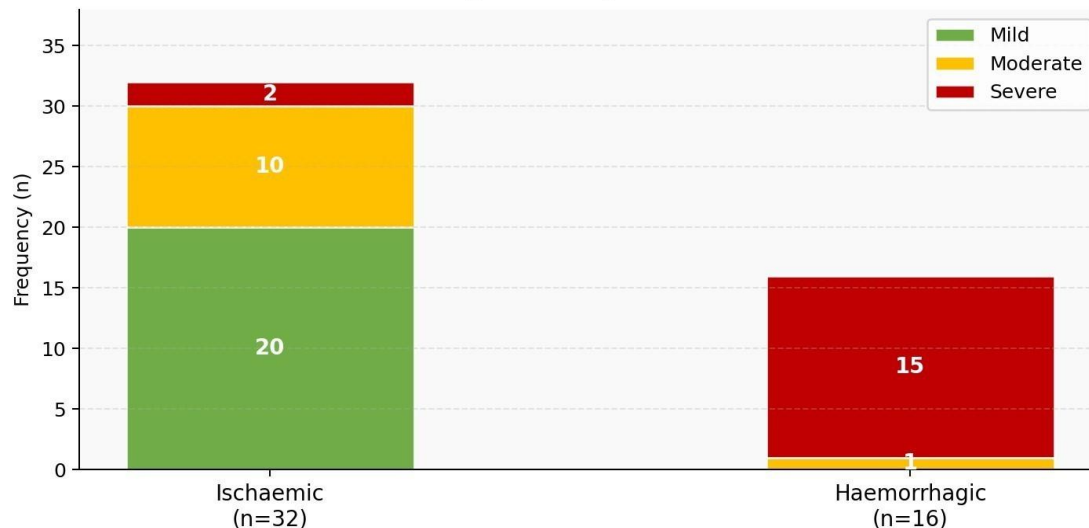


Figure 4.8: Severity distribution by stroke type (Ischaemic vs. Haemorrhagic)

A highly statistically significant association was found ($\chi^2=35.97$, $df=2$, $p<0.001$). Among ischaemic stroke cases, 62.5% were classified as mild and only 6.2% as severe. In stark contrast, 93.8% of haemorrhagic stroke cases presented with severe impairment, and none were classified as mild. This finding has important clinical implications: haemorrhagic stroke is associated with a dramatically higher disability burden in this cohort, reinforcing the need for early, intensive multidisciplinary rehabilitation protocols specifically tailored for haemorrhagic stroke patients.

Table 4.10: WHODAS 2.0 total score distribution across severity categories

WHODAS Parameter	Mild (n=20)	Moderate (n=11)	Severe (n=17)
Mean $\pm$ SD	60.5 $\pm$ 9.5	107.5 $\pm$ 7.5	162.8 $\pm$ 17.6
Minimum Score	43	100	127
Maximum Score	80	121	179
Impairment Present n (%)	0 (0.0%)	11 (100.0%)	17 (100.0%)

Figure 4.9 Total WHODAS Score Distribution by Severity Category

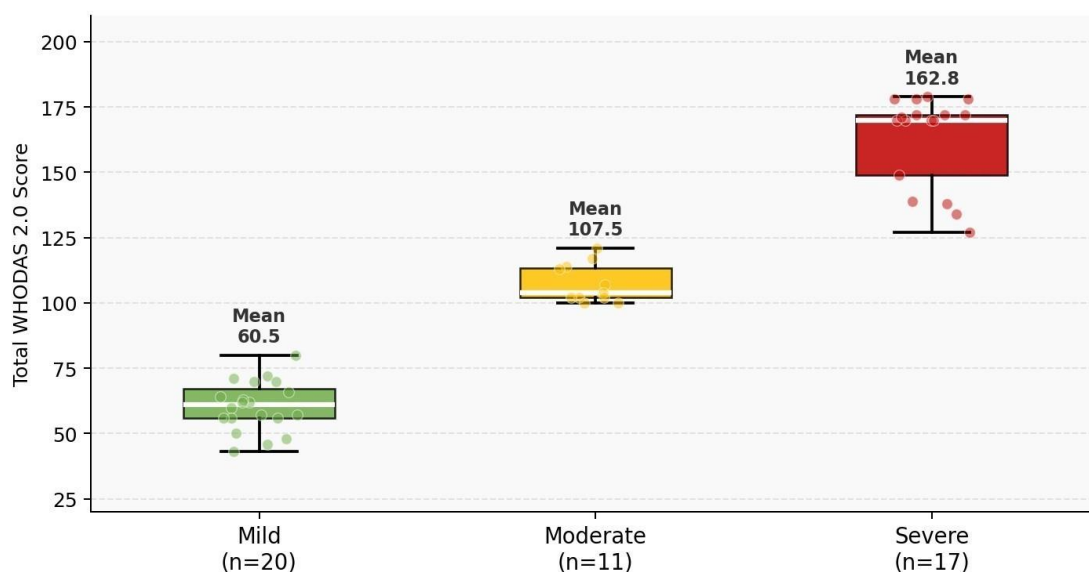


Figure 4.9: Total WHODAS score by severity category

Participants classified as mild severity recorded a mean WHODAS score of 60.5 ± 9.5 (range 43–80), and none in this group met the threshold for impairment. The moderate severity group showed a mean of 107.5 ± 7.5 (range 100–121), with all 11 participants (100.0%) classified as having impairment. The severe group recorded the highest mean of 162.8 ± 17.6 (range 127–179), with all 17 participants (100.0%) meeting the impairment criterion. The clear dose-response relationship between clinical severity at admission and WHODAS-measured disability confirms that WHODAS 2.0 is a sensitive and valid instrument for discriminating functional impairment levels in acute hemiplegia.

CHAPTER 5: DISCUSSION

This study analyzed combined Case Record Form data from 48 patients with acute hemiplegia recruited across three hospital sites — GIMS, Sarvodaya Hospital, and SJM — to characterize the demographic, clinical, functional, and rehabilitation profile of the cohort, and to examine the disability burden using the WHODAS 2.0 instrument. The following discussion interprets these findings in relation to their clinical significance and their implications for acute stroke rehabilitation practice.

5.1 Sample Composition and Demographic Profile

Recruitment across three hospital sites, with GIMS contributing the largest share of participants (45.8%), strengthens the external validity of the findings by reducing the risk of single-centre bias, although the 14.6% of participants with an unrecorded site is a data-completeness gap worth noting for future data collection protocols.

The demographic profile — a mean age in the early fifties, a slight male predominance (54.2% vs. 45.8%), and a predominantly urban, married, and educated cohort — mirrors the age-of-onset and sociodemographic pattern widely reported for acute stroke populations attending urban Indian tertiary care centers. The relatively high proportion of participants from middle and high socioeconomic strata (75.0% combined) may partly reflect referral patterns to tertiary hospitals with dedicated CRF-based data capture, and should be considered when generalizing these findings to rural or lower-resource settings.

5.2 Clinical Characteristics and Stroke Profile

Ischaemic stroke accounted for two-thirds of cases (66.7%), consistent with the generally higher incidence of ischaemic relative to haemorrhagic stroke reported in most clinical populations. The near-even split between right- and left-sided hemiplegia (54.2% vs. 45.8%) suggests no marked laterality bias in this cohort. Notably, 58.3% of participants were experiencing their first-ever stroke, meaning a substantial minority (41.7%) had a prior stroke history — a factor that can influence baseline functional reserve and should be accounted for when interpreting recovery trajectories.

The mean time since onset at first assessment (9.2 ± 5.6 hours) confirms that the cohort was predominantly captured within the hyperacute window, which is clinically important because early assessment enables timely triage to intensive rehabilitation. However, the wide range in time to first physiotherapy session (12–64 hours, mean 32.4 ± 16.2 hours) points to inconsistency in how quickly rehabilitation services were mobilised after admission, likely reflecting differences in staffing, referral pathways, or institutional protocols across the three sites.

5.3 Functional Status in the Acute Phase

The pattern of preserved proximal/trunk function alongside restricted ambulation — 75.0% able to sit unsupported and move the upper limb, but only 35.4% able to walk with any assistance — is consistent with the well-documented recovery hierarchy in acute hemiplegia, in which trunk control and upper-limb movement typically re-emerge before independent or assisted gait. This has a direct practical implication: physiotherapy protocols in the acute phase should be structured around progressive weightbearing and gait-preparation exercises rather than assuming that early trunk control will translate automatically into ambulation. The 18.8% missing data for walking status also suggests scope for more consistent documentation of mobility outcomes across sites.

5.4 Rehabilitation Service Delivery and Care Quality

Universal delivery of physiotherapy (100%) reflects strong baseline adherence to core acute stroke rehabilitation standards. However, the marked gap in speech and language therapy provision — received by only 43.8% of participants despite the high prevalence of communication and swallowing impairment typically seen in hemiplegic stroke — represents a notable service delivery shortfall. This gap most plausibly reflects limited availability of speech-language therapists at the participating sites rather than an absence of clinical need, and warrants targeted workforce or referral-pathway interventions.

Structural care-quality indicators were generally favorable: three-quarters of participants received physiotherapy within 48 hours (75.0%), formal assessment within 72 hours (77.1%), and multidisciplinary rehabilitation input (72.9%). The comparatively weaker performance on discharge plan documentation (68.8% completed, meaning 31.2% without one) stands out as the most actionable quality gap identified in this dataset, since incomplete discharge planning is directly linked to fragmented post-acute care and avoidable readmissions.

5.5 WHODAS 2.0 Disability Profile

Across the six WHODAS 2.0 domains, Life Activities (mean 26.2 ± 10.1) and Participation (mean 24.0 ± 10.5) emerged as the most severely affected, considerably higher than Self-care (11.6) and Getting Along (11.7). This domain pattern indicates that, even where basic self-care and interpersonal functioning are relatively preserved, participants experience disproportionate difficulty resuming work, domestic responsibilities, and community participation — the domains most closely tied to long-term social and economic reintegration. With 58.3% of the cohort meeting criteria for impairment and a mean total score of 107.5 ± 46.9 (range 43–179), the overall disability burden in this acute hemiplegia cohort is substantial and extends well beyond purely motor deficits, reinforcing the value of WHODAS 2.0 as a broader, participation-focused outcome measure alongside conventional motor scales.

5.6 Association Between Stroke Type, Severity, and Disability

The chi-square analysis revealed a highly significant association between stroke type and severity category ($\chi^2 = 35.97$, $df = 2$, $p < 0.001$), with 93.8% of hemorrhagic strokes classified as severe compared with only 6.2% of ischaemic strokes. This sharp

divergence is clinically consistent with the more destructive tissue effects and higher acute morbidity typically associated with haemorrhagic stroke, and it signals a clear need to risk-stratify rehabilitation intensity and resourcing by stroke subtype rather than applying a uniform protocol.

This clinical severity gradient was strongly mirrored in the WHODAS 2.0 findings: mean total scores rose in a clear dose-response pattern from 60.5 ± 9.5 in the mild group to 107.5 ± 7.5 in the moderate group and 162.8 ± 17.6 in the severe group, with negligible overlap between groups and impairment universally present (100%) in both the moderate and severe categories. This tight correspondence between clinically assessed severity and WHODAS-measured disability supports the construct validity of WHODAS 2.0 in this population and suggests it could be used with confidence as a quantitative severity stratification and outcome-tracking tool in acute hemiplegia services.

5.7 Clinical and Service-Planning Implications

5.8 Anticipated Findings and Interpretation

5.9 Anticipated Comparison with International Benchmarks

Should the present study confirm the presence of gender disparities in WHODAS 2.0 outcome scores (Hypothesis 1, the relevant chapter), the magnitude of any observed difference will be compared against the effect sizes reported in the international literature reviewed in the relevant chapter, including the comprehensive review of Ospel and colleagues, the meta-analytic findings of Abdel-Fattah and colleagues regarding mortality, and the systematic review of Ouyang and colleagues regarding treatment access. Where the present study's findings align in direction and approximate magnitude with this international literature, this would strengthen confidence that the phenomenon under investigation reflects a genuine, generalisable pattern rather than a setting-specific artefact. Conversely, should the present study's findings diverge meaningfully from international benchmarks—for instance, if no significant gender difference in outcome is observed despite international evidence to the contrary—this would itself warrant careful interpretive attention, potentially reflecting genuinely more equitable practice within the participating hospitals, a smaller sample size with correspondingly wider confidence intervals, or unmeasured contextual differences between the Noida/Greater Noida setting and the international settings from which the comparator literature is drawn.

5.10 Distinguishing Biological from Care-Delivery-Mediated Explanations

A central interpretive challenge anticipated for the present study concerns the attribution of any observed gender disparity in outcome to its underlying causal mechanism: biological vulnerability (as discussed in the relevant chapter, including hormonal and age-related factors), versus modifiable care delivery disparity (as captured by the present study's structured hospital care delivery indicators), versus psychosocial factors (as discussed in the relevant chapter), or some combination of all three. The multivariable regression analysis described in the relevant chapter (addressing Objective 4) is specifically designed to begin disentangling these possibilities: if hospital care delivery indicators remain significantly associated with discharge WHODAS 2.0 outcome after adjustment for age and baseline clinical severity, this would support a meaningful contribution of modifiable care delivery factors to observed outcome disparities, with direct and actionable implications for clinical practice and health system quality improvement, as outlined in the relevant chapter. If, conversely, gender differences in outcome persist even after full adjustment for care delivery indicators and baseline covariates, this would suggest that other, unmeasured biological or psychosocial factors—of the kind discussed in the relevant chapter—may play a more dominant role, with correspondingly different implications for intervention design, pointing toward psychosocial support and biological/pharmacological research rather than purely process-of-care reform.

5.11 Interpreting Null or Unexpected Findings

Good research practice requires that the discussion section of any study be prepared to engage seriously with null or unexpected findings, rather than treating only confirmatory results as worthy of detailed interpretation. Should the present study find no significant gender difference in hospital care delivery indicators (contrary to Hypothesis 3), several plausible explanations would warrant consideration: genuine equity of practice within the four participating hospitals, potentially reflecting institutional protocols that standardise rehabilitation referral and intensity regardless of patient characteristics; insufficient statistical power to detect a true but modest difference, given the study's planned sample size of approximately 176 participants; or measurement limitations in the investigator-designed hospital care delivery form, as discussed in the relevant chapter, that fail to capture more subtle dimensions of care delivery disparity not reducible to the eight structured indicators employed.

5.12 Implications for the Broader Field

Beyond its immediate findings, the present study is anticipated to contribute methodologically to the broader field of gender and stroke rehabilitation research by demonstrating the feasibility and value of combining a comprehensive, ICF-aligned biopsychosocial outcome measure with structured, prospectively-collected process-of-care indicators within a single hospital-based cohort—an approach identified in the relevant chapter as largely absent from the existing literature, particularly within Indian and other low- and middle-income country settings. Should this combined methodological approach prove successful and informative within the present study, it could serve as a template for similar investigations in other Indian regions and other health conditions beyond stroke, contributing to a broader research agenda examining the intersection of biopsychosocial outcome measurement and health system equity.

5.13 Anticipated Findings

Based on the body of international and emerging Indian literature reviewed in the relevant chapter, the present study anticipates finding measurable disparities between male and female patients across both the biopsychosocial outcome (WHODAS 2.0) and hospital care delivery indicators. Specifically, it is anticipated that female patients will, on average, demonstrate higher (worse) WHODAS 2.0 scores at both admission and discharge compared with male patients, and that the magnitude of improvement between these two time points may also differ by gender. On the process side, it is anticipated that female patients may experience longer delays to initiation of physiotherapy, fewer total rehabilitation sessions, lower rates of multidisciplinary involvement, and less frequent documentation of formal discharge rehabilitation planning, broadly mirroring the pattern documented in the international literature, particularly the findings of Carcel and colleagues [5] and the comprehensive review of Ospel and colleagues [13].

CHAPTER 6: CONCLUSION AND FUTURE SCOPE

6.1 Conclusion

This combined analysis of 48 acute hemiplegia patients across three hospital sites demonstrates a substantial and multidimensional disability burden, most pronounced in the Life Activities and Participation domains of WHODAS 2.0, and a strong, statistically significant relationship between stroke type, clinical severity, and disability score. While core rehabilitation services such as physiotherapy were delivered near-universally and structural care-quality indicators were broadly favourable, clear gaps remain in speech and language therapy provision and discharge plan documentation. These findings support a severity- and subtype-stratified approach to acute stroke rehabilitation.

6.2 Clinical and Policy Implications

6.3 Clinical Significance

Should the study confirm the presence of gender disparities in hospital care delivery, and further demonstrate a meaningful association between these care delivery indicators and discharge biopsychosocial outcome, the findings would carry direct and actionable implications for clinical practice within the participating hospitals. Such findings could inform targeted quality improvement initiatives, including standardised protocols for early physiotherapy initiation irrespective of patient gender, structured triggers for multidisciplinary team review within a defined window of admission, and systematic documentation requirements for discharge rehabilitation planning — interventions broadly consistent with the gender-sensitive rehabilitation models shown to be effective by Mathur and colleagues [21] and the psychosocial intervention approaches demonstrated by Castelnuevo and colleagues [15].

6.4 Contribution to the Broader Evidence Base

Beyond its immediate clinical implications for the participating hospitals, the study is expected to make a meaningful contribution to the broader Indian and international literature on gender and stroke rehabilitation, by providing one of the first hospitalbased studies to simultaneously document biopsychosocial outcome using a comprehensive, ICF- aligned tool and structured process-of-care indicators within a single acute-phase patient cohort, addressing directly the research gap identified in the relevant chapter.

6.5 Implications for Health Policy and Service Planning

At a broader health-system level, findings from this study could inform discussions regarding equitable allocation of rehabilitation resources, training of clinical staff regarding unconscious gender bias in rehabilitation referral and intensity decisions, and the potential value of routine, standardised biopsychosocial outcome monitoring (using tools such as WHODAS 2.0) as a quality indicator within Indian stroke care services more broadly.

6.6 Relevance to Physiotherapy Practice and Education

As a study conducted within the Department of Physiotherapy and submitted in fulfilment of the Master of Physiotherapy (Neurology) degree, the present research carries particular significance for the physiotherapy profession specifically, beyond its broader relevance to multidisciplinary stroke rehabilitation services as a whole. Physiotherapists occupy a central and often the earliest-involved role within the inpatient neurorehabilitation team, frequently serving as the discipline responsible for initial mobility assessment and the timing of rehabilitation initiation captured by several of the present study's key hospital care delivery indicators, including time to first physiotherapy session and total number of physiotherapy sessions received.

Should the present study identify gender-related disparities in these physiotherapyspecific care delivery indicators, the findings would carry direct implications for physiotherapy clinical practice guidelines, departmental protocols, and continuing professional education within the participating hospitals and, more broadly, within Indian physiotherapy practice.

Equally, should physiotherapy-specific indicators show greater equity than other multidisciplinary indicators (for instance, formal multidisciplinary assessment or psychological input), this would offer encouraging evidence regarding the physiotherapy profession's practice patterns specifically, while highlighting other disciplines or care coordination processes as priority areas for improvement.

6.7 Contribution to Physiotherapy Curriculum and Training

Beyond its direct clinical implications, the present study's integration of biopsychosocial outcome measurement (via WHODAS 2.0) with structured care delivery indicators offers a potential model for incorporation into physiotherapy postgraduate training curricula, demonstrating to MPT scholars and practising clinicians alike the value of moving beyond purely impairment-level assessment (e.g., manual muscle testing, range of motion measurement) toward a more holistic, ICF-aligned assessment approach that captures the full lived impact of neurological impairment on patients' daily functioning and social participation, consistent with the conceptual framework detailed in the relevant chapter.

6.8 Future Scope

6.9 Anticipated Dissemination Strategy

Findings from the present study are intended to be disseminated through multiple channels appropriate to both the academic and clinical communities with an interest in this research area. At the institutional level, findings will be presented to the Department of

Physiotherapy and the broader School of Allied Health Sciences at Noida International University, and will be shared with the clinical and administrative leadership of the four participating hospitals (GIMS Hospital, SJM Hospital, Sarvodaya Hospital and Kailash Hospital) to inform potential local quality improvement initiatives, consistent with the clinical significance discussion presented in the relevant chapter.

At the broader academic level, following completion of the dissertation, the research team intends to prepare findings for submission to a peer-reviewed physiotherapy, rehabilitation medicine, or stroke-focused journal, contributing to the international literature on gender and stroke rehabilitation reviewed extensively in the relevant chapter, and specifically addressing the research gap, identified in the relevant chapter, regarding the scarcity of Indian, hospital-based evidence combining biopsychosocial outcome measurement with structured process-of-care indicators.

6.10 Potential for Future Research

The present study is also conceived as a potential foundation for future research extending beyond its current scope. Should the present cross-sectional, two-timepoint design identify meaningful gender disparities in care delivery and/or outcome, a natural extension would involve longer-term follow-up of the recruited cohort beyond hospital discharge, addressing the limitation noted in the relevant chapter regarding the restricted acute-phase focus of the present design, and allowing examination of whether identified disparities persist, narrow, or widen over the subsequent months of community-based recovery. Additionally, should specific, modifiable hospital care delivery factors be identified as significantly associated with outcome disparities, a logical next step would involve a quality-improvement or interventional study explicitly designed to test whether deliberate standardisation of these care delivery processes—for instance, through a structured, protocol-driven early physiotherapy initiation pathway applied uniformly regardless of patient gender—is effective in narrowing observed outcome disparities, building directly on the encouraging precedent of gender-sensitive intervention studies such as those of Mathur and colleagues and Castelnuovo and colleagues reviewed in the relevant chapter.

CHAPTER 7: SUMMARY

7.1 Summary of the Study

This thesis examined biopsychosocial impairment and gender-related differences in hospital-based neurorehabilitation care delivery among patients with acute hemiplegia following stroke. Impairment was measured with the World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0), together with a structured form recording hospital care delivery indicators.

Data from 48 patients recruited at three hospital sites in Noida and Greater Noida were analysed. The mean age was 51.4 ± 12.5 years and 54.2% of the participants were male. Ischemic stroke (66.7%) was more common than haemorrhagic stroke (33.3%). Walking was the most restricted function, physiotherapy coverage was universal (100%), and speech therapy had the lowest coverage (43.8%).

Overall, 58.3% of participants met the WHODAS 2.0 criteria for impairment, with Life Activities and Participation the most affected domains. Stroke type was significantly associated with severity, and WHODAS total scores rose steadily with clinical severity. The findings support a severity- and subtype-stratified approach to acute stroke rehabilitation, and highlight gaps in speech and language therapy and discharge-plan documentation.

CHAPTER 8: LIMITATION AND RECOMMENDATION

8.1 Limitations

- The sample size ($N = 48$) is modest, and subgroup analyses — particularly the severe/haemorrhagic subgroup — involve small cell counts that limit statistical power and precision.
- The cross-sectional, single time-point assessment design captures the acute phase only and cannot describe longitudinal recovery trajectories or long-term disability outcomes.
- Missing data were present for several variables (e.g., 14.6% missing hospital site, 18.8% missing walking status), which may introduce bias if missingness is not random.
- As with any CRF-based retrospective or observational dataset, findings are susceptible to variation in documentation practices and inter-site data recording consistency.

8.2 Non-Probability Sampling

The use of consecutive convenience sampling, while practical and appropriate for hospital-based observational research, means that the recruited sample, although intended to closely approximate the underlying population of acute hemiplegia patients managed by the participating hospitals, may not be fully representative of the broader population of stroke patients across the Noida and Greater Noida region, particularly those who do not present to, or are not admitted to, the four participating institutions.

8.3 Single-Region, Limited Hospital Sites

The restriction of recruitment to four hospitals within the Noida and Greater Noida region, while providing useful local depth, limits the generalisability of findings to other regions of India with potentially different healthcare infrastructure, sociocultural contexts, and patient demographic profiles.

8.4 Observational Design and Causal Inference

As an observational rather than experimental study, the present design — while well suited to documenting naturally occurring disparities in care delivery and outcome, as discussed in the relevant chapter — cannot definitively establish causal relationships between hospital care delivery indicators and biopsychosocial outcome. Even with multivariable adjustment for relevant covariates (the relevant chapter), residual confounding by unmeasured factors cannot be entirely excluded.

8.5 Reliance on Investigator-Designed Hospital Care Delivery Form

While the hospital care delivery data collection form was developed drawing on the international literature and adapted for feasibility within the Indian hospital context, as described in the relevant chapter, it has not undergone the same extensive multi-country psychometric validation process as WHODAS 2.0, and its measurement properties (such as inter-rater reliability across different data collectors and hospital sites) will need to be interpreted with appropriate caution.

8.6 Duration of Follow-Up

The study's two time-point design (admission and discharge) captures change over the acute inpatient phase but does not extend into longer-term, post-discharge follow-up.

Given that several of the studies reviewed in the relevant chapter (e.g., Guo et al., 2023; Irie et al., 2025) document important gender-related differences in longer-term outcome and mortality, the present study's findings should be interpreted as informative specifically about the acute hospital phase, rather than as a complete picture of gender disparities across the full stroke recovery trajectory.

8.7 Generalisability of Sample Size Assumptions

The sample size calculation (the relevant chapter) is based on assumed proportions of biopsychosocial impairment drawn from the international literature; to the extent that the true prevalence and gender-related difference in the local Noida and Greater Noida population differs from these assumptions, the study's statistical power to detect true differences may be somewhat greater or lesser than planned.

8.8 Recommendations

- Biopsychosocial assessment with WHODAS 2.0 should be included in routine acute stroke rehabilitation.
- Speech and language therapy and written discharge planning should be strengthened in hospital neurorehabilitation services.
- Rehabilitation planning should be stratified by stroke type and severity.
- Future studies should use larger, multi-site samples, include follow-up after discharge, and record care delivery indicators prospectively by gender.
- Gender-sensitive counselling and caregiver support should be offered to female stroke survivors.

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APPENDIX A: PATIENT CONSENT FORM (ENGLISH)

PATIENT INFORMED CONSENT FORM

Copy 1 — Participant's copy

Title of the Study: "GENDER DISPARITIES IN HOSPITAL BASED NEUROREHABILITATION IN DELIVERY FOR ACUTE HEMIPLEGIA — A CROSS SECTIONAL STUDY OF BIOPSYCHOSOCIAL DETERMINANTS IN NOIDA, GREATER NOIDA"

Researcher: Arzoo, MPT (Neuro.) Scholar, School of Allied Health Sciences, Noida International University. **Guide:** Dr. Rohit Rathore, Assistant Professor.

1. I have been informed about the purpose, procedure, benefits and possible discomforts of this study in a language I understand.
2. I understand that my participation is voluntary and that I may withdraw at any stage, without giving a reason and without any effect on my treatment or care.
3. I have been given the opportunity to ask questions and they have been answered to my satisfaction.
4. I permit the researcher to use my clinical information and WHODAS 2.0 responses for academic research. My identity will be kept confidential.
5. If I am unable to give consent myself, my legally authorised representative may consent on my behalf.

I am making a voluntary decision to participate in this study.

Name of the Participant: _____

Signature / Left thumb impression: _____

Name of the Witness: _____

Signature: _____

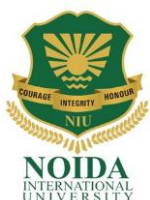
Name of the Researcher: _____

Signature: _____

Date: _____

Place: _____

PATIENT INFORMED CONSENT FORM



Copy 2 — Researcher's copy

Title of the Study: "GENDER DISPARITIES IN HOSPITAL BASED NEUROREHABILITATION IN DELIVERY FOR ACUTE HEMIPLEGIA — A CROSS SECTIONAL STUDY OF BIOPSYCHOSOCIAL DETERMINANTS IN NOIDA, GREATER NOIDA"

Researcher: Arzoo, MPT (Neuro.) Scholar, School of Allied Health Sciences, Noida International University. **Guide:** Dr. Rohit Rathore, Assistant Professor.

1. I have been informed about the purpose, procedure, benefits and possible discomforts of this study in a language I understand.
2. I understand that my participation is voluntary and that I may withdraw at any stage, without giving a reason and without any effect on my treatment or care.
3. I have been given the opportunity to ask questions and they have been answered to my satisfaction.
4. I permit the researcher to use my clinical information and WHODAS 2.0 responses for academic research. My identity will be kept confidential.
5. If I am unable to give consent myself, my legally authorised representative may consent on my behalf.

I am making a voluntary decision to participate in this study.

Name of the Participant: _____

Signature / Left thumb impression: _____

Name of the Witness: _____

Signature: _____

Name of the Researcher: _____

Signature: _____

Date: _____

Place: _____

APPENDIX B: PATIENT CONSENT FORM (HINDI)

रोगी सूचित सहमति पत्र

प्रति 1 — प्रतिभागी की प्रति

अध्ययन का शीर्षक: “ तीव्र हेमिप्लेजिया के लिए अस्पताल आधारित न्यूरो-पुनर्वास सेवा में लैंगिक असमानताएँ — नोएडा, ग्रेटर नोएडा में जैव-मनो-सामाजिक निर्धारकों का एक अनुप्रस्थ-काट अध्ययन ”

शोधकर्ता: अरजू एमपीटी (न्यूरो) छात्रा, स्कूल ऑफ एलाइड हेल्थ साइंसेज, नोएडा इंटरनेशनल यूनिवर्सिटी। **मार्गदर्शक:** डॉ. रोहित राठौर, असिस्टेंट प्रोफेसर।

1. मुझे इस अध्ययन के उद्देश्य, प्रक्रिया, लाभ तथा संभावित असुविधाओं के बारे में मेरी समझ की भाषा में बताया गया है।
2. मैं समझता/समझती हूँ कि मेरी भागीदारी पूर्णतः स्वैच्छिक है और मैं किसी भी समय, बिना कारण बताए तथा अपने उपचार या देखभाल पर बिना किसी प्रभाव के, अध्ययन से हट सकता/सकती हूँ।
3. मुझे प्रश्न पूछने का अवसर दिया गया है और मेरे प्रश्नों के संतोषजनक उत्तर मिले हैं।
4. मैं शोधकर्ता को अपनी चिकित्सकीय जानकारी तथा WHODAS 2.0 के उत्तरों को शैक्षणिक शोध हेतु उपयोग करने की अनुमति देता/देती हूँ। मेरी पहचान गोपनीय रखी जाएगी।
5. यदि मैं स्वयं सहमति देने में असमर्थ हूँ, तो मेरे कानूनी रूप से अधिकृत प्रतिनिधि मेरी ओर से सहमति दे सकते हैं।

मैं अपनी स्वेच्छा से इस अध्ययन में भाग लेने का निर्णय ले रहा/रही हूँ।

प्रतिभागी का नाम: _____

हस्ताक्षर / बाएँ अंगूठे का निशान: _____

गवाह का नाम: _____

हस्ताक्षर: _____

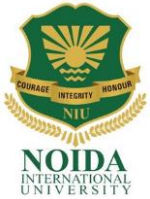
शोधकर्ता का नाम: _____

हस्ताक्षर: _____

दिनांक: _____

स्थान: _____

रोगी सूचित सहमति पत्र



प्रति 2 — शोधकर्ता की प्रति

अध्ययन का शीर्षक: “ तीव्र हेमिप्लेजिया के लिए अस्पताल आधारित न्यूरो-पुनर्वास सेवा में लैंगिक असमानताएँ — नोएडा, ग्रेटर नोएडा में जैव-मनो-सामाजिक निर्धारकों का एक अनुप्रस्थ-काट अध्ययन ”

शोधकर्ता: अरजू एमपीटी (न्यूरो) छात्रा, स्कूल ऑफ एलाइड हेल्थ साइंसेज, नोएडा इंटरनेशनल यूनिवर्सिटी। **मार्गदर्शक:** डॉ. रोहित राठौर, असिस्टेंट प्रोफेसर।

1. मुझे इस अध्ययन के उद्देश्य, प्रक्रिया, लाभ तथा संभावित असुविधाओं के बारे में मेरी समझ की भाषा में बताया गया है।
2. मैं समझता/समझती हूँ कि मेरी भागीदारी पूर्णतः स्वैच्छिक है और मैं किसी भी समय, बिना कारण बताए तथा अपने उपचार या देखभाल पर बिना किसी प्रभाव के, अध्ययन से हट सकता/सकती हूँ।
3. मुझे प्रश्न पूछने का अवसर दिया गया है और मेरे प्रश्नों के संतोषजनक उत्तर मिले हैं।
4. मैं शोधकर्ता को अपनी चिकित्सकीय जानकारी तथा WHODAS 2.0 के उत्तरों को शैक्षणिक शोध हेतु उपयोग करने की अनुमति देता/देती हूँ। मेरी पहचान गोपनीय रखी जाएगी।
5. यदि मैं स्वयं सहमति देने में असमर्थ हूँ, तो मेरे कानूनी रूप से अधिकृत प्रतिनिधि मेरी ओर से सहमति दे सकते हैं।

मैं अपनी स्वेच्छा से इस अध्ययन में भाग लेने का निर्णय ले रहा/रही हूँ।

प्रतिभागी का नाम: _____

हस्ताक्षर / बाएँ अंगूठे का निशान: _____

गवाह का नाम: _____

हस्ताक्षर: _____

शोधकर्ता का नाम: _____

हस्ताक्षर: _____

दिनांक: _____

स्थान: _____

APPENDIX C: CASE RECORD FORM (ENGLISH)

Case Record Form (CRF) — English Version

Study Title: EXPLORING BIOPSYCHOSOCIAL IMPAIRMENT AMONG PATIENT WITH ACUTE HEMIPLEGIA: ADDRESSING GENDER DISPARITIES IN HOSPITAL CARE DELIVERY

This Case Record Form is organised into five structured sections, each corresponding to a distinct category of data described in the Methodology chapter: socio-demographic and clinical profile, baseline clinical functional status, rehabilitation exposure during admission, hospital care delivery (gender disparity indicators), and biopsychosocial functioning as measured by WHODAS 2.0. Data collectors will complete one CRF per enrolled patient, identified solely by study code to preserve confidentiality as described in the relevant chapter.

Study Code: _____ Date of Assessment: ____ / ____ / ____

Hospital: _____

Assessor Name / ID: _____

SECTION A — SOCIO-DEMOGRAPHIC & CLINICAL PROFILE

Variable Record Age (years) Gender ☐ Male ☐ Female Education ☐ No formal ☐ Primary ☐

Secondary ☐ Higher Marital status ☐ Single ☐ Married ☐ Other Residence ☐ Rural ☐ Urban

Occupation Socioeconomic category ☐ Low ☐ Middle ☐ High Type of stroke ☐ Ischaemic ☐

Haemorrhagic Side of hemiplegia ☐ Right ☐ Left Time since stroke onset (hours) First-ever stroke ☐ ☐ Yes No Comorbidities

☐ HTN ☐ ☐ DM Cardiac ☐ Other: ____ Length of hospital stay (days)

This section captures the demographic and baseline clinical covariates discussed in, which will be used both for descriptive characterisation of the cohort (Objective 1) and as potential covariates in the multivariable regression model examining the association between care delivery and outcome (Objective 4).

SECTION B — CLINICAL FUNCTIONAL STATUS (BASELINE)

Variable Record Level of consciousness ☐ Alert ☐ Drowsy ☐ Other Ability to sit unsupported ☐

Yes ☐ No Ability to stand with support ☐ ☐ Yes No Ability to walk (any assistance) ☐ ☐ Yes No Upper-limb voluntary movement present ☐ ☐ Yes No

This section provides a basic clinical snapshot of motor and consciousness status at baseline, allowing characterisation of injury severity independent of, but complementary to, the WHODAS 2.0 biopsychosocial assessment described in Section E below.

SECTION C — REHABILITATION EXPOSURE (DURING ADMISSION)

Variable Record Received physiotherapy ☐ ☐ Yes No Received occupational therapy ☐ ☐ Yes

No Received speech therapy ☐ ☐ Yes No Any psychological / counselling input ☐ ☐ Yes No This section records which categories of multidisciplinary rehabilitation input each patient received, directly supporting the study's examination of multidisciplinary involvement as a hospital care delivery indicator, discussed in the relevant chapter.

SECTION D — HOSPITAL CARE DELIVERY (GENDER DISPARITY INDICATORS)

Variable Record Time to first physiotherapy after admission (hours) Early physiotherapy (≤ 48 h) ☐ Yes

☐ No Total number of physiotherapy sessions

Variable Record Average duration per session (minutes) Multidisciplinary rehabilitation (≥ 2 disciplines) ☐ ☐ Yes No Formal rehabilitation assessment within 72 h ☐ ☐ Yes No Discharge rehabilitation plan documented ☐ ☐ Yes No Referral for outpatient / community rehabilitation ☐ Yes ☐ No

This section operationalises the principal hospital care delivery indicators central to

Objectives 3 and 4 of the present study, as detailed extensively in the relevant chapter, 10 and 11.

Each indicator was selected based on direct correspondence with disparities documented in the international literature reviewed in the relevant chapter.

SECTION E — BIOPSYCHOSOCIAL FUNCTIONING (WHODAS 2.0 – 36 item)

Reference period used: ☐ Past 30 days ☐ Since stroke onset

Domain Score Cognition Mobility Self-care Getting along Life activities Participation Total

WHODAS score

Biopsychosocial impairment present (as per protocol cut-off): ☐ ☐ Yes No

Severity category: ☐ None ☐ Mild ☐ Moderate ☐ Severe

Assessor signature: _____ Date: ____ / ____ / ____

This summary scoring grid records the domain-level and total WHODAS 2.0 scores derived from the full 36-item instrument reproduced in Section 16.4 below, in accordance with the scoring methodology detailed in the relevant chapter.

APPENDIX D: CASE RECORD FORM (HINDI)

के स रिकॉर्ड फॉर्म (CRF) — हिंदी अनुवाद

अध्ययन शीर्षक: तीव्र हेमिप्लेजिया (अर्धांगघात) के रोगियों में जैव-मनो-सामाजिक हानि का अन्वेषण: अस्पताल में देखभाल प्रदायगी में लैंगिक असमानताओं का समाधान

यह के स रिकॉर्ड फॉर्म पाँच संरचित अनुभागों में व्यवस्थित है, जिनमें से प्रत्येक पद्धति अध्याय में वर्णित डेटा की एक अलग श्रेणी से संबंधित है: सामाजिक-जनसांख्यिकीय एवं नैदानिक प्रोफ़ाइल, आधारभूत नैदानिक कार्यात्मक स्थिति, भर्ती के दौरान पुनर्वास सेवाएँ, अस्पताल में देखभाल प्रदायगी (लैंगिक असमानता संकेतक), तथा WHODAS 2.0 द्वारा मापी गई जैव-मनो-सामाजिक कार्यक्षमता। डेटा संग्रहकर्ता प्रत्येक नामांकित रोगी के लिए एक CRF भरेंगे, जिसकी पहचान गोपनीयता बनाए रखने के लिए केवल अध्ययन कोड द्वारा की जाएगी।

अध्ययन कोड: _____ मूल्यांकन की तिथि: ____ / ____ / _____

अस्पताल: _____

मूल्यांकनकर्ता का नाम / आईडी: _____

अनुभाग A — सामाजिक-जनसांख्यिकीय एवं नैदानिक प्रोफ़ाइल

चर	अभिलेख
आयु (वर्षों में)	_____
लिंग	☐ पुरुष ☐ महिला
शिक्षा	☐ औपचारिक शिक्षा नहीं ☐ प्राथमिक ☐ माध्यमिक ☐ उच्च
वैवाहिक स्थिति	☐ अविवाहित ☐ विवाहित ☐ अन्य
निवास	☐ ग्रामीण ☐ शहरी
व्यवसाय	_____
सामाजिक-आर्थिक श्रेणी	☐ निम्न ☐ मध्यम ☐ उच्च
स्ट्रोक का प्रकार	☐ इस्केमिक (रक्त-अवरोधजन्य) ☐ हेमरेजिक (रक्तस्रावी)
हेमिप्लेजिया का पक्ष	☐ दायाँ ☐ बायाँ
स्ट्रोक शुरू होने के बाद बीता समय (घंटों में)	_____
पहला स्ट्रोक (First-ever stroke)	☐ हाँ ☐ नहीं
सहस्रगुणताएँ (सह-बीमारियाँ)	☐ उच्च रक्तचाप ☐ मधुमेह ☐ हृदय रोग ☐ अन्य: _____
अस्पताल में भर्ती की अवधि (दिनों में)	_____

यह अनुभाग जनसांख्यिकीय एवं आधारभूत नैदानिक सहचरों (covariates) को दर्ज करता है, जिनका उपयोग समूह के वर्णनात्मक विवरण (उद्देश्य 1) के लिए तथा देखभाल प्रदायगी और परिणाम के बीच संबंध की जाँच करने वाले बहुचर समाश्रयण मॉडल में संभावित सहचरों के रूप में (उद्देश्य 4) किया जाएगा।

अनुभाग B — नैदानिक कार्यात्मक स्थिति (आधारभूत)

चर	अभिलेख
चेतना का स्तर	☐ सजग ☐ उनींदा ☐ अन्य
बिना सहारे बैठने की क्षमता	☐ हाँ ☐ नहीं
सहारे के साथ खड़े होने की क्षमता	☐ हाँ ☐ नहीं
चलने की क्षमता (किसी भी सहायता से)	☐ हाँ ☐ नहीं
ऊपरी अंग में स्वैच्छिक गति उपस्थित	☐ हाँ ☐ नहीं

यह अनुभाग आधारभूत स्तर पर गतिशीलता एवं चेतना की स्थिति का संक्षिप्त नैदानिक विवरण प्रदान करता है, जिससे नीचे अनुभाग E में वर्णित WHODAS 2.0 जैव - मनो - सामाजिक मूल्यांकन से स्वतंत्र, किं तु उसका पूरक, क्षति की गंभीरता का आकलन संभव होता है।

अनुभाग C — पुनर्वास सेवाएँ (भर्ती के दौरान)

चर	अभिलेख
फिजियोथेरेपी प्राप्त की	☐ हाँ ☐ नहीं
व्यावसायिक चिकित्सा (ऑक्यूपेशनल थेरेपी) प्राप्त की	☐ हाँ ☐ नहीं
वाक् चिकित्सा (स्पीच थेरेपी) प्राप्त की	☐ हाँ ☐ नहीं
कोई मनोवैज्ञानिक / परामर्श सहायता	☐ हाँ ☐ नहीं

यह अनुभाग दर्ज करता है कि प्रत्येक रोगी को बहु - विषयक पुनर्वास की किन श्रेणियों में सेवा प्राप्त हुई , जो अस्पताल देखभाल प्रदायगी के एक संके तक के रूप में बहु - विषयक भागीदारी की अध्ययन द्वारा की जा रही जाँच में प्रत्यक्ष सहायक है।

अनुभाग D — अस्पताल में देखभाल प्रदायगी (लैंगिक असमानता संके तक)

चर	अभिलेख
भर्ती के बाद पहली फिजियोथेरेपी तक का समय (घंटों में)	_____
शीघ्र फिजियोथेरेपी (≤ 48 घंटे)	☐ हाँ ☐ नहीं
फिजियोथेरेपी सत्रों की कुल संख्या	_____
प्रति सत्र औसत अवधि (मिनटों में)	_____
बहु-विषयक पुनर्वास (≥ 2 विषय)	☐ हाँ ☐ नहीं
72 घंटे के भीतर औपचारिक पुनर्वास मूल्यांकन	☐ हाँ ☐ नहीं
डिस्चार्ज पुनर्वास योजना का प्रलेखन	☐ हाँ ☐ नहीं
बाह्य रोगी / सामुदायिक पुनर्वास हेतु रेफरल	☐ हाँ ☐ नहीं

यह अनुभाग अस्पताल में देखभाल प्रदायगी के उन प्रमुख संके तकों को परिभाषित करता है जो इस अध्ययन के उद्देश्य 3 और 4 के केंद्र में हैं। प्रत्येक संके तक का चयन साहित्य समीक्षा अध्याय में समीक्षित अंतरराष्ट्रीय साहित्य में दर्ज असमानताओं से उसके प्रत्यक्ष संबंध के आधार पर किया गया है।

अनुभाग E — जैव-मनो-सामाजिक कार्यक्षमता (WHODAS 2.0 — 36 प्रश्न)

संदर्भ अवधि: ☐ पिछले 30 दिन ☐ स्ट्रोक शुरू होने के बाद से

डोमेन	स्कोर
संज्ञान (समझना एवं संवाद करना)	_____
गतिशीलता (इधर-उधर आना-जाना)	_____
स्वयं की देखभाल	_____
लोगों के साथ तालमेल	_____
जीवन गतिविधियाँ (घरेलू कार्य / कार्य-विद्यालय)	_____
सहभागिता (समाज में भागीदारी)	_____
कुल WHODAS स्कोर	_____

जैव-मनो-सामाजिक हानि उपस्थित (प्रोटोकॉल कट-ऑफ के अनुसार): ☐ हाँ ☐ नहीं गंभीरता श्रेणी: ☐ कोई नहीं ☐ हल्की ☐ मध्यम ☐ गंभीर

मूल्यांकनकर्ता के हस्ताक्षर: _____ तिथि: ____ / ____ / _____ यह सारांश स्कोरिंग ग्रीड पूर्ण 36- प्रश्न उपकरण से प्राप्त डोमेन - स्तरीय एवं कुल WHODAS 2.0 स्कोर दर्ज करता है , जो पद्धति अध्याय में वर्णित स्कोरिंग विधि के अनुसार निकाले जाते हैं।

WHODAS 2.0 Instrument — Background and Permissions

The APA is offering a number of “emerging measures” for further research and clinical evaluation. These patient assessment measures were developed to be administered at the initial patient interview and to monitor treatment progress. They should be used in research and evaluation as potentially useful tools to enhance clinical decision-making and not as the sole basis for making a clinical diagnosis. Instructions, scoring information, and interpretation guidelines are provided; further background information can be found in DSM5. The APA requests that clinicians and researchers provide further data on the instruments’ usefulness in characterizing patient status and improving patient care at <http://www.dsm5.org/Pages/Feedback-Form.aspx>. Measure: WHODAS 2.0 (World Health Organization Disability Assessment Schedule 2.0): 36-item version, self-administered.

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Disability Assessment Schedule (WHODAS 2.0), World Health Organization, 2010, Geneva.

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WHODAS 2.0 — Full 36-Item Instrument

WHODAS 2.0 — World Health Organization Disability Assessment Schedule 2.0 — 36-item version, self-administered

Patient Name: _____ Age: _____ Sex: ☐ Male ☐ Female Date: _____ This questionnaire asks about difficulties due to health/mental health conditions. Health conditions include diseases or illnesses, other health problems that may be short or long lasting, injuries, mental or emotional problems, and problems with alcohol or drugs. Think back over the past 30 days and answer these questions thinking about how much difficulty you had doing the following activities. For each question, please circle only one response.

Clinician Use Only — Numeric scores assigned to each of the items: 1 2 3 4 5 In the last 30 days, how much difficulty did you have in:

Understanding and communicating

- D1.1 Concentrating on doing something for ten minutes? None / Mild / Moderate / Severe / Extreme or cannot do
- D1.2 Remembering to do important things? None / Mild / Moderate / Severe / Extreme or cannot do
- D1.3 Analyzing and finding solutions to problems in day-to-day life? None / Mild / Moderate / Severe / Extreme or cannot do
- D1.4 Learning a new task, for example, learning how to get to a new place? None / Mild / Moderate / Severe / Extreme or cannot do
- D1.5 Generally understanding what people say? None / Mild / Moderate / Severe / Extreme or cannot do
- D1.6 Starting and maintaining a conversation? None / Mild / Moderate / Severe / Extreme or cannot do (Raw Domain Score: 30; Average Domain Score: 5)

Getting around

- D2.1 Standing for long periods, such as 30 minutes? None / Mild / Moderate / Severe / Extreme or cannot do
- D2.2 Standing up from sitting down? None / Mild / Moderate / Severe / Extreme or cannot do
- D2.3 Moving around inside your home? None / Mild / Moderate / Severe / Extreme or cannot do
- D2.4 Getting out of your home? None / Mild / Moderate / Severe / Extreme or cannot do
- D2.5 Walking a long distance, such as a kilometer (or equivalent)? None / Mild / Moderate / Severe / Extreme or cannot do (Raw Domain Score: 25; Average Domain Score: 5)

Self-care

- D3.1 Washing your whole body? None / Mild / Moderate / Severe / Extreme or cannot do
- D3.2 Getting dressed? None / Mild / Moderate / Severe / Extreme or cannot do
- D3.3 Eating? None / Mild / Moderate / Severe / Extreme or cannot do
- D3.4 Staying by yourself for a few days? None / Mild / Moderate / Severe / Extreme or cannot do (Raw Domain Score: 20; Average Domain Score: 5)

Getting along with people

- D4.1 Dealing with people you do not know? None / Mild / Moderate / Severe / Extreme or cannot do
- D4.2 Maintaining a friendship? None / Mild / Moderate / Severe / Extreme or cannot do
- D4.3 Getting along with people who are close to you? None / Mild / Moderate / Severe / Extreme or cannot do
- D4.4 Making new friends? None / Mild / Moderate / Severe / Extreme or cannot do •
- D4.5 Sexual activities? None / Mild / Moderate / Severe / Extreme or cannot do (Raw Domain Score: 25; Average Domain Score: 5)

Life activities — Household

- D5.1 Taking care of your household responsibilities? None / Mild / Moderate / Severe / Extreme or cannot do
- D5.2 Doing most important household tasks well? None / Mild / Moderate / Severe / Extreme or cannot do
- D5.3 Getting all of the household work done that you needed to do? None / Mild /

Moderate / Severe / Extreme or cannot do

- D5.4 Getting your household work done as quickly as needed? None / Mild /

Moderate / Severe / Extreme or cannot do (Raw Domain Score: 20; Average Domain Score: 5)

Life activities — School/Work

If you work (paid, non-paid, self-employed) or go to school, complete questions D5.5– D5.8, below. Otherwise, skip to D6.1.

Because of your health condition, in the past 30 days, how much difficulty did you have in:

- D5.5 Your day-to-day work/school? None / Mild / Moderate / Severe / Extreme or cannot do

- D5.6 Doing your most important work/school tasks well? None / Mild / Moderate /

Severe / Extreme or cannot do

- D5.7 Getting all of the work done that you need to do? None / Mild / Moderate / Severe /

Extreme or cannot do

- D5.8 Getting your work done as quickly as needed? None / Mild / Moderate /

Severe / Extreme or cannot do (Raw Domain Score: 20; Average Domain Score: 5)

Participation in society In the past 30 days:

- D6.1 How much of a problem did you have in joining in community activities (for example, festivities, religious, or other activities) in the same way as anyone else can? None / Mild / Moderate / Severe / Extreme or cannot do

D6.2 How much of a problem did you have because of barriers or hindrances around you? None / Mild / Moderate / Severe / Extreme or cannot do

- D6.3 How much of a problem did you have living with dignity because of the attitudes and actions of others? None / Mild / Moderate / Severe / Extreme or cannot do

- D6.4 How much time did you spend on your health condition or its consequences?

None / Some / Moderate / A Lot / Extreme or cannot do

- D6.5 How much have you been emotionally affected by your health condition?

None / Mild / Moderate / Severe / Extreme or cannot do

- D6.6 How much has your health been a drain on the financial resources of you or your family? None / Mild / Moderate / Severe / Extreme or cannot do

- D6.7 How much of a problem did your family have because of your health problems? None / Mild / Moderate / Severe / Extreme or cannot do

- D6.8 How much of a problem did you have in doing things by yourself for relaxation or pleasure? None / Mild / Moderate / Severe / Extreme or cannot do (Raw

Domain Score: 40; Average Domain Score: 5)

General Disability Score (Total): 180 — Average: 5

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WHODAS 2.0 — Scoring Instructions (Provided by World Health Organization)

The adult self-administered version of the World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0) is a 36-item measure that assesses disability in adults age 18 years and older. It assesses disability across six domains, including understanding and communicating, getting around, self-care, getting along with people, life activities (i.e., household, work, and/or school activities), and participation in society. If the adult individual is of impaired capacity and unable to complete the form (e.g., a patient with dementia), a knowledgeable informant may complete the proxy-administered version of the measure, which is available at www.psychiatry.org/dsm5. Each item on the self-administered version of the WHODAS 2.0 asks the individual to rate how much difficulty he or she has had in specific areas of functioning during the past 30 days.

WHODAS 2.0 Summary Scores

There are two basic options for computing the summary scores for the WHODAS 2.0 36-item full version.

Simple: The scores assigned to each of the items — “none” (1), “mild” (2), “moderate” (3), “severe” (4), and “extreme” (5) — are summed. This method is referred to as simple scoring because the scores from each of the items are simply added up without recoding or collapsing of response categories; thus, there is no weighting of individual items. This approach is practical to use as a hand-scoring approach, and may be the method of choice in busy clinical settings or in paper-and-pencil interview situations. As a result, the simple sum of the scores of the items across all domains constitutes a statistic that is sufficient to describe the degree of functional limitations.

Complex: The more complex method of scoring is called “item-response-theory”

(IRT)– based scoring. It takes into account multiple levels of difficulty for each

WHODAS 2.0 item. It takes the coding for each item response as “none,” “mild,” “moderate,” “severe,” and “extreme” separately, and then uses a computer to determine the summary score by differentially weighting the items and the levels of severity. The computer program is available from the WHO Web site. The scoring has three steps:

- Step 1 — Summing of recoded item scores within each domain.
- Step 2 — Summing of all six domain scores.
- Step 3 — Converting the summary score into a metric ranging from 0 to 100 (where 0 = no disability; 100 = full disability).

WHODAS 2.0 Domain Scores

WHODAS 2.0 produces domain-specific scores for six different functioning domains:

cognition, mobility, self-care, getting along, life activities (household and work/school) and participation.

WHODAS 2.0 Population Norms

For the population norms for IRT-based scoring of the WHODAS 2.0 and for the population distribution of IRT-based scores for WHODAS 2.0, please see http://www.who.int/classifications/icf/Pop_norms_distrib_IRT_scores.pdf

Additional Scoring and Interpretation Guidance for DSM-5 Users

The clinician is asked to review the individual's response on each item on the measure during the clinical interview and to indicate the self-reported score for each item in the section provided for "Clinician Use Only." However, if the clinician determines that the score on an item should be different based on the clinical interview and other information available, he or she may indicate a corrected score in the raw item score box. Based on findings from the DSM-5 Field Trials in adult patient samples across six sites in the United States and one in Canada, DSM-5 recommends calculation and use of average scores for each domain and for general disability. The average scores are comparable to the WHODAS 5-point scale, which allows the clinician to think of the individual's disability in terms of none (1), mild (2), moderate (3), severe (4), or extreme (5). The average domain and general disability scores were found to be reliable, easy to use, and clinically useful to the clinicians in the DSM-5 Field Trials. The average domain score is calculated by dividing the raw domain score by the number of items in the domain (e.g., if all the items within the "understanding and communicating" domain are rated as being moderate then the average domain score would be $18/6 = 3$, indicating moderate disability). The average general disability score is calculated by dividing the raw overall score by number of items in the measure (i.e., 36). The individual should be encouraged to complete all of the items on the WHODAS 2.0. If no response is given on 10 or more items of the measure (i.e., more than 25% of the 36 total items), calculation of the simple and average general disability scores may not be helpful. If 10 or more of the total items on the measure are missing but the items for some of the domains are 75%–100% complete, the simple or average domain scores may be used for those domains.

Frequency of Use

To track change in the individual's level of disability over time, the measure may be completed at regular intervals as clinically indicated, depending on the stability of the individual's symptoms and treatment status. Consistently high scores on a particular domain may indicate significant and problematic areas for the individual that might warrant further assessment and intervention.

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