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Microgeographical Mapping and Dialectometry of Makassar Phonological Variation in Jeneponto Regency

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ABSTRACT

Purpose: This study aims to identify phonological variants of the Makassar language at 11 observation sites in Jeneponto Regency, map their geographical distribution, and measure phonological differences between sites using dialectometry. **Methods:** This study employed a descriptive method with a dialectological approach. Data were collected through elicitation involving three informants at each observation site using the 200-item Swadesh basic vocabulary list, supported by audio recordings and field notes. Elicitation was conducted in group sessions, while each informant's responses were documented separately. The data were analyzed by identifying phonological variants across the 11 observation sites, mapping their distribution at a microgeographic scale, and calculating pairwise phonological distances using dialectometry. **Findings**: Phonological variation was identified in 14 of the 200 lexical concepts, comprising 8 concepts exhibiting vowel correspondences, 2 exhibiting vowel deletion, and 4 exhibiting consonant correspondences. The variants displayed diverse geographical distribution patterns, while the glosses *husband* and *stab* shared the same distribution pattern. Dialectometric calculations based on all 200 concepts yielded phonological distances ranging from 0% to 4.5%, whereas supplementary calculations based on the 14 variable concepts yielded distances ranging from 0% to 64.29%. This difference resulted from the number of concepts used as the basis for calculation, while the relative ranking of phonological distances between observation sites remained unchanged. **Research Implications**: The findings provide information on phonological variation in the Makassar language at a microgeographic scale, offering a reference for further linguistic research and the development of teaching materials that take regional language diversity into account. **Originality**: This study presents a microgeographic mapping of phonological variants in the Makassar language across 11 observation sites covering all subdistricts of Jeneponto Regency and integrates these distribution patterns with measurements of phonological distances between locations.

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INTRODUCTION

Language variation can occur at various linguistic levels, including phonology, and its distribution is often associated with the geographical areas in which a language is spoken. In dialectology, phonological differences are identified not only through their linguistic forms but also through their geographical distribution to determine the patterns they form. The distribution of a linguistic feature can be mapped to identify the areas in which each variant occurs. The geographical boundary of a particular linguistic feature is referred to as an *isogloss*, while several isoglosses that exhibit the same geographical division may form an *isogloss bundle*. However, mapping individual linguistic features does not indicate the overall degree of difference between locations. Dialectometry is therefore used to quantify and compare aggregate linguistic differences across locations. Developments in dialectometry have also incorporated multivariate and computational approaches, allowing multiple linguistic features to be analyzed simultaneously to examine patterns of relationships between locations more systematically (Boberg et al., 2018; Bompolas & Melissaropoulou, 2023; Nerbonne & Kretzschmar, 2013; Pickl, 2016; Shim & Nerbonne, 2022; Wieling & Nerbonne, 2015). When linguistic variation between locations occurs gradually and overlaps without forming clear boundaries, such patterns may indicate a tendency toward a dialect continuum (Jeszenszky et al., 2018). Thus, mapping the geographical distribution of linguistic variants and measuring distances between locations can be combined to provide a more comprehensive understanding of language variation within a particular region.

This approach is relevant to the study of the Makassar language in Jeneponto Regency. Makassar is one of the major regional languages spoken in South Sulawesi and comprises several regional varieties commonly referred to as Lakiung, Turatea, Bantaeng, Konjo, and Selayar. At the broader regional level, Jeneponto is generally associated with the Turatea variety. However, the use of a single variety label does not necessarily indicate that linguistic forms are uniform throughout Jeneponto. More subtle phonological differences may still occur between locations within the regency. The Makassar language has distinctive vowel and consonant systems, gemination, and phonotactic patterns (Tabain & Jukes, 2016; Jukes, 2020). Morphophonological studies have also documented changes in syllable structure, nasalization, and gemination (Khasanah & Subiyanto, 2020) . These characteristics indicate that phonological features can be examined to investigate internal variation in the Makassar language in Jeneponto, particularly when differences in linguistic forms are considered alongside their geographical distribution.

Previous studies have demonstrated the existence of variation within the Makassar language. Kaharuddin et al. (2025) reconstructed Proto-Makassar vowels based on five varieties, including Turatea. At the regency level, Mardatillah & Neyarasmi (2025) reported phonological differences in the Makassar language in Bantaeng, while Mardatillah & Mulyani R (2026) described linguistic variation based on speakers' geographical origins. Geolinguistic studies of other regional languages in Indonesia have also shown that linguistic variation can form geographical patterns that do not necessarily correspond to administrative boundaries or broad dialect labels (Patriantoro, 2025; Saddhono & Hartanto, 2021; Septiana et al., 2023; Septianingtias et al., 2024; Wagiati et al., 2023). These findings highlight the importance of examining language variation at a more localized geographical scale. Nevertheless, studies that map phonological variation in the Makassar language at a microgeographic scale across all subdistricts of Jeneponto Regency while simultaneously comparing linguistic distances between observation sites remain limited. Therefore, phonological variants, their geographical distribution patterns, and the degree of difference between observation sites in Jeneponto Regency need to be examined within an integrated analytical framework.

To address this research gap, the present study combines microgeographic mapping and dialectometry to investigate phonological variation in the Makassar language in Jeneponto Regency. Microgeographic mapping is employed to identify the locations in which each variant occurs and to examine similarities and differences in distribution patterns across 11 observation sites. Pairwise dialectometry is used to measure the degree of phonological difference between observation sites based on the concepts analyzed. These two approaches complement each other, as microgeographic mapping illustrates the geographical distribution of individual variants, whereas dialectometry quantifies phonological differences between locations. Within this framework, the study addresses three research questions: (1) What phonological variants of the Makassar language are identified in the 200-item Swadesh basic vocabulary list in Jeneponto Regency? (2) How are these phonological variants distributed across the 11 observation sites based on microgeographic mapping? (3) What is the degree of phonological difference between observation sites based on dialectometric calculations? The contribution of this study lies in presenting phonological variation, microgeographic distribution patterns, and measurements of differences between locations within a single analytical framework, with findings that can be traced back to the data collected at each observation site.

METHODS

This study employed a descriptive method with a dialectological approach to examine phonological variation in the Makassar language in Jeneponto Regency. The geographical distribution of phonological variants was analyzed through microgeographic mapping, while phonological distances between observation sites were calculated using dialectometry (Mahsun, 2017; Sariono, 2016) . Data were collected over two days in July 2026 at 11 observation sites distributed across all 11 subdistricts of Jeneponto Regency: TP1 Tarowang–Tino, TP2 Batang–Togo-Togo, TP3 Arungkeke–Arungkeke Pallantikang, TP4 Kelara–Bonto Parang, TP5 Rumbia–Bonto Loe, TP6 Binamu–Tamarunang, TP7 Turatea–Bungung Loe, TP8 Tamalatea–Takbuakkang, TP9 Bontoramba–Bangkalaloe, TP10 Bangkala–Kapita, and TP11 Bangkala Barat–Bulujaya. One location in each subdistrict was purposively selected based on accessibility and the availability of local contacts, including the researchers' relatives or acquaintances, who could assist in coordinating with prospective informants. These considerations reflected the limited time available for data collection rather than prior assumptions about dialect boundaries. Each observation site was treated as a location from which linguistic data were collected and was not considered statistically representative of all speakers within its respective subdistrict.

A total of 33 informants participated in the study, with three informants at each observation site. Informants were purposively selected, prioritizing speakers who originated from or had resided in the local area for an extended period, used the Makassar language in everyday communication, and were willing to participate. Older speakers were given priority when available and willing to participate, although age was not an absolute selection criterion. Accordingly, informants included family members contacted through local acquaintances and residents of the surrounding area, including older neighbors. Verbal consent was obtained before data collection, and individuals who declined to participate were excluded. The informants ranged in age from 27 to 78 years and

comprised 26 women and 7 men. Involving three informants at each site enabled responses to be compared within the same location and maintained an equal number of informants across observation sites. However, the selection of informants based on accessibility and willingness to participate, together with the limited sample size, did not permit statistical generalization to the entire population of each subdistrict.

The research instrument was the 200-item Swadesh basic vocabulary list (Swadesh, 1952). All items on the list were used for data collection without preselecting particular items based on anticipated phonological variation. Data were collected through face-to-face elicitation using Indonesian glosses as prompts (Ayatrohaedi, 1983) . Data collection involved direct visits to the informants' locations, taking into account local conditions and participants' comfort during the sessions. At each observation site, three informants participated in an elicitation session at the same location. One member of the research team presented the glosses sequentially, while three other team members each recorded the responses of one informant on separate Swadesh vocabulary sheets. Each informant was asked to provide the Makassar equivalent of each gloss as used in the local area. Glosses were repeated or further explained when they were not clearly heard or understood. The research team sought to encourage informants to respond independently. Nevertheless, for certain glosses, informants who had difficulty recalling the corresponding words spontaneously asked other informants for assistance or clarification. Such interactions did not occur for every gloss but could not always be avoided because the informants were present at the same location and physical separation was not always feasible during field visits. Recording responses separately allowed each response to be traced to the individual informant, although it did not guarantee that all responses were free from influence by other informants.

The elicitation process was accompanied by audio recordings and field notes. The recordings were not fully transcribed but were used to verify responses when uncertainties arose concerning speech sounds, word forms, or their correspondence to the elicited glosses. Uncertain segments were reviewed through repeated listening and cross-checked against field notes before the forms were finalized through examination and agreement during data processing. Phonological variants were identified by comparing the forms documented for the same gloss, with particular attention to vowel differences, vowel deletion, and consonant differences. Reviewing the recordings helped improve the accuracy of data documentation but could not establish that a response was entirely independent when interaction between informants had occurred. These procedures constituted an internal verification process; no acoustic measurements or separate assessments of inter-coder agreement in phonetic transcription were conducted. The question mark (?) used in the original field records was retained as a symbol representing the glottal stop, corresponding to the International Phonetic Alphabet (IPA) symbol [ʔ], to ensure that the forms presented remained traceable to the field data.

The analysis began by identifying all realizations of each gloss from the responses of the three informants at each observation site. When more than one form was recorded at a particular site, all documented forms were combined into a site-level set of variants without selecting the majority form. Accordingly, the distribution data indicated the presence of particular variants rather than their frequency or proportion of use. The different forms were then classified into vowel correspondences, vowel deletion, and consonant correspondences, and their distributions were compared across observation sites. All concepts exhibiting phonological variation were presented in a distribution table, while selected maps were used to illustrate different geographical distribution patterns. Symbols on the maps indicated the locations where particular forms were documented rather than the number of informants who used those forms.

Phonological distances were calculated by comparing all observation sites pairwise using the formula $d = (S/N) \times 100\%$, where d represents the percentage of phonological distance, S denotes the number of concepts exhibiting differences between two observation sites, and N represents the total number of concepts used as the basis for comparison. A concept was counted as different only when the two observation sites shared no identical phonological realization. Conversely, a concept was not counted as different when the two sites shared at least one phonological realization. Each pair of observation sites was compared only once to avoid duplicate calculations. The primary calculation used all 200 items from the Swadesh basic vocabulary list as the denominator to measure phonological distance relative to the entire set of concepts investigated.

As an additional methodological check, a sensitivity analysis was conducted by comparing calculations based on all concepts investigated with calculations restricted to concepts exhibiting phonological variation. The number of concepts included in the supplementary calculation was determined after all data had been identified and classified. The number of differing concepts (S) for each pair of observation sites was kept constant, while the denominator (N) was adjusted according to the set of concepts included in each calculation. Dialectometric classifications in the literature distinguish between measurements at the phonological and lexical levels; therefore, the application of classification thresholds must take into account the characteristics of the linguistic features being measured (Mahsun, 2017; Sariono, 2016). In this study, phonological distance percentages were used to describe the relative degree of phonological difference between observation sites rather than to assign dialect or subdialect status automatically on the basis of classification thresholds. This decision took into account the fact that the maximum attainable distance when all vocabulary items were included was constrained by the number of concepts exhibiting variation, whereas calculations restricted to variable concepts employed a different basis of

measurement. The results of the two calculations were reported separately so that changes in the calculated percentages could be traced and would not be misinterpreted as changes in the linguistic forms documented.

RESULTS

Analysis of the 200-item Swadesh basic vocabulary list identified phonological variation in 14 concepts across the 11 observation sites in Jeneponto Regency. The variation involved vowel correspondences, vowel deletion, and consonant correspondences. The phonological variants documented for these 14 concepts are presented in Table 1.

Table 1. Phonological Variants and Their Distribution Across Observation Sites

Nu.	Gloss Nu.	Gloss (English)	Phonological Variants and Distribution Across Observation Sites
1	034	when	[antekamma]: TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11 [antikamma]: TP1
2	071	you	[ikau]: TP3, TP7, TP8 [kau]: TP1, TP2, TP4, TP5, TP6, TP9, TP10, TP11
3	082	liver	[ate]: TP2, TP3, TP4, TP5, TP6, TP7, TP9, TP10, TP11 [ati]: TP1, TP8
4	091	yes	[iye]: TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8 [iyo]: TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11
5	126	man	[buru?ne]: TP1, TP3, TP4, TP6, TP7, TP8, TP9, TP10, TP11 [bura?ne]: TP2, TP5, TP7
6	132	tongue	[pe?ru]: TP1, TP2, TP3, TP4, TP5, TP6, TP8 [pi?ru]: TP7, TP9, TP10, TP11
7	134	knee	[kalantu]: TP4, TP8, TP9, TP10, TP11 [kulantu]: TP1, TP2, TP3, TP5, TP6, TP7
8	144	mouth	[baba]: TP1, TP2, TP3, TP4, TP5, TP7 [bawa]: TP6, TP8, TP9, TP10, TP11
9	153	hold	[ta?gala]: TP1, TP2, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11 [ti?gala?]: TP3
10	160	cut	[moloŋ]: TP3, TP4, TP6, TP7, TP8, TP9, TP10, TP11 [poloŋ]: TP1, TP2, TP5
11	170	who	[inai]: TP1, TP2, TP3, TP4, TP5, TP7, TP8, TP9, TP10, TP11 [nai]: TP6
12	173	husband	[buru?ne]: TP4, TP5, TP7, TP8, TP9, TP10, TP11 [bura?ne]: TP1, TP2, TP3, TP6
13	182	pull	[beso?]: TP1, TP2, TP3, TP5, TP6, TP7, TP8, TP9, TP10, TP11 [meso?]: TP4
14	192	stab	[tobo?]: TP1, TP2, TP3, TP6 [nobo?]: TP4, TP5, TP7, TP8, TP9, TP10, TP11

As shown in Table 1, vowel correspondences occurred in eight concepts: /e/~/i/ in the glosses *when*, *liver*, and *tongue*; /e/~/o/ in *yes*; /a/~/u/ in *man*, *knee*, and *husband*; and /a/~/i/ in *hold*. Correspondences of the same type did not necessarily have the same geographical distribution for every gloss. For example, the /e/~/i/ correspondence in *tongue* is represented by [pe?ru] and [pi?ru], whose distribution is mapped in Figure 1.

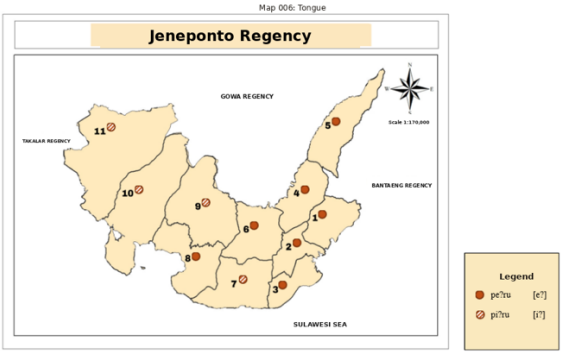

Figure 1. Distribution Map of [pe?ru] and [pi?ru] for the Gloss *Tongue*

Figure 1 shows that [pe?ru] was recorded at TP1–TP6 and TP8, whereas [pi?ru] occurred at TP7 and TP9–TP11. Only one of these two forms was documented at each observation site. Nevertheless, this distribution differs from those of the /e/~/i/ variants in *when* and *liver*. Other vowel correspondences also showed distinct distributions. For example, the gloss *knee* had [kulantu] at six sites and [kalantu] at five sites. The complete set of forms and their locations is provided in Table 1.

In addition to vowel correspondences, vowel deletion was observed in two concepts. Deletion of /i/ distinguished [ikau] from [kau] in the gloss *you* and [inai] from [nai] in *who*. These forms differ in whether the vowel /i/ is retained or omitted. Figure 2 illustrates the geographical distribution of [ikau] and [kau] for *you*.

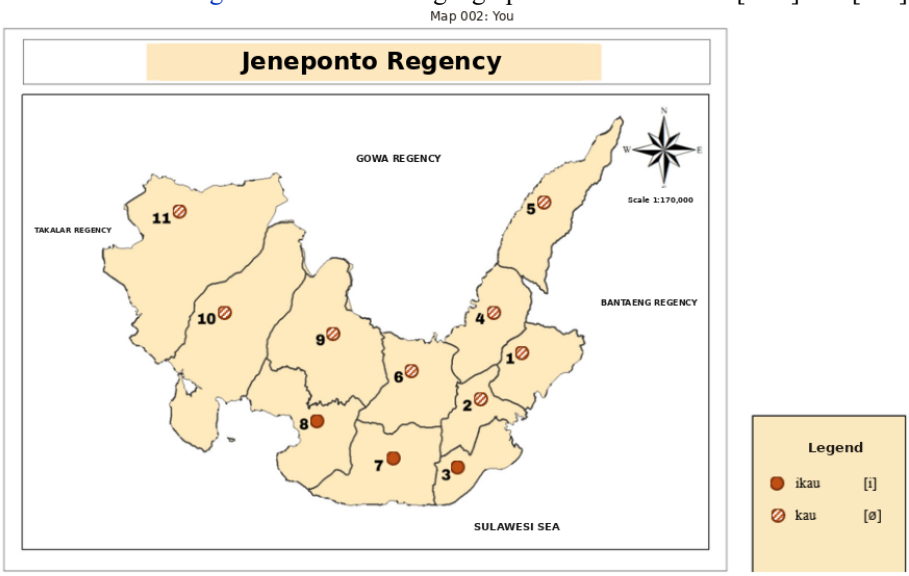

Figure 2. Distribution Map of [ikau] and [kau] for the Gloss *You*

Figure 2 indicates that [ikau] was documented at TP3, TP7, and TP8, whereas [kau] occurred at the other eight observation sites. Only one of the two variants was recorded at each site; consequently, no overlap was found for the gloss *you* in the data analyzed. This pattern differs from that of *who*, for which [nai] occurred only at TP6 and [inai] was documented at the remaining ten sites.

The third type of variation identified in Table 1 was consonant correspondence, which occurred in four concepts: /b/~/w/ in *mouth*, /m/~/p/ in *cut*, /b/~/m/ in *pull*, and /t/~/n/ in *stab*. Each concept exhibited a distinct distribution of variants. For *mouth*, [baba] occurred at six sites and [bawa] at five; for *cut*, [moloŋ] occurred at eight sites and [poloŋ] at three; and for *pull*, [beso?] was documented at ten sites and [meso?] only at TP4. As an example of consonant correspondence, Figure 3 maps the distribution of [tobo?] and [nobo?] for the gloss *stab*.

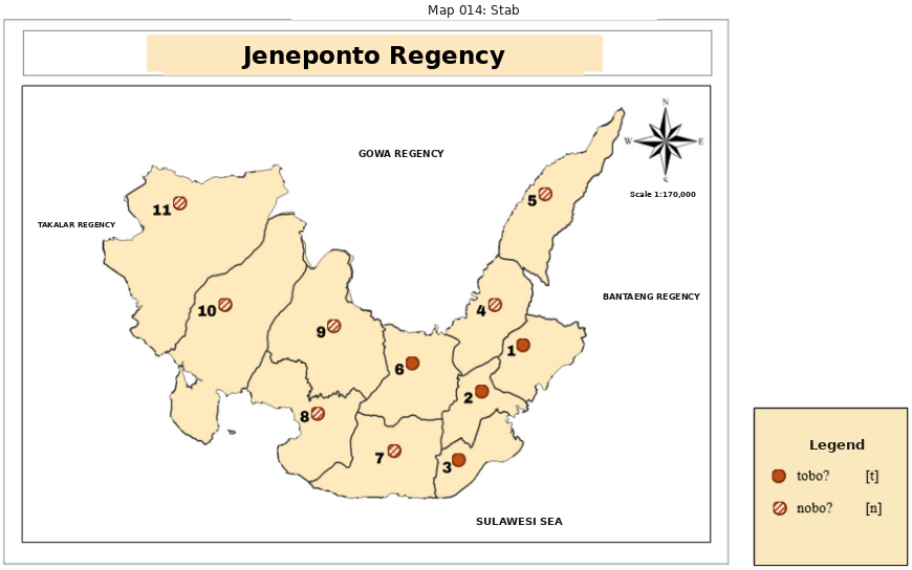

Figure 3. Distribution Map of [tobo?] and [nobo?] for the Gloss *Stab*

Figure 3 shows that [tobo?] occurred at TP1–TP3 and TP6, while [nobo?] was documented at TP4, TP5, and TP7–TP11. The two variants were not recorded together at any observation site. The same distribution pattern was observed for *husband*, as indicated in Table 1. Specifically, [tobo?] occurred at the same sites as [bura?ne], whereas

[nobo?] had the same distribution as [buru?ne]. Thus, the glosses *stab* and *husband* exhibited identical distribution patterns despite differing in their forms and types of phonological correspondence.

Unlike the glosses *stab* and *husband*, the gloss *yes* had two phonological variants at the same observation sites. Both [iye] and [iyo] were documented at TP2–TP8. This finding demonstrates that a single observation site does not necessarily have only one variant for a given concept. Their distribution is illustrated in Figure 4.

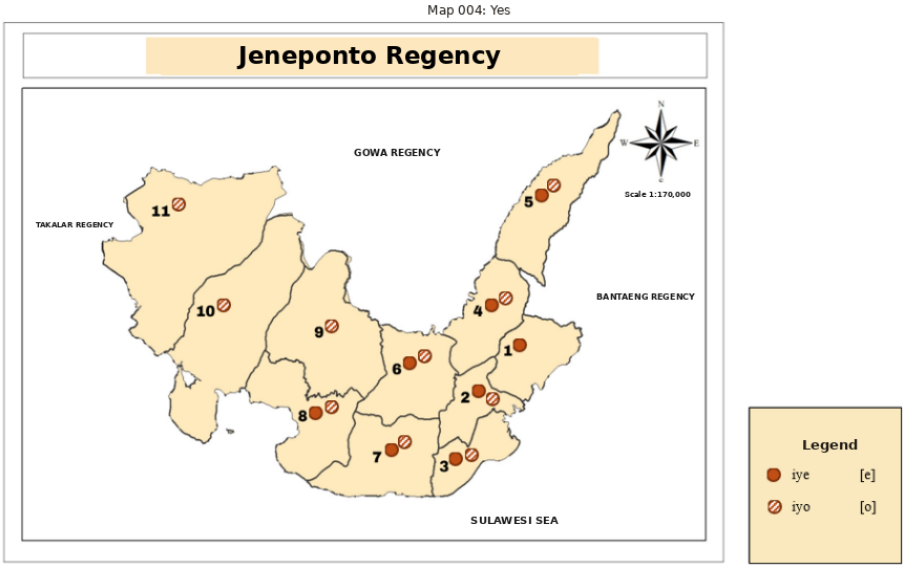

Figure 4. Distribution Map of [iye] and [iyo] for the Gloss *Yes*

According to Figure 4, only [iye] was recorded at TP1 and only [iyo] at TP9–TP11, whereas both forms occurred at TP2–TP8. A similar situation was documented for the gloss *man*, for which [buru?ne] and [bura?ne] were both recorded at TP7. These findings demonstrate that more than one phonological variant may occur at the same observation site for a single concept. However, the maps indicate the presence of documented variants at each site, not the number of informants who used each form.

Overall, microgeographic mapping revealed diverse distribution patterns across the 14 variable concepts. For some concepts, variants occurred at different observation sites, whereas for others two variants were documented at the same site. Mapping thus establishes where phonological variants occur but does not quantify the overall phonological differences between sites. The analysis therefore proceeded to pairwise dialectometric calculations.

The dialectometric analysis compared all observation sites pairwise. A concept was considered different only if the two sites shared no phonological form. This rule also applied when a site had more than one variant. For instance, TP1 had [buru?ne] for the gloss *man*, while TP7 had both [buru?ne] and [bura?ne]. Because the two sites shared [buru?ne], the concept was not counted as different for the TP1–TP7 pair. Nevertheless, the two sites differed on seven other concepts, resulting in a phonological distance of (7/200) × 100% = 3.5%.

Dialectometric calculations showed that the number of differing concepts between observation sites ranged from zero to nine. Using all 200 concepts as the basis of calculation, phonological distances ranged from 0% to 4.5%. The detailed results are presented in Table 2.

Table 2. Pairwise Phonological Distances Based on 200 Concepts (Percentage/Number of Differing Concepts)

TP	1	2	3	4	5	6	7	8	9	10	11
1	-	1.5/3	2.5/5	3.5/7	2.5/5	2.5/5	3.5/7	3.5/7	4.5/9	4.5/9	4.5/9
2	1.5/3	-	2.0/4	3.0/6	1.0/2	2.0/4	2.5/5	4.0/8	3.5/7	3.5/7	3.5/7
3	2.5/5	2.0/4	-	3.0/6	3.0/6	2.0/4	2.0/4	3.0/6	3.5/7	3.5/7	3.5/7
4	3.5/7	3.0/6	3.0/6	-	2.0/4	3.0/6	2.0/4	2.0/4	1.5/3	1.5/3	1.5/3
5	2.5/5	1.0/2	3.0/6	2.0/4	-	3.0/6	1.5/3	3.0/6	2.5/5	2.5/5	2.5/5
6	2.5/5	2.0/4	2.0/4	3.0/6	3.0/6	-	3.0/6	3.0/6	2.5/5	2.5/5	2.5/5
7	3.5/7	2.5/5	2.0/4	2.0/4	1.5/3	3.0/6	-	2.0/4	1.5/3	1.5/3	1.5/3
8	3.5/7	4.0/8	3.0/6	2.0/4	3.0/6	3.0/6	2.0/4	-	1.5/3	1.5/3	1.5/3
9	4.5/9	3.5/7	3.5/7	1.5/3	2.5/5	2.5/5	1.5/3	1.5/3	-	0.0/0	0.0/0
10	4.5/9	3.5/7	3.5/7	1.5/3	2.5/5	2.5/5	1.5/3	1.5/3	0.0/0	-	0.0/0
11	4.5/9	3.5/7	3.5/7	1.5/3	2.5/5	2.5/5	1.5/3	1.5/3	0.0/0	0.0/0	-

In Table 2, the figure before the slash (/) indicates the percentage of phonological distance, while the figure after the slash indicates the number of differing concepts. For instance, 3.5/7 for TP1–TP7 indicates seven differing concepts and a distance of 3.5%. The highest distance, 4.5%, occurred for TP1–TP9, TP1–TP10, and TP1–TP11, each of which differed on nine concepts. In contrast, a distance of 0% was recorded among TP9, TP10, and TP11. These results demonstrate variation in phonological distance between observation sites within the set of concepts analyzed.

The dialectometric calculations in Table 2 used all 200 Swadesh basic vocabulary concepts, although phonological variation was found in only 14. Because the remaining 186 concepts showed no variation, the theoretical maximum distance using 200 as the denominator was 7%. Accordingly, the relatively low percentages in Table 2 must be interpreted in light of the large number of invariant concepts. To determine the degree of difference between sites specifically within the concepts showing phonological variation, a sensitivity analysis was performed using the 14 variable concepts as the denominator. The results are presented in Table 3.

Table 3. Matrix of Pairwise Phonological Distances Based on the 14 Variable Concepts (%)

TP	1	2	3	4	5	6	7	8	9	10	11
1	—	21,43	35,71	50,00	35,71	35,71	50,00	50,00	64,29	64,29	64,29
2	21,43	—	28,57	42,86	14,29	28,57	35,71	57,14	50,00	50,00	50,00
3	35,71	28,57	—	42,86	42,86	28,57	28,57	42,86	50,00	50,00	50,00
4	50,00	42,86	42,86	—	28,57	42,86	28,57	28,57	21,43	21,43	21,43
5	35,71	14,29	42,86	28,57	—	42,86	21,43	42,86	35,71	35,71	35,71
6	35,71	28,57	28,57	42,86	42,86	—	42,86	42,86	35,71	35,71	35,71
7	50,00	35,71	28,57	28,57	21,43	42,86	—	28,57	21,43	21,43	21,43
8	50,00	57,14	42,86	28,57	42,86	42,86	28,57	—	21,43	21,43	21,43
9	64,29	50,00	50,00	21,43	35,71	35,71	21,43	21,43	—	0,00	0,00
10	64,29	50,00	50,00	21,43	35,71	35,71	21,43	21,43	0,00	—	0,00
11	64,29	50,00	50,00	21,43	35,71	35,71	21,43	21,43	0,00	0,00	—

As shown in Table 3, phonological distances between observation sites ranged from 0% to 64.29%. The highest values occurred for TP1–TP9, TP1–TP10, and TP1–TP11, each of which differed on nine of the 14 variable concepts. For example, the TP1–TP9 comparison yielded 4.5% when calculated against all 200 concepts but 64.29% when calculated against the 14 variable concepts. These percentages describe the same observed differences between sites using different denominators.

DISCUSSION

The findings reveal phonological diversity in Makassar across 11 observation sites in Jeneponto Regency. Of the 200 Swadesh basic vocabulary concepts, 14 displayed phonological variants with nonuniform distributions. Pairwise comparisons yielded between zero and nine differing concepts, equivalent to distances of 0%–4.5% when calculated against all 200 concepts. This range represents differences observed within the scope of the research instrument, not an absolute measure of similarity across speakers' entire phonological systems. This distinction matters because the number of variable concepts limits the maximum value of the primary calculation to 7%. Phonological distances should therefore be interpreted alongside the forms and their geographical distributions rather than automatically equated with dialect or subdialect categories.

The phonological variation documented in this study included vowel correspondences, vowel deletion, and consonant correspondences. Vowel correspondences were identified in several glosses, particularly /e/~/i/ and /a/~/u/. The sound system of Makassar, including its vowel system, has been described phonetically by Tabain & Jukes (2016). Vowel correspondences were also examined by Kaharuddin et al. (2025) in reconstructing relationships among five Makassar varieties. In the present study, however, the same type of vowel correspondence did not necessarily follow the same geographical distribution. For example, /e/~/i/ and /a/~/u/ occurred in multiple glosses, but the locations where their variants appeared differed. This finding indicates that phonological variation in Jeneponto is gloss-specific and does not exhibit a uniform geographical pattern solely on the basis of correspondence type.

Differences between glosses were more clearly demonstrated through microgeographic mapping. The four selected maps illustrate a vowel correspondence in *tongue*, vowel deletion in *you*, a consonant correspondence in *stab*, and overlapping variants in *yes*. Together, they demonstrate that variation types do not necessarily have identical geographical distributions and that more than one form can be documented at a single observation site. These findings are consistent with geolinguistic studies in Indonesia showing that linguistic patterns do not always coincide directly with administrative boundaries (Saddhono & Hartanto, 2021; Septianingtias et al., 2024; Wagiati et al., 2023). In addition, *husband* and *stab* shared the same distribution pattern, as shown in Table 1 and Figure

3. This correspondence represents one repeated geographical pattern, but it was not consistently observed across all the concepts analyzed.

The maps also reveal overlapping variants at certain sites, as illustrated by the gloss *yes*. The form [iye] was recorded at TP1; both [iye] and [iyo] occurred at TP2–TP8; and [iyo] was documented at TP9–TP11. Accordingly, TP1 differs from TP9–TP11 for this concept because they share no identical realization. By contrast, TP2–TP8 share at least one form with both TP1 and TP9–TP11 and therefore are not counted as different from either group for this concept. A similar consideration applies to the gloss *man*, because TP7 has both [buru?ne] and [bura?ne]. Under the site-level variant aggregation rule, this gloss does not contribute a difference between TP7 and other sites that share either form. This treatment underscores the importance of applying a consistent comparison rule and distinguishing the occurrence of variants from differences between locations.

The sensitivity analysis demonstrates that phonological distance percentages depend on the number of concepts used as the denominator. Calculations based on all 200 concepts indicate differences relative to the complete vocabulary set, whereas calculations based on 14 concepts indicate differences specifically within the variable concepts. This distinction matters because low percentages in the primary calculations do not necessarily imply equally small differences within the subset of variable concepts. The sensitivity analysis therefore provides additional information for interpreting dialectometric results across different sets of concepts. Calculations based on 200 concepts remain the primary findings, while those based on 14 concepts serve as a supplementary comparison for interpreting phonological distances between observation sites. Quantitative comparisons of geographical linguistic variation have also been employed by Patriantoro (2025), Septiana et al. (2023), and Shim & Nerbonne (2022) .

Considered together, microgeographic mapping and dialectometry reveal phonological differentiation at a local scale within Jeneponto Regency. The variable concepts show different geographical distributions, while certain variants are shared across locations. The identical distribution patterns of *husband* and *stab* demonstrate the recurrence of the same geographical division for two features, but this pattern does not extend uniformly to all concepts. Studies of geographical variation and dialectometry have shown that linguistic relationships between locations can be gradual, overlapping, or characterized by transitional areas (Jeszenszky et al., 2018; Nerbonne & Kretzschmar, 2013; Pickl, 2016; Wieling & Nerbonne, 2015). The present study did not investigate whether a dialect continuum exists; rather, it highlights the importance of accounting for overlapping variants when comparing observation sites. In this framework, dialectometric distances and isogloss patterns complement one another in describing variation without imposing predefined groupings of speech areas.

The differences in distribution patterns between glosses cannot be explained on the basis of factors outside the linguistic data analyzed here. Speaker mobility, family relationships and social networks, interregional language contact, geographical conditions, population movement, and economic interaction were not measured in this study. Consequently, no conclusions are drawn about the relationships between these factors and variant distribution. Their potential roles require investigation in future research specifically designed for that purpose.

The findings indicate that Jeneponto, which is broadly associated with the Turatea variety, nevertheless exhibits phonological diversity at a finer geographical scale. This diversity is reflected in different realizations of selected basic vocabulary items, nonuniform variant distributions, and varying phonological distances between pairs of observation sites. The study's contribution therefore lies not in identifying new dialect boundaries but in documenting variation and providing quantifiable comparisons between sites based on collected data. Distinguishing the proportion of variable concepts, the number of differences for each pair, and the distance percentages obtained with different denominators also clarifies the interpretation of dialectometric results. Microgeographic mapping and pairwise dialectometry can thus provide a basis for further research on the distribution of phonological variation in Makassar in Jeneponto.

The findings should be interpreted in light of the scope of the data and the conditions under which they were collected. The analysis was based on 200 Swadesh basic vocabulary items elicited from 33 informants across 11 observation sites, selected with consideration of accessibility and speaker availability. During elicitation, informants were asked to answer independently, and their responses were documented separately. Nevertheless, because informants were present together, some sought assistance or clarification from others for particular glosses. Such interactions could have influenced some responses and cannot be ruled out by reviewing recordings alone. Uncertain forms were checked against audio recordings and field notes, without independent transcription reliability testing or acoustic analysis. The study also did not measure individual variant frequencies, geographical distances, social networks, or the use of the forms in spontaneous speech. The findings should therefore be interpreted as a description of phonological variation documented at the selected sites rather than as statistically generalizable results for all Makassar speakers in Jeneponto Regency.

CONCLUSION

Of the 200 Swadesh basic vocabulary concepts analyzed, 14 showed phonological variation in Makassar in Jeneponto Regency. These comprised eight concepts exhibiting vowel correspondences, two exhibiting vowel deletion, and four exhibiting consonant correspondences. Microgeographic mapping across 11 observation sites

revealed diverse variant distribution patterns. Most concepts displayed distinct patterns, whereas the glosses *husband* and *stab* followed identical distributions. In addition, two phonological variants were documented at the same observation site for the glosses *yes* and *man*. Pairwise dialectometry based on all 200 concepts yielded phonological distances of 0%–4.5%, with the lowest distances between TP9–TP10, TP9–TP11, and TP10–TP11 and the highest between TP1–TP9, TP1–TP10, and TP1–TP11. The sensitivity analysis based on the 14 variable concepts yielded distances of 0%–64.29%, demonstrating that the percentage of differences depends on the number of concepts used as the denominator. Overall, the study identifies phonological variants, describes their microgeographic distribution, and quantifies phonological differences between observation sites in Jeneponto Regency. Future research could include more informants, conduct individual elicitation sessions, and incorporate spontaneous speech and acoustic-phonetic analysis to broaden coverage and improve analytical precision.

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AUTHOR CONTRIBUTION STATEMENT

[RM] contributed to the conceptualization of the study, development of the methodology and initial instrument design, data collection, validation of Makassar language data, data processing and analysis, and finalization of the manuscript's substantive content; [FN] contributed to refining and preparing the research instruments, including the Swadesh vocabulary instrument and informant information sheet, and reviewing the completeness of the research materials; [SMR] contributed to instrument editing, data collection, identification of Swadesh items showing phonological variation, mapping the distribution of variants based on the research data, and reviewing and revising the manuscript; [MI] contributed to preparing the initial article draft based on the research data and the completed variation maps, organizing the findings into the structure of a scientific article, and reviewing the manuscript. All authors reviewed and approved the final version of the manuscript.

AI USE STATEMENT

ChatGPT (OpenAI) was used for language editing, structural organization, and manuscript formatting. All content, data, analyses, interpretations, and final decisions were reviewed by the authors, who take full responsibility for the final version of the article.

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