



Acoustic Analysis of Nigerian English... Muhammad, K. B. & Sule, M. (2025)

Acoustic Analysis of Nigerian English Vowels: A Comparative Phonetic Study of Educated and Non-Educated Speakers

MUHAMMAD, Khadijah Bala¹
muhammadkhadijah616@gmail.com

SULE, Muhammad²
muhammadsule@fugusau.edu.ng

¹Department of Education Foundations, College of Education, Open and Distance Learning, Kampala International University, Kampala, Uganda

²Department of Educational Foundations, Federal University Gusau, Zamfara State, Nigeria

Abstract

Nigerian English (NE) displays notable phonetic diversity, particularly in its vowel systems, shaped by the interplay of indigenous languages, social factors, and formal education. While prior research has extensively examined major NE varieties such as Yoruba, Hausa, and Igbo English, less attention has been given to minority sub-varieties, including Tiv and Urhobo English. This study presents a comprehensive acoustic investigation of vowel production in educated and non-educated speakers of these underexplored varieties, aiming to understand how formal education and social exposure influence vowel realization. A total of forty native NE speakers participated, evenly split between educated individuals (holding at least a bachelor's degree) and non-educated individuals (with primary or secondary education). Speech samples were collected through word lists and controlled sentences in quiet settings and analyzed using Praat software to measure vowel formants (F1, F2, F3), duration, and spectral features. Findings reveal systematic differences: educated speakers produced vowels closely aligned with Standard British English norms, whereas non-educated speakers exhibited vowel centralization, reduction, diphthong simplification, and substitutions influenced by their first languages. Specifically, monophthongs such as /i:/ and /ɔ:/ were altered in non-educated speech, while diphthongs like /eɪ/ and /aɪ/ often became monophthongized. Vowel duration was generally longer in educated speakers, contributing to perceptible differences in intelligibility and prosody. These results suggest the emergence of a socially stratified NE vowel system and underscore the significant role of education and social experience in shaping vowel production. The study expands our understanding of NE phonology and highlights the need to include speakers from diverse educational and regional backgrounds in future phonetic and sociolinguistic research.

Keywords: Nigerian English, vowel acoustics, educated, non-educated speakers,

Introduction

Nigerian English (NigE) has long been a central focus of phonological research, particularly regarding its vowel systems. Early foundational studies, such as Dunstan (1969), examined the phonologies of twelve Nigerian languages in comparison with English, identifying specific areas that posed challenges for English language instruction in Nigeria. Building on this foundation, later research by Jibril (1982, 1986) and Jowitt (1991) categorized NigE into Northern and Southern varieties, highlighting the prominence of Hausa, Igbo, and Yoruba English. However, these influential studies often overlooked the phonological diversity present among smaller ethnic groups. More recent research has begun to address this gap by examining underrepresented varieties, including Urhobo and Tiv English (Amoniyan, 2023; Aor, 2021), thereby broadening the understanding of NigE phonology.



Acoustic Analysis of Nigerian English... Muhammad, K. B. & Sale, M. (2025)

Prior studies suggest that vowel patterns in NigE are largely predictable and strongly influenced by speakers' native phonologies (Simo Bobda, 2007; Jibril, 1982; Jowitt, 1991; Udofot, 1997). While this characterization generally applies to major varieties, it oversimplifies the more nuanced variations found in minority sub-varieties. The present study seeks to provide a detailed acoustic analysis of vowel systems in Urhobo and Tiv English, comparing the speech of educated and non-educated speakers to examine the influence of formal education and English exposure on vowel production.

Vowel Patterns in Nigerian English

The acoustic properties of vowels, including duration, formant frequencies, and spectral characteristics, are essential for understanding phonetic variation in NigE. Research indicates that vowel realization often diverges from Standard British English (SBE) due to the influence of indigenous phonological structures (Adegbembo et al., 2021; Melefa & Amoniyan, 2020; Mustapha, 2004). For instance, in Yoruba English, the schwa /ə/ in unstressed syllables is frequently replaced by stronger vowels such as /a/ or /ɑ:/, resulting in alterations to stress patterns and vowel quality. Additionally, vowel insertion to resolve syllabic consonants, a feature transferred from native consonant-vowel structures, affects both vowel duration and quality, particularly among non-educated speakers. Despite extensive research on major NigE varieties, systematic acoustic comparisons between educated and non-educated speakers remain limited. Most studies have relied on word lists or reading passages, often neglecting spontaneous speech. Consequently, careful comparisons of vowel formants (F1, F2, and F3), duration, and spectral characteristics across educational and social groups are necessary to understand how education and English exposure shape vowel production in Nigerian English.

Tiv and Urhobo English as Understudied Varieties

Similar to the under-researched Tiv English (Aor, 2021; Mbapuun, 2021), Urhobo English represents a sub-variety of NigE spoken by minority ethnic groups whose vowel systems may differ significantly from the major varieties. Investigating these sub-varieties is essential for developing a comprehensive understanding of NigE's phonetic landscape. Comparing vowel production between educated and non-educated speakers in these groups can illuminate the extent to which native phonology, second-language acquisition, and formal education collectively influence vowel realization in Nigerian English.

Literature Review

Phonological Studies of Nigerian English

Extensive research has explored the phonology of Nigerian English (NigE), examining both segmental and suprasegmental features. Scholars have investigated vowel shifts, stress patterns, and rhythm, consistently highlighting the influence of indigenous languages on English pronunciation. For instance, Melefa and Amoniyan (2020) analyzed stress patterns in Tiv English, identifying unique stress behaviors shaped by native phonologies. Similarly, Amoniyan (2023) studied stress assignment among Tiv English speakers, demonstrating how first-language acquisition impacts second-language learning and English prosody. Recent investigations have also focused on the vowel systems of specific Nigerian languages. Aziza (2025) conducted a detailed phonemic analysis of Tiv vowels, distinguishing /v/, /ɔ/, /o:/, and /ɔ:/ as distinct phonemes. Likewise, Aor (2021) examined phonemic substitutions in the English-Tiv loan phonology, analyzing how vowel and consonant substitutions influence Tiv grammar and highlight patterns of L1 transfer into English. These studies underscore the complexity and variability of vowel systems in Nigerian English, particularly in under-researched sub-varieties.



Acoustic Analysis of Nigerian English... Muhammad, K. B. & Sale, M. (2025)

Acoustic Analyses of Vowel Systems

Acoustic studies have provided critical insights into the vowel systems of Nigerian languages. A comparative acoustic study of Gokana and Urhobo vowel systems by Amoniyon (2024) examined their phonetic, phonological, and acoustic properties, revealing both distinctions and similarities in vowel realization. Similarly, Ekiugbo (2019) presented a descriptive phonological analysis of Uvwie, exploring its phonemic inventory and the organization of its vowel system. These investigations highlight the essential role of acoustic analysis in capturing the fine-grained characteristics of Nigerian English vowels and point to the need for further studies in this area, especially for minority sub-varieties.

Objectives of the Study

This study seeks to:

1. Identify and characterize unique vowel patterns in the evolving Urhobo English sub-variety, highlighting their relevance to the ongoing standardization of Nigerian English.
2. Expand the database of Nigerian English vowel phonology beyond the dominant Hausa, Igbo, and Yoruba English varieties.
3. Compare vowel formants (F1, F2, F3), duration, and spectral properties between educated and non-educated speakers to understand the influence of education and exposure to English on vowel production.

Social Influence on Nigerian English Vowels

Research indicates that mother-tongue interference plays a significant role in shaping vowel realization in Nigerian English (NE). For example, Yoruba speakers often replace the Received Pronunciation (RP) vowel /ɪ/ with [i], while Hausa speakers may centralize /ʊ/ toward [u] (Adegbembo et al., 2021; Usar & Ofoegbu, 2017). These patterns are especially pronounced among non-educated speakers, who rely heavily on native phonological structures and have limited exposure to formal English instruction. In contrast, educated speakers produce vowel qualities that more closely approximate Standard British English (SBE), reflecting the influence of formal education and extensive exposure to English (Aor, 2021; Melefa & Amoniyon, 2020). These findings suggest that social and educational factors interact to create a socially stratified phonetic landscape within Nigerian English, emphasizing the need to consider both linguistic background and educational context when analyzing vowel production.

Methodology

The study involved forty native Nigerian English (NE) speakers, divided evenly into two groups based on educational background: Educated speakers (n = 20): are Participants having at least a bachelor's degree, demonstrated fluency in NE, and had consistent exposure to formal English instruction and non-educated speakers (n = 20): are Participants had completed only primary or secondary education and had limited exposure to formal English. All participants reported at least one Nigerian first language (L1), and individuals with extended residence outside Nigeria (more than two years) were excluded to control for foreign language influence. Participants' ages ranged from 20 to 55 years, with balanced representation of males and females across both groups, ensuring demographic diversity. Two types of speech materials were employed to elicit vowel production: Word list: A set of 50 target words representing all major NE vowel phonemes in controlled phonetic contexts. This allowed for systematic measurement of vowel properties under consistent conditions. Sentences: Carefully constructed sentences were used to elicit connected speech and natural prosody, minimizing reading-induced hyper articulation and providing a more accurate representation of spontaneous vowel production.



Acoustic Analysis of Nigerian English... Muhammad, K. B. & Sale, M. (2025)

Acoustic Analysis

Speech data were recorded using high-quality digital recorders in quiet environments or sound-treated rooms to ensure optimal clarity. Acoustic analysis was conducted using **Praat software** (Boersma & Weenink, 2024), which enabled precise extraction of vowel formants (F1, F2, F3) and measurement of vowel duration. **Formant measurement:** The midpoint of monophthongs was measured, while diphthongs were analyzed at multiple trajectory points to capture their dynamic spectral characteristics and **Duration measurement:** Vowel duration was determined from onset to offset using combined spectrographic and waveform cues, ensuring accurate temporal analysis. This methodology ensured rigorous, systematic, and reliable acoustic analysis of vowel production across both educated and non-educated NE speakers.

Presentation of Results

Monophthong Variation

The acoustic analysis revealed systematic differences between educated and non-educated Nigerian English (NE) speakers in the production of monophthong vowels. Educated speakers generally produced vowels closer to Standard British English (SBE) norms, whereas non-educated speakers exhibited systematic shifts influenced by their native languages.

Table 4.1

Vowel	SBE	Educated NE	Non-Educated NE	Observation
/i:/	[i:]	[i]	[ɪ]	Non-educated speakers show slight centralization.
/ɛ/	[ɛ]	[ɛ]	[e]	Raising observed in non-educated NE.
/ɔ:/	[ɔ:]	[ɔ]	[a]	Shortening and lowering in non-educated NE.

Educated speakers-maintained vowel qualities that approximated SBE norms, whereas non-educated speakers demonstrated consistent centralization and lowering or raising of vowels. This suggests a strong influence of first-language phonology on NE vowel production among non-educated speakers (Adegbebo et al., 2021; Mustapha, 2004).

Diphthong Simplification

Diphthongs were particularly susceptible to simplification in non-educated speakers, often resulting in monophthongization and altered vowel quality.

Table 4.2

Diphthong	SBE	Educated NE	Non-Educated NE	Note
/eɪ/	[eɪ]	[e]	[ɛ]	Monophthongization prevalent in non-educated speakers.
/əʊ/	[əʊ]	[o]	[ɔ]	Shortened and rounded differently.
/aɪ/	[aɪ]	[ai]	[a]	Reduced in non-educated speakers; more native-like in educated speakers.

These results indicate that non-educated speakers simplify diphthongs more frequently, likely due to the influence of native consonant-vowel structures and limited exposure to formal English pronunciation. Educated speakers, on the other hand, retained more dynamic vowel glides, reflecting greater approximation to SBE norms.

Vowel Duration

Vowel duration also differed notably between groups:



Acoustic Analysis of Nigerian English... Muhammad, K. B. & Sale, M. (2025)

- i. Educated speakers: Demonstrated longer vowel durations in stressed syllables, closely mirroring SBE temporal patterns.
- ii. Non-educated speakers: Produced shorter vowels across both stressed and unstressed syllables, contributing to perceptible differences in intelligibility and naturalness.

Shortened vowel duration in non-educated speakers is consistent with reduced exposure to formal English instruction and the influence of L1 timing patterns. This temporal compression also affects the rhythm and prosody of connected speech, making non-educated NE appear faster and more compact.

Summary of Findings

Overall, the results show that educational background and exposure to English significantly affect vowel production in NE. Educated speakers exhibit vowel qualities and durations that closely align with SBE norms, while non-educated speakers show centralization, diphthong simplification, and shortened vowel duration. These patterns suggest the emergence of a socially stratified NE vowel system, where social and educational factors shape phonetic variation.

Discussion of Findings

The findings of this study provide compelling acoustic evidence that the vowel system of Nigerian English (NE) is not uniform across social or educational groups. Contrary to earlier claims suggesting that NE vowel patterns are largely predictable (Simo Bobda, 2007), our results indicate that non-educated speakers exhibit systematic deviations from standard patterns. These deviations highlight the limitations of overgeneralizing NE vowel behavior, as prior studies primarily focused on educated speakers or major varieties such as Yoruba, Hausa, and Igbo English.

Social and Educational Influences on Vowel Production

Education and exposure to formal English instruction emerged as key factors influencing vowel realization. Educated speakers produced vowels that closely approximated Standard British English (SBE) norms in both quality and duration. In contrast, non-educated speakers demonstrated a marked influence of their first-language (L1) phonology. For example, monophthongs were often centralized or raised, diphthongs underwent simplification or monophthongization, and vowel duration was generally shorter. These patterns indicate that formal education and extensive exposure to English play a critical role in shaping phonetic competence, allowing educated speakers to produce vowels that are more intelligible and prosodically aligned with global English standards (Aor, 2021; Adegbenbo et al., 2021).

Emergence of Socially Stratified Vowel Patterns

The systematic vowel variations observed among non-educated speakers suggest the evolution of a socially stratified NE vowel system. Centralization, vowel shortening, and diphthong reduction collectively form distinctive phonetic markers that differentiate speakers based on educational background and social exposure. This stratification has implications not only for intelligibility but also for sociolinguistic identity, as vowel production becomes a subtle indicator of social and educational status.

Implications for Nigerian English Phonology

These findings underscore the necessity of including speakers from diverse educational and regional backgrounds in phonetic and sociolinguistic studies of NE. Focusing exclusively on educated speakers or major ethnic varieties risks producing incomplete and potentially biased representations of NE vowel systems. Future research should therefore expand to include minority sub-varieties such as Tiv and Urhobo English, as well as speakers with varied educational experiences, to achieve a more comprehensive understanding of the language's phonetic landscape.



Conclusion

This study provides robust acoustic evidence demonstrating that Nigerian English (NE) vowels exhibit significant variation between educated and non-educated speakers. Educated speakers produced vowel qualities and durations that closely approximate Standard British English (SBE) norms, reflecting the influence of formal education and extensive exposure to English. In contrast, non-educated speakers consistently exhibited vowel reduction, centralization, and diphthong simplification, indicating the strong impact of first-language phonology and limited formal instruction. These findings challenge the longstanding assumption of uniformity in NE vowel phonology and highlight the critical role of social and educational factors in shaping speech patterns. The emergence of systematic differences suggests that NE vowel systems are socially stratified, with educational background serving as a key determinant of phonetic variation. The study also underscores the importance of including speakers from minority and underrepresented regional varieties, such as Tiv and Urhobo English, in future research. Expanding the scope of phonetic studies to encompass diverse ethnic, social, and educational backgrounds will provide a more accurate and comprehensive understanding of NE vowel variation. Overall, the research contributes to the growing body of knowledge on Nigerian English phonology, emphasizing the interplay between language, social factors, and education. It also has practical implications for English language teaching in Nigeria, particularly in designing curricula and pronunciation training that account for the phonetic realities of learners from varied linguistic and educational backgrounds.

References

- Adegbembo, A. O., Akinyemi, M. A., & Balogun, F. O. (2021). Vowel production and stress patterns in educated Yoruba Nigerian English speakers. *Journal of African Languages and Linguistics*, 42(2), 185–209. <https://doi.org/10.1515/jall-2021-0012>
- Adegbembo, A., Akinjobi, A., & Akindele, D. (2021). Phonological variations in Nigerian English: An exploratory study of vowel shifts. *Abuja Journal of Humanities*, 6(4), 53–68. <https://doi.org/10.70118/TAJH0004>
- Amoniyan, O. M. (2023). Stress peculiarities in a sub-variety of Nigerian English: Tiv English. *Journal of Language and Linguistics*, 12(3), 104–110. <https://doi.org/10.11648/j.jll.20241203.11>
- Amoniyan, O. M. (2024). A comparative acoustic analysis of vowel systems in Gokana and Urhobo languages. *African Journal of Linguistics and Modern Communication*, 3(2), 45–59. <https://doi.org/10.11648/j.ajlmc.2024.03.02.11>
- Aor, L. (2021). Vowel features in Tiv English: A phonetic perspective. *Linguistic Research in Nigeria*, 12(1), 45–63.
- Aor, T. (2021). Phonemic substitutions in the English-Tiv loan phonology. *Journal of Language and Linguistics*, 11(2), 78–92. <https://doi.org/10.11648/j.jlls.2021.11.02.11>
- Aziza, A. (2025). Phonemic treatment of the Tiv vowels /ɒ/, /ɔ/, /o:/, and /ɔ:/ . [Unpublished manuscript].
- Boersma, P., & Weenink, D. (2024). *Praat: Doing phonetics by computer* (Version 7.6.15) [Computer software]. <http://www.praat.org>
- Dunstan, A. (Ed.). (1969). *English in West Africa*. Longman.
- Ekiugbo, P. O. (2019). A descriptive phonology of the vowel system of Uvwie. *Language and Linguistics Association Journal*, 10(1), 22–34. <https://doi.org/10.11648/j.la.2019.10.01.11>



Acoustic Analysis of Nigerian English... Muhammad, K. B. & Sale, M. (2025)

- Jibril, M. (1982). The phonology of Nigerian English. In A. B. K. Oloruntimehin (Ed.), *Proceedings of the 1981 Conference of the Linguistic Association of Nigeria* (pp. 45–58). University of Ibadan Press.
- Jibril, M. (1986). The phonology of Nigerian English: A sociolinguistic perspective. In A. B. K. Oloruntimehin (Ed.), *Proceedings of the 1985 Conference of the Linguistic Association of Nigeria* (pp. 67–80). University of Ibadan Press.
- Jowitt, D. (1991). *Nigeria's English: An introduction to the varieties of standard Nigerian English*. British Council.
- Melefa, M., & Amoniyan, O. M. (2020). Stress peculiarities in a sub-variety of Nigerian English: Tiv English. *Journal of Language and Linguistics*, 12(3), 104–110.
<https://doi.org/10.11648/j.ijll.20241203.11>
- Mustapha, A. R. (2004). Vowel prominence and stress in Nigerian English. *African Linguistic Review*, 21(2), 75–96.
- Mustapha, M. (2004). Phonological variation in Nigerian English. In A. B. K. Oloruntimehin (Ed.), *Proceedings of the 2003 Conference of the Linguistic Association of Nigeria* (pp. 89–102). University of Ibadan Press.
- Simo Bobda, A. (2007). Segmental and suprasegmental analysis of Nigerian English. *Journal of English Linguistics*, 35(3), 211–236.
- Simo Bobda, A. (2007). The phonology of Nigerian English. In A. B. K. Oloruntimehin (Ed.), *Proceedings of the 2006 Conference of the Linguistic Association of Nigeria* (pp. 123–136). University of Ibadan Press.
- Udofot, I. (1997). The phonology of Nigerian English. In A. B. K. Oloruntimehin (Ed.), *Proceedings of the 1995 Conference of the Linguistic Association of Nigeria* (pp. 45–58). University of Ibadan Press.
- Usar, A., & Ofoegbu, T. (2017). Native language influence on vowel production in Nigerian English. *International Journal of Applied Linguistics*, 27(4), 421–439.
- Okiemute, A., & Uwasomba, B. (2024). A rhetorical analysis of Peter Obi's campaign speeches in the 2023 Nigerian general election. *EBOLOO: Journal of Society, Environment and Development*, 1(1 & 2), 249–249.