

## Morphological Processes in the Kwarta Mataci Dialect of Karekare (West Chadic): Evidence from Affixation, Infixation, and Tonal Modification

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**Abstract:** This study examines morphological processes in the Kwarta Mataci dialect of the Karekare language, one of the West Chadic languages that remains poorly documented in northeastern Nigeria. The unit of analysis in this study is morphologically complex words, obtained from native speakers through field-based oral interviews and supported by secondary linguistic sources. This study aims to provide a systematic description of word-formation strategies in the Kwarta Mataci dialect, with a focus on affixation, infixation, and tonal modification. Data were collected from educated and uneducated speakers and analyzed using a descriptive linguistic approach based on the framework of Matthews (1993) and the morphological process model of Abubakar (2001). The results show that the Kwarta Mataci dialect makes productive use of prefixation and suffixation in derivation and plural marking, as well as reduplication for intensifying meaning. An important finding of this study is the presence of productive infixation (-gwa-) as a word-formation strategy, a process that is relatively rarely reported in Chadic languages. In addition, tonal variations have been shown to function morphologically, marking shifts in word classes and meaning contrasts, suggesting a close interaction between morphology and tone. These findings provide new empirical evidence regarding infixation and morphophysiological processes in the Karekare language. Overall, this study contributes to the morphological typology of West Chadic by presenting the first dialect-specific description of the morphology of Kwarta Mataci and by expanding understanding of the phasic organization and tonal morphology in poorly documented Afro-Asiatic languages.

**Keywords:** Kwarta Mataci Karekare; morphological processes; affixation; infixation; tonal modification; West Chadic

## 1. Introduction

The formation and variation of word structure in language are important aspects of linguistic studies because they provide insight into how speakers form meanings from the smallest unit of language (Gbeyonron, 2013). In West Africa in particular, Afro-Asiatic languages such as Hausa and Karekare exhibit rich morphological complexity, encompassing a variety of word-formation strategies that reflect historical differences and social contacts between speaking communities (Greenberg, 1963; Newman, 1977). The Kwarta Mataci dialect, a local variant of the Karekare language, is widely used in daily life in certain regions of northeastern Nigeria, but there is still limited academic documentation, especially regarding morphological aspects of word forms. This social fact shows that speakers of the dialect interact intensively with other languages, such as Hausa, which can affect their morphological structure, especially in word formation (Barde, 2010). Therefore, an in-depth and systematic study of the morphology of these dialects is not only important for general linguistic knowledge but also for the preservation of the cultures and languages of minorities that are in danger of losing their social functions.



A number of works have discussed the morphology of Chadic and Afro-Asiatic languages in general, including Abubakar's (2001) description of word structure in Hausa in *An Introductory Hausa Morphology* and Gamawa's (2018) study of lexical reduction in the Karekare dialect. Abubakar (2001) provides the basis for Afro-Asiatic morphological theory, while Gamawa (2018) focuses on lexical variation in Karekare; however, neither study systematically explains all morphological processes, such as infixation and tonal modification, that may be present in the Kwarta Mataci dialect. In addition, Marcus' (2014) research on the morphosyntactic Hausa spoken by Kwarta Mataci speakers has not comprehensively addressed dialect morphology and emphasizes more syntactic aspects of the two languages than patterns of word formation. The literature on general morphology by Mathews (1993) and Katamba & Stonham (2006) provides a relevant, though still limited, theoretical framework for minor languages in West Africa. Thus, there is a clear research *gap* in the documentation and systematic analysis of morphological processes in the Kwarta Mataci dialect, especially regarding infixation and morphological-tone interactions, which have not been addressed in previous studies (Abubakar, 2001; Gamawa, 2018; Marcus, 2014).

In response to the research gap, this study aims to provide a systematic description of the morphological processes in the Kwarta Mataci dialect, with a primary focus on affixation (prefixation and suffixation), infixation, reduplication, and tonal modification. This goal was formulated to fill empirical gaps in dialect documentation and word-formation patterns that are not yet available in the existing scientific literature, especially outside the Hausa language. This analysis also uses a descriptive approach, drawing on the concepts of generative and descriptive morphology as discussed in the linguistic literature (Mathews, 1993; Katamba & Stonham, 2006), with an emphasis on empirical evidence from primary data collected through interviews with native speakers. Thus, the main objective of the study is not only to identify the morphological processes in Kwarta Mataci, but also to describe how these processes function semantically and structurally within the language's word system. Thus, this article directly addresses the academic need for underrepresented documentation of language morphology while enriching the Chadic linguistic database.

This research argues that the Kwarta Mataci dialect not only employs the conventional affixation processes common in many Afro-Asiatic languages but also features unique morphological patterns, including productive infixation and grammatically functional tone modifications in word formation. Theoretically, infixation is often poorly documented in Chadic languages, so its presence in Kwarta Mataci may be an important contribution to the morphological typology of languages in the region (Mathews, 1993). The research hypothesis states that, in addition to basic affixation, processes such as infixation and tonal modification play a significant role in the formation of derivative and categorical meanings in these dialects, and that the patterns reflect the internal structure of languages that differ from neighboring languages, such as Hausa. This study tested the hypothesis through a comprehensive analysis of primary data, as well as comparing it with previous literature findings in both the Karekare context and other Afro-Asiatic languages. The results are expected to show that Kwarta Mataci has distinct morphological characteristics that warrant consideration in typological linguistics and minor language documentation.

## 2. Literature Review

### 2.1. Affixation in Morphological Typology

Affixation is one of the main processes in morphology that contributes to the formation of new word forms and grammatical functions. In general, affixing involves attaching bound morphemes such as prefixes, suffixes, and infixes to basic forms to change the meaning or category of a word through derivative or inflectional mechanisms (Lieber, 2014). In the typology of world languages, affixation is studied as a universal phenomenon that arises across various language families, and its differences are influenced by the phonological structure and typological principles of each language (Bybee, 1985; Blevins, 2006). This kind of study shows that although the process of affixation is often found across languages, the specific patterns of affixation can vary widely, contributing to significant morphological

diversity worldwide (Lieber, 2014). This emphasizes that affixation is not only a means of word formation, but also a reflection of the internal structure of language.

International empirical research has reviewed affixation in a variety of languages, providing evidence of diverse patterns relevant to typological studies. For example, a study by Kalin (2022) showed that infixation—as a type of affixation—is systematically distributed in a number of languages through complex allomorphic analysis in 42 languages from 15 different families, suggesting that the mechanism of infixation is often bound by specific phonological and morphological phenomena. These findings confirm that understanding affixation, including variations in prefixation and suffixation, requires not only concatenative morphology analysis but also consideration of the interaction between morphology and phonology. Thus, the study of affixation plays an important role in understanding the internal structure of language and the interconnectedness of morpheme functions in word formation.

## 2. Infixation as a Morphological Phenomenon

Infixation is a type of affixation in which bound morphemes are inserted in the center of the base form, rather than at the beginning or end, and are often associated with changes in grammatical meanings or word categories. Typologically, infixation is a relatively rare phenomenon across the world's languages, but when present, its placement patterns and functions offer important insights into morphological structure and the interface between phonology and morphology (Blevins, 2006). The infixation theory literature also suggests that the position and distribution of infixes are influenced by phonological factors, such as syllable pressure or syllabic structures that serve as pivot points for morpheme insertion (McCarthy & Prince, 1993). Empirical studies have identified complex mechanisms in various languages that use productive infixation. This is important because infixation not only adds descriptive variation in morphological typology but also provides a window into understanding the relationship between word structure and meaning across different linguistic systems.

Various case studies show how infixation works in world languages. For example, research by Soares (2025) on the Makasae language in Timor-Leste showed that verbs can be infixed to mark specific semantic features, such as causality and reciprocity, demonstrating that infixation can be a productive morphological element. Typologically, these findings are relevant to the argument that infixation is bound not only to internal positions but also to specific grammatical meanings, as well as to suggest that a less-documented language can offer a new understanding of the function of infixes in its morphological system. In conclusion, infixation is an important morphological phenomenon that should be analyzed descriptively and typologically to expand our understanding of cross-linguistic morphological theory.

## 3. Tonal Morphology and Its Interaction with Segmental Morphology

Tonal morphology refers to the phenomenon in which tonal tone or contour plays a role in marking morphological functions such as cases, aspects, or categories of derivatives, and not just phonetic characteristics. Recent typological research suggests that tonal morphology is an important component in the morphological systems of many tonal languages, especially in Africa and Asia, and cannot be understood through segmental morphological analysis alone (Kaldhol, 2024). These findings confirm that tone can function as an independent morphological exponent that carries grammatical information and therefore need to be integrated into a comprehensive morphological study. For example, in tonal exposure, tonal shifts are not just phonetic variations but are part of a strategy to mark specific morphological features.

Empirical studies on tonal morphology have demonstrated its relevance in word formation and grammatical structure. For example, an article by Donohue (2021) on Nubri (Tibeto-Burman) shows how high pitches can mark genitive cases and increase transitivity, demonstrating tonal effects on structural morphological functions (Donohue, 2021). In addition, longitudinal research on tonal phenomena affecting aspect expression and nominalization in African languages suggests that tonal morphology can synergize with, or even replace, segmental morphemes as

grammatical markers. These findings support the argument that tonal morphology plays an important role in the formation of specific words and the broader typological value in the study of global linguistics.

### **3. Methods**

#### *3.1 Material Objects*

The material objects of this study are complex word forms in the Kwarta Mataci dialect of the Karekare language that represent morphological processes, especially affixation, infixation, reduplication, and tonal modification. Data in the form of lexemes and morphological constructions are used naturally by native speakers. The selection of the Kwarta Mataci dialect is based on its status as a relatively standard variety in Karekare and the lack of previous linguistic documentation (Gamawa, 2018; Marcus, 2014). Thus, the research focuses on morphological units relevant to the descriptive objectives of this study.

#### *3.2 Research Design*

This study uses a qualitative design with a descriptive linguistic approach. This approach was chosen to systematically describe the pattern of word formation without manipulating linguistic variables. The analysis is framed by the morphological framework of Matthews (1993) and the morphological process model of Abubakar (2001), which classifies the main processes into affixation, reduplication, and modification. This design allows the identification of the internal structure of the word as well as its semantic and grammatical functions in the Kwarta Mataci dialect.

#### *3.3 Data Source*

The source of research data consists of primary and secondary data. Primary data were obtained directly from native speakers of the Kwarta Mataci dialect living in the Karekare-speaking area of Yobe State, Nigeria. Secondary data are derived from relevant literature, including the Karekare–British–Hausa dictionary (Gambo et al., 2004) and previous studies on Karekare and Hausa morphology (Abubakar, 2001; Gamawa, 2018). The combination of these two sources ensures the adequacy and linguistic validity of the analyzed data.

#### *3.4 Data Collection Techniques*

Data collection was carried out through unstructured oral interviews with educated and uneducated speakers, as described in the linguistic field methodology. The informant is asked to produce word and sentence forms that exhibit the target's morphological process, and the response is then recorded manually. This technique was chosen because it allows spontaneous exploration of natural language use and captures morphological variations that may not appear in structured elicitation (Abubakar, 2001; Marcus, 2014).

#### *3.5 Data Analysis Techniques*

Data were analyzed using a descriptive method comprising identification, classification, and interpretation of morphological forms. Each lexeme is categorized according to its type of process (prefixation, suffixation, infixation, reduplication, and tonal modification), and then its grammatical and semantic functions are analyzed. The analysis procedure refers to the classification of Matthews (1993) and Abubakar (2001), with the aim of uncovering the systematic pattern of word formation in the Kwarta Mataci dialect and its contribution to the morphological typology of West Chadic.

## 4. Results

### 4.1 Affixation in the Kwarta Mataci Dialect

The data shows that affixation is the most productive morphological process in the Kwarta Mataci dialect. Affixation appears in the form of prefixation and suffixation that function to form new lexemes and mark certain grammatical categories. Identified prefixes include *ba*, *gi*, *nanta*, and *bo*. The prefix *ba* is used to denote masculine referents, as seen in *ba+màrkò* → *bamàrkò* 'male walker' and *ba+riiwò* → *bari iwò* 'male liar'. The *nanta* prefix realizes feminine markings, e.g., *nanta+luùwò* → *nantaluùwò* 'witch girl'. The *gi* prefix forms place nouns, such as *gi+bidā* → *gibidā* 'bathroom', while *bo* forms relational nouns related to boundaries or openings, such as *bo+beenu* → *bobeenu* 'door'. These patterns show that the prefix in Kwarta Mataci is a derivative function with a relatively stable semantic contribution. These findings are in line with the description of the affixation process in Afro-Asiatic languages that places prefixes as the main derivation markers (Abubakar, 2001; Matthews, 1993), as well as in line with typological reports that prefixation is commonly used for the formation of nouns and the marking of referential categories (Katamba & Stonham, 2006; Lieber, 2014). Overall, the data show that prefixation is a central mechanism in the formation of the Kwarta Mataci lexeme.

**Table 1. Prefixes in the Kwarta Mataci Dialect**

Prefix	Basic shape	Shape derivatives	Glos	Function
ba	màrkò	bamàrkò	traveller (male)	gender masculine
ba	riiwò	bari iwò	liar (male)	gender masculine
nanta	luùwò	nantaluùwò	wizard woman	gender feminine
nanta	tàra	nantatàra	farmer (female)	gender feminine
gi	bidā	gibidā	bathroom	Location
gi	waàno	giwaàno	workplace	Location
bo	beenu	bobeenu	door	Relasional
bo	tàra	botàra	farm boundary	Relasional

In addition to prefixation, suffixes also appear systematically, especially for plural and possessive markings. The suffix *-no* realizes first-person ownership, such as *tàra* → *tàranò* 'my field' and *wàyim* → *wàyimnò* 'my money'. Plural marking is realized through several allomorphs, including *-cino*, *-yin*, *-ai*, *-cin*, and *-un*. For example, *kwàro* → *kwàrcinò* 'houses', *ràgai* → *ràgangàyin* 'lepers', *leèwi* → *leèwài* 'children', and *doòku* → *doòkun* 'horses'. In addition, the suffix *-tuku* denotes the second person plural possessive, such as *leèwi* → *leèwituku* 'your children'. This variation of the plural suffix form indicates the existence of an allomorphic system bound to the lexemic class. Similar patterns have been reported in other morphological studies of Chadic and Afro-Asiatic languages, which show plural marking via various suffixes depending on the noun class (Abubakar, 2001; Newman, 1977). This description is also consistent with cross-linguistic reports that pluralization is often manifested through multiple morphemic strategies within a single language (Bybee, 1985; Katamba & Stonham, 2006). Thus, Kwarta Mataci data shows a diverse inventory of suffixes with defined grammatical functions.

**Table 2. Plural and Possessive Suffixes**

Suffix	Single shape	Derivative forms	Glos	Function
-no	tàra	tàranò	my farm	possessive
-no	wàyim	wàyimnò	my money	possessive
-cino	kwàro	kwàrcinò	houses	Plural
-yin	ràgai	ràgangâyin	lepers	Plural
-ai	leéwi	leéwài	children	Plural
-cin	koòro	koòracin	donkeys	Plural
-un	doòku	doòkun	horses	plural
-tuku	leéwi	leéwituku	your children	Possessive plural

Affixation in Kwarta Mataci also includes a systematic mapping between morphemic forms and lexical meanings, as seen in the correspondence of gender prefixes (*ba* vs. *nanta*) and locative prefixes (*gi*). This relationship of forms and meanings is consistent across the data collected from native speakers. The findings are in line with previous morphological descriptions of Hausa and Karekare, which place affixation as the main mechanism of word formation (Abubakar, 2001; Gamawa, 2018). Karekare–English–Hausa dictionary data also confirm the recurrence of this affixation pattern in the basic lexicon (Gambo et al., 2004). At the empirical level, the overall example shows that prefixes and suffixes work concatenatively, with relatively transparent morpheme boundaries. The international literature on derivative morphology also reports that languages with such an affixal structure tend to maintain a stable correspondence between affixes and their semantic functions (Lieber, 2014). In summary, these results show that affixation—both prefixation and suffixation—is a dominant and productive process in the Kwarta Mataci dialect, providing a structural basis for noun formation, plural marking, and possessive relations.

#### 4.2 Infixation in the Kwarta Mataci Dialect

In addition to the affixation of word edges, the data also shows the existence of infixation as a process of word formation in Kwarta Mataci. The identified infix is *-gwa-*, which appears inside the base form and generates a derived lexeme. Empirical examples include *mbùgum* → *mbùgwàgum* 'curtain' and *tùgum* → *tùgwàgum* 'wooden block'. In both cases, the morpheme *-gwa-* is inserted after the initial consonant of the root, forming a consistent internal pattern. The presence of this infix is recorded repeatedly in the field data and is not limited to a single lexeme, indicating that the infixation is part of the morphological inventory of this dialect. These findings complement previous descriptions of Karekare morphology that emphasized prefixation and suffixation (Abubakar, 2001; Gamawa, 2018). Descriptively, the insertion pattern *-gwa-* shows a fixed position relative to the root structure. In the cross-linguistic literature, infixation is reported to be a rarer phenomenon than prefixation and suffixation, yet it is documented in a number of world languages (Matthews, 1993; Blevins, 2006; Kalin, 2022). Thus, Kwarta Mataci's data adds to the empirical inventory of languages that use infixes as a word-formation strategy.

**Tabel 3. Infiks -gwa- dalam Kwarta Mataci**

Basic shape	Infix	Derivative forms	Glos
mbùgum	-gwa-	mbùgwàgum	blinds
tùgum	-gwa-	tùgwàgum	logs

The *-gwa-* distribution in the data shows that the infix appears in a specific nominal form and generates a new lexical meaning without drastically changing the basic category. The form of the infixation results still functions as a noun, as seen in the *mbùgum/mbùgwàgum* and *tùgum/tùgwàgum* pairs. No significant phonological variation was found in the infix other than the stable middle vowel, and there was no evidence of allomorphy in this morpheme in the available data. This regularity indicates that the infix *-gwa-* has a consistent segmental shape. Descriptively, this pattern is in line with cross-lingual reports that infixes often have a limited but stable distribution in certain word classes (Lieber, 2014; Kalin, 2022). In the context of Chadic languages, explicit reports of infixation are still relatively limited (Newman, 1977), so this Kwarta Mataci documentation expands the empirical data available. Thus, these results show that infixation is not a marginal phenomenon in this dialect but rather part of a morphological system directly observed in the speaker's data.

The existence of infixation was also confirmed by the consistency of responses from informants with various educational backgrounds, both educated and uneducated, resulting in similar forms during interview sessions. This reinforces the status of the infix *-gwa-* as a naturally used element in everyday language. This documentation complements Karekare's previous morphological findings that focused on lexical modification and affixation (Gamawa, 2018; Marcus, 2014). In the general morphological literature, infixation is often treated as a minor strategy compared to word-edge affixation, yet it is still recognized as part of the typology of world morphology (Matthews, 1993; Katamba & Stonham, 2006). Kwarta Mataci data shows concrete examples of infixation that can be replicated through field elicitation. In summary, the results of this subsection empirically document the existence of *the infix-gwa-* with a consistent distribution, thus adding to the description of the morphological processes operating in the Kwarta Mata dialect.

#### 4.3 Tonal Modification as a Morphological Process

The study also shows that tonal variations function as a morphological device in Kwarta Mataci. Changes in tonal contours result in differences in lexical meaning and grammatical categories without segmental changes. Documented examples include *sàrá* (LH) 'hands' versus 'fashionable' *saarà* (HL), *lāwà* 'harvest' versus *lāwaa* 'fruits', as well as *cāwā* 'to hold' versus *cāwaa* 'shame'. In these pairs, the shift in tone from low to high or vice versa is directly correlated with a change in meaning. The data show that tone acts as a stand-alone morphological marker. These findings are in line with Abubakar's (2001) report on the morphological function of tone in regional languages, and are consistent with the international literature documenting tonal morphology as an exponential mechanism in various tonal languages (Hyman, 2011; Kaldhol, 2024). Thus, Kwarta Mataci shows a system in which tone contributes directly to the formation of words.

**Table 4. Pasangan Modifikasi Tonal**

Shape (Tone 1)	Glos	Shape (Tone 2)	Glos	Changes
sàrá (LH)	hand	saarà (HL)	fashionable	Meaning
lāwà	harvest	lāwaa	fruits	Category/Semantics

Shape (Tone 1)	Glos	Shape (Tone 2)	Glos	Changes
cāwà	hold	cāwaa	shame	Category/Semantics

Tonal modifications in Kwarta Mataci are not limited to a single class of words, but appear in nouns and verbs. A change in tone can mark a shift from the meaning of action to the outcome or from a concrete referent to an evaluative meaning, as seen in the data pairs collected. No segmental affix addition was found in these examples; The change in meaning is realized solely through a shift in tone. This pattern suggests that tone functions as an independent morphological exponent. This description aligns with cross-linguistic findings that tone can carry grammatical information, such as categories, aspects, or semantic relationships, without the support of segmental morphemes (Hyman, 2011; Donohue, 2021). In the context of Karekare, these findings complement previous reports that alluded to the role of tone but did not present a systematic data set (Abubakar, 2001). Empirically, the overall pairs show a stable correspondence between tonal patterns and differences in meaning.

The consistency of tonal modification was also confirmed through informants' repeated responses in different elicitation sessions. Shapes with contrasting tonal contours are produced stably, suggesting that the speaker masters these distinctions as part of their linguistic competence. The typological literature shows that Afro-Asiatic and Niger-Congo languages extensively use tone as a morphological marker, though its realization varies across languages (Hyman, 2011). The Kwarta Mataci data add to the empirical evidence from the West Chadic region regarding the morphological function of tone. Thus, the results of this subsection show that tonal modification is an integral component of the morphological system of the Kwarta Mataci dialect, alongside affixation and infixation. In summary, the overall results show three main mechanisms—affixation, infixation, and tonal modification—that are directly observed in the field data and function in the formation of these dialect words.

## 5. Discussion

This study documents three main mechanisms of word formation in the Kwarta Mataci dialect, namely affixation, infixation, and tonal modification. Affixation emerges as the most productive process, realized through the prefixes *ba*, *nanta*, *gi*, and *bo* that mark gender, location, and relationships, and through the suffixes *-no*, *-cino*, *-yin*, *-ai*, *-cin*, and *-un* that denote possessive and plural. In addition, the infix *-gwa-* is recorded consistently on a number of nouns, while tonal form pairs indicate that tonal changes can produce differences in meaning without segmental changes. These findings expand on previous descriptions of Karekare morphology that focused on lexical modification and affixation (Abubakar, 2001; Gamawa, 2018), and they confirm lexical data from the Karekare–English–Hausa dictionary (Gambo et al., 2004). In summary, the study's results show that the Kwarta Mataci morphological system combines segmental and suprasegmental processes as a productive strategy for word formation.

Reflection on these results shows that Kwarta Mataci operates a multi-strategic morphological system. The predominance of prefixation and suffixation shows a transparent concatenative pattern, as is also found in other Chadic languages (Newman, 1977; Greenberg, 1963). The existence of the infix *-gwa-* indicates the existence of an internal process of words that previously received less attention in the study of Karekare (Abubakar, 2001; Gamawa, 2018). On the other hand, tonal modification shows that tone functions as a stand-alone morphological exponent, enriching the system of word formation. The consistency of these forms in various informants reinforces their status as part of the speaker's linguistic competence. These results are also relevant to Marcus' (2014) report on the interaction of Karekare and Hausa morphological structures, as well as to Barde's (2010) observations about the dynamics of language use in speaking areas. Thus, Kwarta Mataci data reflect a stable, adaptive morphological system that is resilient to language contact.

Interpreting these findings, affixation provides the main framework of derivation and inflection in Kwarta Mataci, while infixation and tone serve as significant complementary mechanisms. The gender prefix pattern (for vs. nanta) and plural suffixes with various allomorphs exhibit a systematic mapping between morphemic forms and semantic functions, in line with the general principles of derivative morphology (Matthews, 1993; Katamba & Stonham, 2006). The *-gwa-* infix exhibits consistent internal insertion, which is typologically consistent with reports that infixation, although rare, is a productive strategy in certain languages (Lieber, 2014; Blevins, 2006; Kalin, 2022). Meanwhile, tonal pairing suggests that tonal changes can mark lexical differences without segmental morpheme support, as also reported in cross-linguistic tonal morphology studies (Donohue, 2021; Kaldhol, 2024). Thus, Kwarta Mataci shows a close integration between segmental and suprasegmental morphology.

Compared with previous studies, these results expand the description of Karekare morphology, which has emphasized affixes and lexical changes (Abubakar, 2001; Gamawa, 2018). The documentation of the *-gwa-* infix closes a data gap in the Chadic study, which more often reports prefixation and suffixation as the primary strategies (Newman, 1977; Greenberg, 1963). The findings on tonal modification also enriched Hassan's (1988) report on the orthography of Karekare, providing empirical evidence for the grammatical function of tone. Typologically, the Kwarta Mataci pattern aligns with the general description of infixation and tonal morphology in world languages (Lieber, 2014; Kalin, 2022; Donohue, 2021; Kaldhol, 2024), while also exhibiting a distinctive local character. Thus, the Kwarta Mataci dialect occupies an important position in the Afro-Asiatic morphological typology as a variety that combines productive affixation, limited infixation, and tonal exponentiation.

Based on these findings, further research is needed to document the distribution of the infix-*gwa* and its productivity across other word classes. Acoustic studies are also needed to instrumentally measure tonal realization and its relationship to morphological categories, thus complementing elicitation-based descriptions. Given the influence of Hausa on Karekare (Barde, 2010; Marcus, 2014), comparative studies of Karekare dialects and Hausa are also important for tracing morphological changes resulting from language contact. In addition, the development of an annotated corpus will allow analysis of the frequency and variation in the use of affixes and tonal patterns. Overall, this study provides an empirical foundation for further exploration of West Chadic morphology and contributes to the mapping of the typology of word-formation processes in West Africa.

## 6. Conclusion

This study concludes that the morphology of the Kwarta Mataci dialect of the Karekare language is built through three main mechanisms, namely affixation, infixation, and tonal modification. Affixation emerges as the most productive process, realized through the prefixes *ba*, *nanta*, *gi*, and *bo* that mark gender, location, and relationships, as well as through the suffixes *-no*, *-cino*, *-yin*, *-ai*, *-cin*, and *-un* that mark possessive and plural. In addition, the infix *-gwa-* is consistently documented in a number of nouns, indicating a stable internal process of the word. In addition, tonal shape pairing suggests that tonal changes function as independent morphological exponents that produce differences in meaning without segmental changes. All of these findings are supported by field data from native speakers and by Karekare lexicographic sources. Thus, the study's results confirm that word formation in Kwarta Mataci involves a systematic interaction between segmental and suprasegmental processes.

Scientifically, this research makes an important contribution to documenting the morphology of the Karekare language and to the morphological typology of West Chadic. The study not only reinforces previous findings regarding the dominance of affixation, but also adds empirical evidence about the existence of the infix-*gwa-* as well as the productive role of tonal modification in word formation. The presentation of data through affix, infix, and tonal pairing tables clarifies shape-meaning mapping and allows transparent pattern verification. By detailing the distribution of prefixes, suffixes, infixes, and tones, this article expands the documented inventory of morphological processes for Karekare, which was previously more focused on lexical changes and affixes. This contribution places Kwarta Mataci as an important case in Afro-Asiatic studies, particularly in understanding how Chadic languages blend

concatenative and suprasegmental morphologies. Therefore, this study enriches the African linguistic literature while providing a database for cross-linguistic comparative analysis.

Based on the results of this study, further research is recommended to expand the scope of the data, especially regarding the productivity of the infix-gwa- across other word classes and its variations across different Karekare dialects. Phonetic-acoustic studies are also needed to instrumentally examine tonal realization and its relationship to morphological categories, thereby strengthening the quantitative description of tonal morphology. In addition, comparative research with Hausa and other Chadic varieties is important for tracing the influence of language contact on morphological changes in Kwarta Mataci. The development of a morphologically annotated corpus will allow for a more systematic analysis of the frequency, variation, and distribution of forms. Overall, these steps are expected to deepen understanding of Karekare's morphological dynamics and expand the language's empirical contribution to the world's morphological typology.

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