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(RESEARCH ARTICLE)

An Early Report on the Barthel Index in Niger Delta Stroke Care: A 2007–2008 Cohort Study from University of Port Harcourt Teaching Hospital

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Abstract

Background: Stroke is a leading cause of disability in the Niger Delta, yet systematic functional outcome data from this region remain scarce. This study evaluated the clinical utility and nurse-led feasibility of the Barthel Index (BI) at the University of Port Harcourt Teaching Hospital (UPTH), where no dedicated stroke unit existed and neuroimaging was unreliable during the study period.

Methods: A prospective cohort of 30 consecutive first-ever stroke patients was enrolled from October 2007 to March 2008. Trained ward nurses administered the BI, Mini-Mental State Examination (MMSE), and Glasgow Coma Scale (GCS) at Weeks 1, 6, and 12 post-stroke. Longitudinal changes were examined using one-way repeated-measures ANOVA with least significant difference post-hoc testing.

Results: Mean BI improved from 20.9 at Week 1 to 83.5 at Week 12 ($F = 31.74$, $p < .001$). By Week 12, 16 of 30 participants (53%) had achieved full independence (BI = 100). MMSE rose from 15.7 to 27.6 ($F = 9.56$, $p < .001$) and GCS from 10.6 to 13.9 ($F = 9.72$, $p < .001$). All 30 participants completed every assessment; each session required 5–10 minutes.

Conclusion: This cohort represents one of the earliest documented applications of the BI in Niger Delta stroke care, predating its formal Nigerian validation. Nurse-led bedside assessment was entirely feasible without specialist support. As Nigeria develops stroke unit infrastructure, these 2007–2008 recovery data provide a rare pre–stroke-unit functional baseline for the region.

Keywords: Barthel Index; Stroke rehabilitation; Nigeria; Functional assessment; Nursing assessment; Activities of daily living; Resource-limited setting

1. Introduction

Stroke hits the Niger Delta harder than most places in Nigeria, bringing high levels of lasting harm and loss of life.[1,2] Across sub-Saharan Africa, stroke stands out as the main reason people live with serious physical limits, and that burden has only grown in recent years.[3,4] In hospitals around Nigeria, nearly nine out of every hundred patients are admitted

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due to stroke, and close to two out of ten who die are stroke cases.[5,6] People in the Niger Delta face steeper odds still, because daily habits, poor access to care, and weak health services pile on top of an already heavy load.[1]

Back when I started at UPTH in 2007, nurses had no standard way to measure how patients improved. There was no existing research on the Barthel Index anywhere in the Niger Delta. What made things harder was that the Modified Barthel Index was not get formally validated for Nigerian populations until 2012 — that is, four years after I had already finished collecting this data.[7] Even though stroke cases were common, most big hospitals had no special stroke care teams, and brain scanning tools remained hard to reach. Because machines and specialists were scarce, nurses ended up handling nearly all parts of checking patients right after arrival and over time.

Born in 1965,[8] the Barthel Index checks ten basic daily tasks without needing special tools. Though proven reliable in many parts of the world,[9,10] nobody had looked at how it performs in a Niger Delta clinical setting. The aim here was to find out whether the tool fits well and picks up real changes in patients treated at Medical Ward 3 of UPTH. Because real-world settings differ sharply from ideal validation conditions, testing such scales where they are actually used matters just as much as testing them in theory.

For busy hospital floors, any useful evaluation method must fit smoothly into a nurse's long shift, require minimal training, and deliver clear results. It must be able to track healing one day and shape future bedside teaching the next — all without electricity, specialist hardware, or extra staffing. That was the standard this study was quietly held to, even if nobody wrote it down that way at the time.

This study addressed three objectives: (i) to measure functional status, cognitive performance, and level of consciousness at one week post-stroke using the BI, MMSE, and GCS; (ii) to track changes in those measures across twelve weeks; and (iii) to assess the feasibility of the BI as a routine nursing tool in a resource-limited general medical ward without specialist support.

What This Study Adds

- This is among the earliest documented applications of the Barthel Index in Niger Delta stroke care, predating formal Nigerian validation.
- Two ward nurses achieved 100% protocol completion over 12 weeks with only two hours of orientation — demonstrating the feasibility of structured nurse-led assessment in resource-limited Nigerian settings.
- More than half of stroke survivors achieved full functional independence within three months, in a ward with no stroke unit and no rehabilitation programme.
- These 2007–2008 data provide a rare pre–stroke-unit functional recovery baseline for the Niger Delta, essential for evaluating future service improvements.

2. Methods

2.1. Design and setting

The study used a prospective cohort design. Data were gathered between October 2007 and March 2008 at UPTH, the primary referral hub for Nigeria's South-South zone, serving a catchment population of around 300,000. There was no dedicated stroke unit; neurology support remained minimal, and general teams managed neurological emergencies without specialist backup. Medical Ward 3 (30 beds, three-foot bed spacing, no climate control, and no rehabilitation staff) was the study site. A CT scanner existed but was non-functional for six consecutive weeks during data collection — recorded in contemporaneous notes — so stroke diagnosis relied on careful clinical examination following WHO classification criteria.[11]

2.2. Participants

Thirty consecutive patients with first-ever stroke admitted within 24 hours of symptom onset were enrolled. Inclusion required confirmed stroke diagnosis, age ≥18 years, and capacity for bedside assessment directly or through an interpreter. Excluded were pregnant patients, those admitted for another primary diagnosis, and anyone who declined consent.

2.3. Assessment instruments

The **Barthel Index** measured ten domains of self-care and mobility on a scale from 0 (total dependence) to 100 (full independence). The original English form[8] was used; earlier Nigerian work showed test–retest reliability of r = 0.93.[9] The **MMSE** assessed orientation, memory, attention, language, constructional ability, and recall on a 30-point scale (scores <23 may indicate significant impairment); Cronbach's α in this cohort was 0.86. Because many participants answered in Ijaw, Urhobo, or Nigerian Pidgin rather than English, MMSE scores must be interpreted with caution, as language barriers can mimic cognitive deficits that are not real. The **Glasgow Coma Scale** assessed consciousness through eye opening, verbal response, and motor reaction on a 3–15 scale (scores <13 indicating impairment); intraclass correlation in this cohort was 0.87.

2.4. Data collection

Two ward nurses (Sisters Eunice and Grace) received approximately two hours of guided orientation before independently administering all three instruments. Each patient was assessed during early morning rounds at Weeks 1, 6, and 12. The nurse who conducted the previous assessment did not conduct the next, and all records were stored in sealed folders in a locked cabinet to which only the lead researcher had access. When patients were unable to consent directly, next-of-kin provided permission. Saturday mornings were reserved for Week 12 evaluations to minimise interruptions. Each session took five to ten minutes.

2.5. Ethics

Ethical approval was granted by the UPTH Institutional Review Board (Ref: UPTH/ADM/90/VOL.X/256). Written informed consent was obtained from each participant or their next-of-kin. Participants were informed clearly that declining participation would not affect their care.

2.6. Statistical analysis

Data were entered into SPSS version 14 and verified in STATA version 7. Baseline characteristics were summarized descriptively. One-way repeated-measures ANOVA with least significant difference post-hoc comparisons examined changes across the three time points. Pearson's r tested continuous correlations; chi-square was used for categorical comparisons. Significance was set at $p < .05$.

3. Results

3.1. Participant characteristics

Thirty people participated. Men comprised 16 (53.3%). Ages ranged from 35 to 75 years, with a mean of 59 years. Twenty-three were married; 18 had primary-level schooling; and more than a third worked in unskilled physical occupations. Ischemic stroke affected 18 cases (60.0%), haemorrhagic stroke four (13.3%), and eight (26.7%) remained unclassified because neuroimaging was unavailable. Left-sided weakness was more common, affecting 17 participants (56.7%). Sixteen had documented pre-stroke depressive symptoms. Table 1 presents the full demographic and clinical profile.

Table 1 Demographic and clinical characteristics of participants (n = 30)

Variable / Category	n	%
Age (years)		
31–40	2	6.7
41–50	5	16.7
51–60	10	33.3
≥61	13	43.3
Gender		
Male	16	53.3
Female	14	46.7

Marital status		
Married	23	76.7
Widowed	7	23.3
Education		
Primary	18	60.0
Secondary	4	13.3
Tertiary	8	26.7
Stroke type		
Ischemic	18	60.0
Haemorrhagic	4	13.3
Unclassified	8	26.7
Side of weakness		
Left	17	56.7
Right	13	43.3

Categories without numeric entries are section subheadings.

3.2. Baseline functional status

At Week 1, 19 participants (63.3%) scored 0–20 on the BI (total dependence). Eight scored 21–60; two scored 61–90; and one achieved 100. Twenty-four of thirty (80%) scored below 13 on the GCS. More than half (53.3%) scored 22 or below on the MMSE, though language barriers likely inflated the apparent severity of cognitive impairment. Table 2 presents the full baseline distribution.

Table 2 Baseline functional status at Week 1 (n = 30)

Variable / Category	**n**	**%**
Barthel Index score		
0–20 (Total dependency)	19	63.3
21–60 (Severe dependency)	8	26.7
61–90 (Moderate dependency)	2	6.7
100 (Independence)	1	3.3
MMSE score		
≤22 (Severe impairment)	16	53.3
23–26 (Borderline)	4	13.3
≥27 (Normal)	10	33.3
GCS score		
<13 (Impaired consciousness)	24	80.0
≥13 (Normal)	6	20.0

BI = Barthel Index; GCS = Glasgow Coma Scale; MMSE = Mini-Mental State Examination. MMSE scores should be interpreted with caution in this linguistically diverse sample; language barriers may inflate apparent cognitive impairment.

3.3. Changes in function over time

All three measures showed statistically significant improvement. Mean BI rose from 20.9 (SD 26.6) at Week 1 to 61.7 (SD 31.3) at Week 6 and 83.5 (SD 30.0) at Week 12 ($F = 31.74$, $p < .001$). By Week 12, 16 of 30 participants (53%) had

achieved a BI of 100. MMSE improved from 15.7 to 27.6 ($F = 9.56$, $p < .001$) and GCS from 10.6 to 13.9 ($F = 9.72$, $p < .001$). The BI showed the largest magnitude of change across the three instruments. Table 3 presents the full longitudinal data.

Table 3 Functional, cognitive, and neurological status across three assessment points (n = 30)

Measure	Week 1 Mean (SD)	Week 6 Mean (SD)	Week 12 Mean (SD)	F (p)
Barthel Index	20.9 (26.6)	61.7 (31.3)	83.5 (30.0)	31.74 (<.001)
MMSE	15.7 (12.9)	23.2 (10.4)	27.6 (5.5)	9.56 (<.001)
GCS	10.6 (2.4)	12.8 (3.6)	13.9 (0.4)	9.72 (<.001)

Values are mean (SD). All F-values are significant at $p < .001$. GCS = Glasgow Coma Scale; MMSE = Mini-Mental State Examination; SD = standard deviation.

3.4. Feasibility

After approximately two hours of orientation, both nurses administered all assessments independently. All 30 participants completed every scheduled assessment across 12 weeks (100% completion). Each session was conducted in five to ten minutes using no equipment beyond pen and paper. No participant declined, and no session was interrupted or repeated.

4. Discussion

4.1. Key findings

As far as the authors know, this marks among the first recorded times the Barthel Index was applied to stroke rehabilitation in the Niger Delta. The data were gathered between 2007 and 2008, well ahead of the Modified Barthel Index being formally validated for Nigerian populations by Obembe et al. in 2012.[7] That timing gap matters: it means the feasibility and sensitivity of the original BI were demonstrated here in real clinical practice before its Nigerian psychometric profile was even established.

Sixteen of thirty people could manage fully on their own by Week 12. That aligns with global findings showing that half to 70% of stroke survivors regain meaningful function within three months.[12,13] What makes this striking is the complete absence of structural support: no stroke ward, no rehabilitation programme, no inpatient physiotherapy. Recovery happened regardless, and the BI captured it more sharply than either the MMSE or GCS — the F-value of 31.74 makes that clear.

More than half the cohort scored 22 or less on the MMSE at Week 1, which on the surface looks alarming. But this figure needs to be held carefully. The MMSE was not designed for speakers of Ijaw or Urhobo, and many participants were not confident in English, especially those with aphasia. Studies from better-resourced settings using culturally adapted tools and speech therapy support found cognitive impairment rates of 14% to 40%[14] — the gap between those figures and ours most likely reflects measurement challenge rather than genuinely worse cognition.

4.2. Nurse-led assessment is possible

In Medical Ward 3, the Barthel Index was effective — requiring no specialised tools, only close observation of patients. A nurse could finish it in under ten minutes during a normal ward round. At that time, rehabilitation did not exist inside those walls; movement therapy stayed outside; structured daily living support had not yet arrived. Consequently, nurses bore the full weight of longitudinal evaluation, and they managed it without a single missed assessment. As Ezeugwu et al. later confirmed, most Nigerian nurses and physiotherapists still do not use standardised outcome measures routinely.[15] This study, conducted seventeen years earlier, demonstrates it was always achievable — two hours of orientation, pen and paper, ten minutes per patient.

4.3. What has changed between 2008 and now — and why this baseline still matters

These data are historical, but the problem they were responding to is not. A 2022 nationwide survey confirmed that most Nigerian tertiary hospitals still lack dedicated stroke units.[16] Akinyemi et al. issued a direct call to action in The Lancet Neurology, noting that Africa has not moved quickly enough despite decades of evidence.[17] Aderinto et al.'s 2025 scoping review found that longitudinal rehabilitation data from the Niger Delta remain among the scarcest in African

stroke literature.[18] The World Stroke Organisation confirmed that sub-Saharan Africa now records the world's highest stroke incidence and mortality rates.[3] If stroke units are to change outcomes here, someone must know what recovery looked like before they arrived. These 2007–2008 data provide that record for the Niger Delta. Table 4 summarises the key contextual continuities and changes between 2008 and today.

Table 4 Stroke care context in the Niger Delta: 2007–2008 versus 2024–2025

Domain	2007–2008	2024–2025
Stroke unit availability	No dedicated stroke unit at UPTH or in the Niger Delta	Most Nigerian tertiary hospitals still lack dedicated stroke units; rollout remains uneven[16]
Neuroimaging	CT scanner non-functional for six consecutive weeks	CT access improved at some centres but remains unreliable in the Niger Delta[17]
Standardised outcome tools	No BI validation for Nigeria; no nursing bedside protocol	Modified BI validated for Nigerian language use[7]; routine nursing use remains poor[15]
Rehabilitation	No inpatient physiotherapy; nurses sole evaluators	Rehabilitation capacity improving but coverage unequal across Nigeria[18]
Global stroke burden	SSA already highest-burden region globally	SSA now records highest stroke incidence and mortality worldwide[3]

CT = computed tomography; BI = Barthel Index; SSA = sub-Saharan Africa. Superscript numbers refer to the reference list. [7] Obembe 2012; [15] Ezeugwu 2023; [16] Adeloye 2022; [17] Akinyemi 2021; [18] Aderinto 2025; [3] Feigin 2022.

4.4. Limitations

Thirty participants from a single hospital cannot represent all stroke presentations across Nigeria. Most diagnoses were made by clinical assessment alone because CT was unavailable, which could misclassify subtypes. Post-discharge support is unknown, and the twelve-week cut-off leaves longer-term recovery unexamined. Original paper records were discarded under institutional rules by 2018; raw data therefore cannot be shared for independent verification. MMSE scores in this linguistically diverse sample should be treated as a lower bound on cognitive function rather than a precise measure.

5. Conclusion

In 2007–2008, nurses in a Nigerian teaching hospital used the Barthel Index before it was ever formally validated for local patients, without a stroke unit, without a rehabilitation programme, and with a CT scanner that spent weeks switched off. Training took two hours. The tool fit within a ten-minute window during a normal ward round. More than half the stroke survivors in this cohort achieved full functional independence within three months.

The update this paper adds is direct: the conditions that made these findings necessary in 2008 have not disappeared. Stroke units are coming to Nigeria, and that is welcome progress. But for those units to know whether they improve outcomes, someone must know what recovery looked like before they arrived. For the Niger Delta, this cohort is part of that answer. These numbers need to be in the literature, even now.

Recommendations

- Nursing curricula across Nigeria should include training on the Barthel Index and equivalent standardised functional assessment tools. This study shows that two hours of orientation is sufficient for ward nurses to administer the BI accurately and consistently over twelve weeks.
- As stroke units are established in Nigerian hospitals, the 2007–2008 functional recovery data reported here should be incorporated into national outcome benchmarking. Pre-unit baselines are essential for demonstrating the benefit of new services.
- Future prospective studies should extend follow-up beyond twelve weeks and embed culturally and linguistically adapted cognitive instruments to provide more accurate cognitive outcome data in multilingual Nigerian populations.

Compliance with ethical standards

Disclosure of conflict of interest

The author declares no conflicts of interest in connection with this study.

Statement of ethical approval

Ethical approval was granted by the UPTH Institutional Review Board (Ref: UPTH/ADM/90/VOL.X/256). 'The present research work does not contain any studies performed on animals/humans subjects by any of the authors'.

Statement of informed consent

"Informed consent was obtained from all individual participants included in the study." Written informed consent was obtained from each participant or their next-of-kin. Participants were informed clearly that declining participation would not affect their care.

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