

Urban–Rural Disparities in Access to Epidural Labour Analgesia and Provider Perspectives in Nigeria: A Preliminary Comparative Study

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Abstract

Background: Epidural analgesia is the most effective pharmacological method of intrapartum pain relief, yet its availability across Nigerian healthcare facilities remains limited and unevenly distributed. **Aims:** This preliminary study compared access to, and healthcare providers' perspectives on, epidural labour analgesia between urban and rural Nigerian healthcare facilities. **Methods:** A descriptive cross-sectional survey using a structured, self-administered electronic questionnaire distributed to maternal healthcare providers (midwives, nurses, obstetricians, medical officers, and anaesthetists). Thirty-five valid responses were analysed using descriptive statistics, Pearson's chi-square test, and Fisher's exact test, with significance set at $p < 0.05$. **Results:** Twenty-eight respondents (80.0%) practised in urban facilities and seven (20.0%) in rural facilities. Epidural analgesia was available in 39.3% of urban facilities compared with none in rural facilities ($p = 0.072$). Trained personnel capable of administering epidural analgesia were present in 60.7% of urban facilities versus 0.0% of rural facilities ($p = 0.008$). Rural respondents cited lack of trained staff as a limiting factor in 85.7% of cases, compared with 32.1% of urban respondents ($p = 0.027$). **Conclusion:** Provider attitudes toward the effectiveness and safety of epidural analgesia were favourable in both settings, with no statistically significant urban–rural difference. A substantial urban–rural gap exists in the availability of trained personnel and functional epidural analgesia services in Nigeria, even though provider attitudes toward the intervention are broadly positive in both settings; the principal barriers are structural and human-resource related rather than attitudinal. Given the modest sample size, these findings should be regarded as preliminary and hypothesis-generating rather than nationally representative. Targeted investment in training, equipment, and government funding, particularly for rural and primary healthcare facilities, is recommended to close this gap, alongside larger, probability-sampled replication.

Keywords: epidural labour analgesia; access to care; urban–rural disparities; healthcare provider perspectives



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Introduction

Labour pain is among the most intense forms of pain a woman may experience, and how it is managed shapes

both the immediate birth experience and, in some cases, longer-term maternal and neonatal outcomes. Epidural analgesia, achieved by injecting local anaesthetic near the

nerves that transmit pain in the lower spine, is widely regarded as the most effective pharmacological method of intrapartum pain relief currently available (Anim-Somuah et al., 2018). The World Health Organization has affirmed that women in labour have a right to pain relief, positioning access to effective analgesia as a core component of respectful, woman-centred intrapartum care (World Health Organization, 2018). Despite this global consensus, uptake of epidural analgesia in many low- and middle-income countries, including Nigeria, remains comparatively low, constrained less by clinical demand than by structural barriers in the health system itself.

Nigerian studies conducted principally in urban tertiary teaching hospitals have documented persistently low patient awareness and uptake of epidural labour analgesia (Fyनेface-Ogan et al., 2009; Ogboli-Nwasor & Adaji, 2014; Okojie & Isah, 2014; Oladokun et al., 2009; Olaleye et al., 2020). Notably, an early survey at a leading Nigerian teaching hospital found that only 19.5% of antenatal attendees were aware epidural analgesia existed as an option, and that no labour epidural service was available at that institution at all (Oladokun et al., 2009), while a separate hospital-based study in Port Harcourt similarly found that women's views of epidural anaesthesia were shaped as much by limited exposure to the concept as by any informed weighing of its risks and benefits (Fyनेface-Ogan et al., 2009). Elsewhere in West Africa, qualitative work among Ghanaian midwives found that providers often default to non-pharmacological pain management not by clinical preference but because pharmacological options are simply unavailable in practice (Aziato et al., 2017). These patient-facing and provider-facing findings point to the same underlying reality: epidural labour analgesia in Nigeria is not merely underused; it is frequently unobtainable. Nigeria's health workforce, including the anaesthetists and trained midwives capable of safely administering epidural analgesia, is disproportionately concentrated in urban centers and tertiary institutions, leaving rural facilities chronically short of the specialist personnel this intervention requires (Nwankwo et al., 2022), while epidural analgesia additionally depends on a chain of supporting infrastructure, continuous fetal monitoring, reliable electricity and drug supply, and sterile procedure kits, which are more likely to be incomplete in poorly resourced rural and primary facilities.

Existing Nigerian research has concentrated heavily on patient awareness within single urban tertiary hospitals; far less is known about how the availability of epidural analgesia, trained personnel, and facility-level protocols differ systematically between urban and rural healthcare facilities across a broader spread of the country, or about how the providers responsible for offering the service

perceive the barriers that limit it. Without this comparative, provider-level evidence, policy responses risk being designed around the patient-awareness gap alone, while leaving the underlying supply-side gap in personnel, equipment, funding, and protocols largely unaddressed. The central research question this study addressed was: Does access to epidural labour analgesia, and the enabling infrastructure that supports it, differ systematically between urban and rural healthcare facilities in Nigeria?

This study therefore compared access to, and provider perspectives on, epidural labour analgesia between urban and rural Nigerian healthcare facilities, using a descriptive cross-sectional survey of maternal healthcare providers, and examined the research question of whether a statistically significant urban-rural difference exists in the availability of epidural labour analgesia services, trained personnel, and standard guidelines or protocols. The specific objectives were to compare, between urban and rural facilities: (i) the availability of epidural analgesia services, trained personnel, and standard protocols; (ii) the frequency with which epidural analgesia is administered; (iii) provider-perceived barriers to its provision; (iv) provider attitudes toward its effectiveness, safety, and appropriateness; and (v) provider-recommended strategies for improving access.

Methods

This study adopted a descriptive, cross-sectional survey design with a comparative analytic approach. The target population comprised maternal healthcare providers (midwives, nurses, obstetricians, medical officers, and anaesthetists) practising in primary, secondary, or tertiary healthcare facilities in urban or rural locations across Nigeria, recruited through a combination of convenience and snowball sampling via professional and institutional networks. Snowball sampling began with direct invitations to maternal healthcare providers known to the research team, who were then asked to refer eligible colleagues; recruitment continued until the four-week data collection window closed [Author: please confirm/insert the initial seed contact(s) and exact recruitment cut-off date]. A minimum indicative sample size of approximately 43 was estimated using the Cochran (1977) formula for an unknown population proportion ($n_0 = Z^2pq/e^2$, with $p = 0.5$, $e = 0.15$, 95% confidence); following a four-week electronic data collection window, 35 valid responses were retained for analysis (81.4% of the calculated target). The questionnaire was administered via [Author: please confirm survey platform, e.g. Google Forms/SurveyMonkey]; a total of [Author: please confirm number of invitations/links distributed] invitations were sent, yielding a response rate of [Author: please calculate]. Duplicate submissions were minimised by [Author: please

confirm mechanism, e.g. one response per email address/device, or a unique access link per respondent].

Data were collected using a structured, self-administered electronic questionnaire comprising 25 items across five sections: socio-demographic and professional characteristics; knowledge and formal training on epidural analgesia; facility-level service availability (availability, frequency of administration, trained personnel, standard protocols, and perceived barriers); provider attitudes (five-point Likert items on effectiveness, safety, appropriateness for routine offer, and the value of increased funding); and two open-ended items on perceived barriers and recommended strategies. The study supervisors and two independent senior maternal healthcare practitioners reviewed the instrument for face and content validity, and each item was mapped against the study's specific objectives; the instrument was piloted with five providers before full deployment, and minor wording revisions were made to two items.

Data were analysed using Python (pandas and SciPy libraries). Descriptive statistics summarised respondent characteristics and categorical responses. Pearson's chi-square test compared urban and rural facilities on categorical outcomes where expected cell counts permitted; Fisher's exact test was used where expected cell counts fell below five, which was frequently the case given the smaller rural sub-sample ($n = 7$). An independent-samples t-test compared mean respondent age between

groups. Statistical significance was set at $p < 0.05$. Open-ended responses were analysed using inductive thematic content analysis. Ethical approval was obtained from the Center for Health Systems Support and Development Research Ethics Panel prior to data collection; all respondents provided electronic informed consent, participation was voluntary and anonymous, and no personally identifying information was collected. Ethical approval for this study was obtained from the Center for Health Systems Support and Development Research Ethics Panel, University of Abuja [HREC number: FCT/UACHSSD/HREC/0153]. All participants provided electronic informed consent before participating.

Results

Thirty-five valid responses were analysed: 28 (80.0%) from urban and 7 (20.0%) from rural facilities. Mean respondent age was 45.5 years ($SD = 9.3$; range 31–64); urban respondents' mean age was 45.0 years ($SD = 9.8$) and rural respondents' 47.7 years ($SD = 7.1$), with no significant difference ($t = -0.84$, $p = 0.417$, 95% CI). The sample was predominantly female (28/35, 80.0%) and predominantly midwives and nurses (28/35, 80.0%). All 15 tertiary-facility respondents practised in urban areas, and no rural respondent practised in a tertiary facility (Table 1).

Table 1 Socio-demographic and professional characteristics of respondents by facility location

Characteristic	Category	Urban n (%)	Rural n (%)	Total n (%)
Age (years)	Mean $\pm$ SD	45.0 $\pm$ 9.8	47.7 $\pm$ 7.1	45.5 $\pm$ 9.3
Gender	Female	21 (75.0)	7 (100.0)	28 (80.0)
	Male	7 (25.0)	0 (0.0)	7 (20.0)
Profession	Midwife/Nurse	22 (78.6)	6 (85.7)	28 (80.0)
	Obstetrician	2 (7.1)	0 (0.0)	2 (5.7)
	Medical Officer	1 (3.6)	0 (0.0)	1 (2.9)
	Anaesthetist	1 (3.6)	0 (0.0)	1 (2.9)
	Other	2 (7.1)	1 (14.3)	3 (8.6)
Experience	≥ 15 years	14 (50.0)	6 (85.7)	20 (57.1)
Facility type	Primary	4 (14.3)	6 (85.7)	10 (28.6)
	Secondary	9 (32.1)	1 (14.3)	10 (28.6)
	Tertiary	15 (53.6)	0 (0.0)	15 (42.9)
Sector	Government	23 (82.1)	7 (100.0)	30 (85.7)
	Private	5 (17.9)	0 (0.0)	5 (14.3)

Most respondents (29/35, 82.9%) reported familiarity with epidural labour analgesia, with no significant urban–rural difference (24/28 urban, 85.7% vs. 5/7 rural, 71.4%; $p = 0.576$). Formal training was far less common: only 9/35 (25.7%) of respondents had received formal

training, numerically lower among rural (1/7, 14.3%) than urban (8/28, 28.6%) respondents, though not statistically significant ($p = 0.648$).

Only 31.4% of facilities had epidural analgesia available overall. The urban–rural difference was

pronounced: 39.3% of urban facilities reported availability compared with 0.0% of rural facilities ($\chi^2 = 7.37$, $df = 2$, $p = 0.025$ for the three-category outcome; Fisher's exact $p = 0.072$ for the collapsed binary comparison). The disparity was statistically decisive for

trained personnel: 60.7% of urban facilities had trained personnel available versus 0.0% of rural facilities ($p = 0.008$). Standard guidelines or protocols followed the same pattern (32.1% urban vs. 0.0% rural; $p = 0.153$) (Table 2).

Table 2 Availability of epidural analgesia services and enabling infrastructure by facility location

Indicator	Urban n (%)	Rural n (%)	Total n (%)	p-value
Epidural analgesia available	11 (39.3)	0 (0.0)	11 (31.4)	0.072
Trained personnel available	17 (60.7)	0 (0.0)	17 (48.6)	0.008*
Standard protocols in place	9 (32.1)	0 (0.0)	9 (25.7)	0.153

*Statistically significant at $p < 0.05$ (Fisher's exact test).

Collapsing frequency of administration into "ever administered" versus "never," 57.1% of urban respondents reported epidural analgesia was ever administered at their facility compared with 28.6% of rural respondents; this difference did not reach statistical significance ($p = 0.229$). The most frequently cited barriers overall were financial constraints, poor patient awareness, and lack of trained staff (15/35, 42.9% each). Lack of trained staff was the only barrier to differ significantly by location: cited by 6/7 rural respondents (85.7%) versus

9/28 urban respondents (32.1%) ($p = 0.027$, $OR = 0.079$) (Table 3). As all seven rural respondents practised in primary-level facilities and none in a tertiary facility (Table 1), this urban-rural comparison is potentially confounded by facility type: the near-total absence of trained personnel and epidural services in the rural sub-sample may reflect the primary-versus-tertiary facility-type imbalance between the two groups as much as geographic location per se, and should be interpreted with this caveat in mind.

Table 3 Provider-reported barriers to epidural analgesia services by facility location

Barrier	Urban n (%)	Rural n (%)	Total n (%)	p-value
Lack of trained staff	9 (32.1)	6 (85.7)	15 (42.9)	0.027*
Financial constraints	13 (46.4)	2 (28.6)	15 (42.9)	0.672
Poor patient awareness	13 (46.4)	2 (28.6)	15 (42.9)	0.672
Cultural beliefs	10 (35.7)	2 (28.6)	12 (34.3)	1.000
Inadequate equipment	9 (32.1)	2 (28.6)	11 (31.4)	1.000

*Statistically significant at $p < 0.05$. Percentages do not sum to 100% as respondents could select more than one barrier.

Attitudes toward epidural analgesia's clinical value were favourable overall: 33/35 (94.3%) of respondents agreed or strongly agreed it is effective in reducing labour pain, 32/35 (91.4%) that it improves maternal satisfaction, and 31/35 (88.6%) that it is safe for mother and baby. Agreement was more muted on routine universal offer, endorsed by only 15/35 (42.9%) of respondents. None of the four core attitude items differed

significantly between urban and rural respondents (p -values 0.095–1.000) (Table 4). Separately, 21/35 (60.0%) of all respondents, in similar proportions across both settings (20/28 urban and 5/7 rural, 71.4% alike), agreed that rural facilities face greater barriers than urban facilities, and 30/35 (85.7%) agreed that increased government funding could improve access.

Table 4 Provider attitudes toward epidural labour analgesia by facility location (% agree/strongly agree)

Attitude statement	Urban (%)	Rural (%)	Overall (%)	p-value
Effective in reducing labour pain	92.9	100.0	94.3	1.000
Improves maternal satisfaction	96.4	71.4	91.4	0.095
Safe for mother and baby	89.3	85.7	88.6	1.000
Should be routinely offered	42.9	42.9	42.9	1.000

All 35 respondents provided at least one free-text recommendation. Training and capacity-building and public and patient awareness were the most frequently

cited themes (each 54.3%), followed by government funding or policy change (48.6%), staffing provision (37.1%), equipment provision (17.1%), and standard

protocols (5.7%) (Table 5). One rural respondent observed: "More Midwives to be trained mostly in Primary health care"; an urban respondent similarly noted, "Very few trained staff to administer epidural, and patient on epidural labour analgesia requires electronic fetal monitoring. This equipment is scarce in our facilities."

Table 5 Thematic analysis of provider-recommended strategies for improving access

Theme	Respondents citing theme n (%)
Training/capacity-building	19 (54.3)
Public/patient awareness	19 (54.3)
Government funding/policy	17 (48.6)
Staffing/human resources	13 (37.1)
Equipment/commodities	6 (17.1)
Standard protocols/guidelines	2 (5.7)

Discussion

This study found a consistent overall pattern: providers in both urban and rural Nigerian facilities hold broadly favourable attitudes toward epidural analgesia, yet the structural means to translate those attitudes into service delivery are concentrated overwhelmingly in urban facilities. Every tertiary-facility respondent practiced in an urban area, mirroring the well-established concentration of Nigeria's physician and nursing workforce, and of higher-level health infrastructure more broadly, in urban centers (Nwankwo et al., 2022). This study extends that general workforce finding by showing how it translates into access to epidural labour analgesia, a service not previously examined through a facility-level, provider-reported, urban–rural comparative lens in the Nigerian literature.

A striking finding was the gap between general familiarity with epidural analgesia (82.9%) and formal training in its administration (25.7%), present in both settings but somewhat wider in rural facilities. This is consistent with the broader Nigerian pattern in which awareness of epidural analgesia has tended to outpace both patient uptake and provider readiness to deliver it (Oladokun et al., 2009; Ogboli-Nwasor & Adaji, 2014), and echoes a comparable provider survey in Ethiopia, where reasonable general knowledge of labour analgesia coexisted with considerably more limited hands-on training (Melesse et al., 2022). A provider who is aware of, and favourable toward, epidural analgesia but has never been trained to administer it cannot convert that awareness into service delivery.

The central finding, that not a single rural respondent reported trained personnel available at their facility compared with 60.7% of urban respondents, is consistent with, and adds Nigeria-specific, service-level detail to, the

broader literature on rural–urban health workforce maldistribution (Nwankwo et al., 2022), and with international literature describing obstetric anaesthesia services in low-resource settings as constrained principally by workforce shortages rather than by clinical demand or attitudinal resistance (Anim-Somuah et al., 2018). That lack of trained staff was the only individual barrier to differ significantly by location, cited by 85.7% of rural respondents, reinforcing personnel shortage as the single most differentiating obstacle between the two settings, distinct from financial constraints, patient awareness, and cultural beliefs, which were common in both settings without significant urban–rural difference.

These findings are usefully interpreted through Andersen's Behavioural Model of Health Services Use (Andersen, 1995), which distinguishes predisposing factors (provider profession, experience, and prior training), enabling factors (personnel, equipment, funding, and protocols), and need or perceived-value factors (provider attitudes toward effectiveness and safety) as joint determinants of service use and provision. Applied at the facility level, as in this study, the model's central proposition— that even strong predisposing and need factors will not translate into actual service provision in the absence of adequate enabling factors— offers a coherent explanation for the pattern observed here: broadly favourable provider attitudes and reasonable general awareness (predisposing and need dimensions) coexisting with starkly unequal service availability (the enabling dimension) (Xin et al., 2023). Within this framework, the rural sub-sample shows a near-total absence of enabling factors despite intact predisposing and need factors, the configuration the model predicts would produce the service gap this study documented (Saunders et al., 2024; Lederle et al., 2021).

The study's central, initially counter-intuitive finding is the coexistence of favourable, statistically indistinguishable provider attitudes with sharply divergent service availability. It suggests that the main obstacle to expanding access to epidural labour analgesia in rural Nigeria is a shortfall in enabling infrastructure, personnel, protocols, equipment, and funding, rather than any deficit in provider knowledge, attitude, or willingness. This has a direct practical implication: attitudinal or awareness-based interventions targeted at providers are unlikely to meaningfully close this gap, since providers already hold favourable views; resource-focused interventions that prioritise training and deploying skilled personnel to rural and primary facilities are the more promising lever (Udenigwe et al., 2021; Oluwole et al., 2022). It is also important to note that, because every rural respondent in this sample practised at a primary-level facility and every tertiary-facility respondent practised in an urban area, the observed urban–rural gap is entangled

with a facility-type gap; policy responses should therefore extend beyond staff deployment alone to include deliberate capacity-building, equipment provision, and protocol development at rural primary and secondary facilities, so that these lower tiers of care are structurally equipped to offer epidural services rather than relying on referral to distant tertiary centers (Dennis & Sheridan, 2023). Consistent with this interpretation, the strategies providers themselves most frequently recommended, training and capacity-building and public awareness, align closely with the study's empirical findings, while standard protocols and guidelines, despite their evident structural importance, were the least frequently recommended strategy, perhaps because frontline providers experience the absence of trained staff and equipment as the more immediately felt constraint than the comparatively administrative gap of undocumented protocols (McBride & Moucheraud, 2022).

Agreement on whether epidural analgesia should be routinely offered to all women in labour was also considerably more muted (42.9%) than agreement on its effectiveness, satisfaction contribution, or safety (88.6–94.3%), and this pattern held equally in both settings. This divergence suggests that Nigerian providers, even where resources exist, may hold a more nuanced clinical view than a simple resource-access narrative alone would predict: favourable evaluation of epidural analgesia as an option does not straightforwardly translate into support for it as a default, routinely offered intervention, an important qualification for policy language that should perhaps favour informed patient choice within an expanded, better-resourced service, rather than treating routine universal offer as an unqualified policy objective in its own right (World Health Organization, 2018).

Limitations

This study's achieved sample of 35, and particularly the rural sub-sample of only 7 respondents, fell short of the pre-specified target of approximately 43 and limited statistical power to detect urban–rural differences with confidence; several comparisons showing strong, consistent directional differences did not reach conventional significance, which should be interpreted as a power limitation rather than evidence of equivalence. The non-probability convenience and snowball sampling techniques mean the sample cannot be assumed statistically representative of Nigerian maternal healthcare providers, and the pronounced urban skew (80.0%) may partly reflect the researcher's professional network. Providers self-reported all data rather than having them independently verified against facility records, and the cross-sectional design cannot establish causal direction. Finally, the study examined provider-reported outcomes

only and did not incorporate direct patient-level data on maternal satisfaction or clinical safety outcomes.

Conclusion

This preliminary study compared access to and provider perspectives on epidural labour analgesia between urban and rural healthcare facilities in Nigeria using a descriptive cross-sectional survey of 35 maternal healthcare providers. It found a pronounced and statistically significant urban–rural gap in trained personnel availability in the enabling infrastructure required to deliver epidural analgesia, coexisting with favourable and statistically indistinguishable provider attitudes toward the intervention across both settings. In relation to the study's research question, we confirmed a statistically significant urban–rural difference in trained-personnel availability, with strong, directionally consistent, though not statistically significant, support for the remaining two indicators (epidural analgesia availability and standard protocols). Addressing this gap will require resource-focused interventions that prioritise training and deploying skilled personnel, functional equipment, and government funding for rural and primary healthcare facilities, alongside developing and enforcing standard labour analgesia protocols, rather than attitudinal or awareness-based interventions directed at providers. Given the small, non-probability sample, these findings are indicative rather than definitive and should be treated as hypothesis-generating; larger, nationwide probability-sampled replication and facility-level audits are necessary to confirm and extend these findings before they inform national policy.

Declaration of Conflicting Interest

The authors declare no conflicts of interest.

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Author's Contribution

Dhikroh Oriyomi Adekola: conceptualization, methodology, data collection, formal analysis, writing – original draft. **Khadijat T. Musah:** supervision, conceptualization, writing – review and editing. **Saheed Ayodeji Adekola:** supervision, writing – review and editing. All authors made substantial contributions to the conception and design of the study, the acquisition, analysis, or interpretation of data, and

the drafting or critical revision of the manuscript for important intellectual content; all authors gave final approval of the version submitted and agree to be accountable for all aspects of the work.

Data Availability Statement

The datasets analysed during the current study are available from the corresponding author on reasonable request, in accordance with the journal's data-sharing policy.

Declaration of Use of AI in Academic Writing

AI-based language and formatting assistance (Claude, Anthropic) was used to help condense and reformat this manuscript for journal submission from the authors' original seminar report. The authors conducted the underlying research design, data collection, statistical analysis, and scientific interpretation. The authors did not use AI to generate, alter, or interpret research data or findings.

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