AN ACOUSTIC STUDY OF NIGERIAN ENGLISH VOWELS PRODUCED BY HAUSA SPEAKERS

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KUALA LUMPUR

2015

AN ACOUSTIC STUDY OF NIGERIAN ENGLISH VOWELS PRODUCED BY HAUSA SPEAKERS

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DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF LINGUISTICS

FACULTY OF LANGUAGES AND LINGUISTICS
UNIVERSITY OF MALAYA
KUALA LUMPUR

2015

UNIVERSITI MALAYA
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ABSTRACT

This study aims at examining the Hausa speakers' production of English monophthong vowels from the acoustic point of view. The study focuses on native Hausa speakers of Northern Nigeria. Hausa language has 10 monophthong vowels, while English has 14 monophthong vowels; this shows clearly that there may be a disparity between English and Hausa in terms of vowels and sounds inventory. There are perceived differences between how the native speakers of English produce some of their monophthong vowels and how the Hausa speakers produce those same monophthongs. These differences may be because of vowel quality, duration, rhythm and accent of the speakers. It is not well understood how systematically the vowels of NigE are. Research on the acoustic measurements of NigE vowels is at dearth. In order to examine the vowels in NigE, monosyllabic words with CVC structure of the eleven (11) monophthong sounds in '*hVd*' and *'bVd'* contexts were produced by ten (10) NigE. As a comparison, the pronunciation of English monophthongs was also done on 10 speakers, Malays speakers of English, 5 males and 5 females. Their age ranged from 24 to 40 years old. The recorded data were analyzed using PRAAT version 5.3.81 (Boersma and Weenik, 2014) phonetic software for instrumental analysis to measure the quality and quantity of vowels and the extent to which these vowels were phonetically contrasted between typically paired vowels. The findings from this study reveal that in both contexts, the vowels were produced almost similarly. However, in terms of vowel length contrast, all the vowels were differentiated between long and short, but lack of contrast is more apparent in vowel quality between the /ɪ/ - /iː/, /ʌ/ - /ɑː/ and /ɒ/ - /ɔː/ vowel pairs.

ABSTRAK

Kajian ini bertujuan untuk mengkaji pengeluaran vokal-vokal monoftong dalam kalangan penutur Hausa dari segi akoustik. Kajian ini memberi fokus pada penutur asli Hausa yang berasal dari Utara Nigeria. Bahasa Hausa mempunyai 10 vokal monoftong, sementara bahasa Inggeris mempunyai 14 vokal monoftong, ini menunjukkan bahawa, kemungkinan terdapat perbezaan antara bahasa Inggeris dan bahasa Hausa dari segi inventori bunyi vokal. Terdapat perbezaan di antara cara bagaimana penutur asli bahasa Inggeris menghasilkan vokal monoftong dan bagaimana penutur Hausa menghasilkan monoftong yang sama. Perbezaan ini mungkin disebabkan oleh kualiti vokal, tempoh, irama dan loghat seseorang penutur tersebut. Ia tidak dapat difahami dengan begitu baik tentang bagaimana sistematiknya vokal-vokal NigE. Kajian tentang ukuran akoustik vokal NigE masih kurang. Jadi, untuk mengkaji vokal-vokal dalam NigE, perkataan-perkataan ekasuku dengan struktur CVC bagi sebelas (11) bunyi monoftong dalam kontek *'hVd'* dan *'bVd'* dihasilkan oleh sepuluh (10) orang penutur Nigeria. Sebagai perbandingan, sebutan monoftong bahasa Inggeris juga dihasilkan oleh sepuluh (10) penutur Melayu, lima (5) lelaki dan lima (5) perempuan. Mereka berumur di antara 24 hingga 40 tahun. Data yang telah direkodkan dianalisis menggunakan PRAAT versi 5.3.81 (Boersma dan Weenik, 2014) perisian fonetik untuk analisis instrumental bagi mengukur kualiti dan kuantiti vokal-vokal dan sejauh mana vokal-vokal ini berbeza secara fonetik dengan pasangan vokal yang biasa. Hasil daripada kajian ini menunjukkan bahawa dalam kedua-dua konteks, vokal-vokal dihasilkan adalah hampir sama. Walau bagaimanapun, dari segi perbandingan panjang vokal, semua vokal dibezakan antara panjang dan pendek, tetapi kurang berbeza dari segi kualiti vokal tersebut seperti antara pasangan vokal /ɪ/ - /iː/, /ʌ/ - /ɑː/ dan /ɒ/ - /ɔː/

ACKNOWLEDGEMENTS

I would like to express my deepest sense of gratitude to my supervisor Dr. Roshidah Hassan for her patience, guidance and excellent advice throughout this study. She has been encouraging me with advice and constructive suggestions towards completing my research, giving me close supervision and critically corrected my way of thinking. I owe deepest gratitude to my supervisor Dr. Roshidah Hassan. I am indebted to my utmost mentor Ass prof Stefanie Sharmila Pillai for truly defining the concept of acoustic phonetics and her valuable advice on the early work of this research. Without Dr. Stef's incredible research supports, encouragements, attention to details and insistence on explicitness, this dissertation would not have been possible. I am forever thankful for all she taught me and continue to teach me, she will probably never fully know how much I have benefited from her faith in me. Her able assistance is always gratefully acknowledged. Many thanks to my panels who have provided guidance and support that extends far beyond this dissertation.

A very special thank you to my family, for all of your prayers and support throughout my entire academic career, especially my mum, dad, sisters and brothers. Am forever thankful to you a rare father, Alh. Ibrahim Ata. Your continuous academic support, both financially and psychologically have been my driving force beginning from my elementary school to date.

This research project would not have been possible without my participants' involvement. I wish to express my gratitude to my respondents and lab technicians for their willingness to participate in my research..

Lastly, to my Kano State governor, in person of Dr. Rabi'u Musa Kwankwaso for giving the scholarship to pursue this study.

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LIST OF ABBREVIATIONS

BrE: British English

CamE: Cameroon English

EAfE: East African English

F0: Fundamental frequency

F1: First formant frequency

F2: Second formant frequency

GhE: Ghanaian English

Hz: Hertz

MalE: Malaysian English

Ms: Milliseconds

NigE: Nigerian English

RP: Received Pronunciation

SBE: Standard British English

SD: Standard deviation

WAfE: West African English

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CHAPTER 1

INTRODUCTION

1.1. Introduction

This chapter explains the basic concepts and description of the study. These include the background to the study, statement of the problem, research objectives, research questions, significance of the research and scope and limitation of the research.

1.2. Background to the Study

The use of English language is becoming increasingly global, something that has paved way to the emergence of various forms of English spoken across the globe by different people and ethnicities (Schneider, 2003). Thus, English being used as a second language accommodates changes from different languages and in different dialects at different levels giving rise to various new forms of the language. The differences identified in the New English of today's world, range from the phonological, morphological, syntactic to the pragmatic level. These kinds of differences that co-occur across many countries of non-native speakers of English are amazingly taking different shapes, which sometimes seem to be unintelligible to the native speakers of English.

Bamgbose (1996), Banjo (1996), Gibbon and Gut (2001), Jibril (1982), Jowitt (1991) and Schneider (2007) asserted the existence of Nigerian English variety, (henceforth NigE). English is spoken in Nigeria as a second language; as well as an official language in a

formal context of education, institutions of government, business transactions; and as a lingua franca between educated speakers of different indigenous languages (Gut, 2004; Jowitt, 1991 & Schneider, 2007). Although English has been considered as the official language in Nigeria, and is predominantly used in the formal context such as government, education, literature, business and commerce, there is so far no government statute or gazette that stated this (Gut, 2008).

Nigeria is a multi-lingual society having English and many different indigenous languages, with three major regional languages, notably: Hausa, Igbo and Yoruba and over 500 hundred minority languages in contact. The contact between English and the hundreds of indigenous languages resulted in differences in the usages of their English among these native speakers of different languages. In addition, the accents of these indigenous languages are either directly or indirectly transferred to their English (Gut, 2007). These indigenous languages spoken by the Nigerian affect the phonology, structure and lexis of the English language and which in turn influences their spoken English. Quite a number of Nigerians are bilingual or multilingual with a command of numerous indigenous or non-indigenous languages. The main non-indigenous language spoken is English throughout the country. Arabic is another non-indigenous language spoken in the Northern part mostly in Islamic schools followed by French language which is taught in some colleges and tertiary institutes.

It is pertinent to note that, there is no uniform accent spoken throughout the country. Scholars identified various forms of NigE, which are approximately divided into three sub-varieties that are assumed to represent three regions of the country, namely; the North, Southeast and the Southwest. The Hausa English, the Igbo English and the Yoruba English

are spoken in the Northern, Southeastern and the Southwestern regions respectively. Therefore, this classification reflects the (3) three major ethnic groups in Nigeria. NigE is said to include all the sub varieties spoken in Nigeria as Igbo English, Yoruba English and Hausa English. It was established by Schneider (2003) that NigE variety is undergoing endonormative stabilization. This assertion is based on Schneider's dynamic Model of evolution of post-colonial varieties (Schneider, 2003; 2007), where he suggested that the marked local accent shows features which some linguists identified as the transfer of phoneme from the phonology of the indigenous languages.

Hausa is a particular language spoken in the northern part of Nigeria and southern Niger. The language has its own peculiar phonological variation; it is a tonal language (Newman, 2000), which uses some features for pitch variation besides the different phonetic inventory of sounds. Hausa is a member of Afro-Asiatic languages (Greenberg, 1963). Thus, a Hausa speaker may have different characteristics in producing and realizing the English vowel sounds. Hence, it is anticipated that, this speaker may have a particular way of pronouncing the English vowel sounds, which might be due to differences in vowel quality in the manner of pronunciation as explained in Schneider's theoretical framework as a result of transfer of phoneme from the phonology of the indigenous languages.

Vowels play a major role in the production of each speech sounds. One of the main distinctions in the pronunciation of English sounds has to do with how vowels are produced in different varieties of English as in Cox (2006), Deterding (1997, 2003), Ferragne and Pellegrino (2010), Hillenbrand, Getty, Clark and Wheeler (1995), Mutonya (2008), Pillai, Mohd, Knowles and Tang (2010) and Sharbawi (2006).

1.3. Background about Nigeria

Nigeria is a West African country extending its territorial coastline with the Gulf of Guinea borders, which is part of the Atlantic Ocean. Nigeria shares international boundaries with Benin in the west, Cameroun in the east, Chad bordering towards the northeast and Niger republic covering the north with the Atlantic Ocean enveloping the southern limits of the Nigerian territory. Nigeria has a total number of 521 spoken languages with three (3) major languages, Hausa, Igbo and Yoruba. Additionally, there are network languages, which include Fulfulde, Edo, Efik, Ijaw, Kanuri and Idoma. They are composed of more than 250 ethnic groups of which the following are the most populous and politically influential Hausa and Fulani 29%, Yoruba 21%, Igbo (Ibo) 18%, Ijaw 10%, Kanuri 4%, Ibibio 3.5%, Tiv 2.5% (http://www.international.ucla.edu/africa/). These three (3) major languages belong to the Afro Asiatic (Chadic), Niger Kordofanian and the Khoisan language families (Greenberg, 1963).

The three (3) major ethnic groups in Nigeria are made up of the Hausa, the Yoruba and the Igbo, which constitutes 70 percent of the Nigerian population. A portion of 10 percent covers several other groups such as the Kanuri, Tiv and Ibibio, with a total number of more than 1 million members each. More than 300 smaller ethnic groups distributed across the country absorb the remaining 20 percent of the population. However, these smaller ethnic groups are blended with lingual intersect thus melting most of the boundaries to become assimilated into a closer major ethnic group. Despite the fact that most ethnic groups prefer to communicate in their own language, it is pertinent to note that the multilingual composition of Nigeria puts most of Nigerians prone to speaking more than one language. Looking at the spatial distribution of populace in Nigeria, where the vast majority lives in

rural areas, the major spoken languages of communication in the country remains the indigenous languages. Nigerian's official language is English, making it widely spoken, especially among educated people (Jowitt, 1991). However, because of different ethnic identities, Nigerians developed a lingua Franca of Pidgin English, which they use to communicate at all levels with varying regional influences on dialect and slang. Apart from English, more than 500 native Nigerian languages are used for communication within ethnic identities with some being affected by the inferiority complex syndrome, and hence endangered to extinction.

1.4. New Englishes

McArthur (2003) coined the term new Englishes in the 1980s to refer to post-colonial Englishes, which emerged in countries such as Nigeria, Malaysia, Singapore, Kenya and the host of other non-native English countries. In those countries, the initial contact and exposure to English language dates back to trading contacts, missionaries, colonial administration and educational system that are set by the native English speakers. Previous studies indicate that, the application of New English as a communication tool by second language users dated back to 1980s. A striking distinction between these varieties and that of countries like USA and Australia is that, the latter did not develop from colonial English. That is to say, in the latter countries English is spoken as a mother tongue as against the former, where it is learnt as a second language later. Thus the countries frequently developed to multilingual settings, where English language is maintained and has an important status of the language in education, media, business and commerce as well as interethnic communications or even as an official or national language.

The impact of first language spoken in regions on New Englishes is very strong as observed in Hokkien Chinese, Malay or Tamil in Singapore (Schneider, 2008). Countries like Nigeria and India have embraced the New Englishes as the native speaker variety of English and lingua franca due to many native languages, which are mutually incomprehensible. This brings about the expansion of its usage and recognition of its application as embedded in some of the educational policies of those countries.

Notwithstanding its status as a new discipline of English linguistics, studies on new varieties of English as a linguistic research can be traced back to the early 1980s, following the works of Bailey (1973), Bailey and Gorlach (1982), Kachru (1986), Platt, Weber and Ho (1984), Schneider (2003), Trudgill and Hannah (1982) and Wells (1982). These studies focus more on issues relating to the prominence and functions of English as a global language and its linguistic characteristics. Prior to this, some books were published on some of the major new varieties of English, some of which were the English of Australia and New Zealand (Baker, 1945; Ramson, 1966; Turner, 1966) West Africa variety (Spencer, 1971) and Singapore and Malaysia (Crewe, 1977; Tongue, 1974).

The manifested differences of new Englishes in features and cultural identities as well as linguistic arose because of different historical, political, geographical, and social-cultural factors that gave birth to them. Therefore, the New English in Nigeria will certainly differ from any other form of New Englishes as the Malaysian, Ghanaian or Singaporean English would differ from each other. The extent of difference is defined by the measure of impact at the various linguistic levels, which is determined by the degree of localization of English.

Scholars Adetugbo (1979), Bamgbose (1995), Jibril (1979), Jowitt (1991), Kachru (1983), Platt et al. (1984), Pride (1982), Spencer (1971), Ubahakwe (1979) view New English as a legitimate variety and a sociolinguistic reality raising concerns to the issues of its identification and characteristics.

The term New Englishes as asserted by Baskaran (2008), Crystal (1997), Mesthrie and Bhatt (2008) and Trudgill (2002) is also referred to as Modern Englishes, International Englishes, or World Englishes. Examples of such varieties of English include South African English, West African English (WAfE), Singaporean English, NigE, Australian English and Indian English. It is envisaged that the root of these New Englishes stems out of the British colonialism during the 19th century (Jenkins, 2003; McArthur, 1998). As Eka (2000), Greenbaum and Nelson (2002), Kachru (1995), Mesthrie and Bhatt (2008) Trudgill and Hannah (1982) among many others highlighted the recognition of the establishment of other varieties of English, which differ from the Standard British English henceforth SBE or American English.

1.5. English in Nigeria

English language was introduced in Nigeria with the establishment of trade contact between the British and Nigerians on the West African coast in the early 16th century. The earliest appearance of English in West Africa dated back to this century, where the British trade ships landed on the West coast. Later in the 17th century, trading ports and forts were also established. English served as a language of communication between the Nigerians and the British people. This contact resulted in a form of spoken English variety, "the Nigerian pidgin", which was largely drawn out of the contextual comprehension of instructions. The

contact that was largely limited to the needs of the trading, which included the famous slave trade serves as the void within which the British and Nigerians communicated in different ways that ranged from demonstrative signs to language instructions. Some form of English was well established on the coast by the 18th century.

In the 19th century, the growing political, economic and religious concerns led to the expansion of trading activities; and with the advent of missionaries near Lagos and Calabar, different stations were founded in different societies - paving ways for the missionaries to penetrate into the vicinities mostly following the established trading routes. Gut (2004) stated that in 1851, Lagos state was occupied and developed into a British colony. Thus, the English language emanated to the region in the mid-19th century, due to commercial interest, which were followed by the Royal Niger Company, founded in 1880s, and were turned into protectorate in 1900.

Missionaries intended to spread Christianity by vernaculars hence, the religious activities were operated in English. The missionary stations, then became the community centers of education and culture. Consequently, by 1880s, instructions were given to teach English to meet up with the demand for literate indigenous English-speakers. Thereafter, the state schools followed for the same reasons, expanding the number of English speaking literate locals. However, missionary education was not readily available in the northern part of the country, which is a Muslim dominated region. This warrants the need for conquering deeper into the northern region and establishing missionary centers. After a period of resistance, state schools were established as stated by Gut (2004). Therefore, early bilingualism spread, which was associated with elitism, began with the dual function of colonial coercion and missionary tactics.

Egbokhare (2003) claims that the coastal trading contacts produced a developing pidgin, apparently as a basic form at first, but later manifested itself as a variety setting off a "commercial elite". The uncertainty surrounding the exact origin of Pidgin English in Nigeria remains a riddle that is difficult to solve. Going by the historical antecedent of the regions, its origin is envisaged to have come from the southeastern Niger Delta region or in the south-west in and around Lagos. Furthermore, it suggests that Krio and ultimately West Indian forms of English may have influenced NigE in its formative period.

With colonial expansion and the missionaries that found it useful, the Pidgin English moved central, but it became stigmatized when a new elitist class of English-speaking Nigerians emerged (Jowitt, 1991). English language gradually expanded its function by becoming interethnic lingua Franca. According to Huber (1999) many phonological properties of Nigerian Pidgin were shaped in the early coastal contact phase around 1800.

1.6. Problem Statement

NigE from the view of being a new variety of English emerged mainly from colonization in Asia and Africa (Schneider, 2007). Banjo (1996), Jibril (1982), Bamgbose (1996), Jowitt (1991), Gibbon and Gut (2001) and Schneider (2007) asserted the existence of NigE and categorized it into three different sub varieties, whose structures are influenced by the indigenous languages spoken in Nigeria (Gut, 2007). These NigE sub-varieties are the Hausa, Igbo and the Yoruba English. Studies on NigE pronunciation are based on impressionist works and it is recognized. There is a systematic difference between standard NigE variety and British English (Henceforth BrE) in phonology, syntax and vocabulary. However, there seems to be dearth of an acoustic research on the vowels of NigE. Jibril

(1982), Bamgbose (1996) and Udofot (2004) investigated the NigE variety. Gut (2004), Akinjobi (2002) and Olaniyi (2006) studied the suprasegmental features of NigE, but an acoustic research that deals with the English vowel sounds produced by the Hausa speakers is yet to be done.

According to Abraham (1962), Abubakar (2001), Bargery and Westermann (1951), Galadanci (1976), Jaggar (2001), Leben (1970), Muhammad (2014), Newman (1986, 2000), Sani (2005) and Yalwa (1992) studies and researches on Hausa focus broadly on the grammar and phonology of the language. There is currently lack of research and proper documentation on the acoustic phonetic characteristics of Hausa speakers of NigE. To fill this gap, this study examines the pronunciation of English vowels by educated Hausa speakers by conducting acoustic analysis of the monophthong vowels.

1.7. Research Objectives

As pointed out in Yavas (2006) for a better description of vowel sounds, there is a need for the description of the vowel acoustic structure; however, currently it lacks the acoustic analysis of the segmental vowels of the NigE. Hence, this study tries to fill the gap mentioned. The study also provides a cross language acoustic comparison of vowels in NigE and Malaysian English (henceforth MalE), to find systematic differences and similarities of the English monophthongs sound. The main aim of this research is to investigate the physical properties of vowel sounds in NigE. The objectives of the research are as follows:

1. To examine the acoustic features of English monophthong vowels as produced by Hausa speakers.
2. To investigate if there is a vowel contrast between typical vowel pairs as produced by Hausa speakers.
3. To compare, if there is any significant differences and similarities found in males and females speech and between NigE and MalE speakers.

1.8. Research Questions

In need for this, the research has three (3) research questions.

1. What are the acoustic features of English monophthong vowels as produced by Hausa speakers?
2. To what extent is there a vowel contrast in terms of quality and length between the typical vowel pairs?
3. To what extent is there a difference in vowel realization in males and females speech and between NigE and MalE speakers?

The first research question aims at providing a general picture of NigE sound produced by Hausa speakers based on the acoustic analysis of the vowels. The goal of the second research question is to have a clearer picture as to what extent is there a contrast between typical vowel pairs in terms of vowel in quality and length. The third research question focuses on the comparisons of vowel quality and length produced between the male and female speakers. Nevertheless, the vowels produced by these males and females in NigE

and MalE were compared to find out the differences and similarities in the vowel quality, length and the quality of the typical vowel pairs.

Although there are recent empirical investigations on the vowels of the MalE such as Pillai (2014), Pillai et al. (2010) and Tan and Low (2010) yet, new data on MalE was recorded to provide a primary source of data and to corroborate that of the NigE. However, there is a need to compare NigE and MalE since both countries have a similar sociolinguistics background of multi-lingual and multiethnic societies. The English language was introduced due to colonization and is used as a second language and for educational purposes.

Studies in Schneider (2008) and Gut (2004) suggest that native English is far different from the English spoken by non-native speakers either as a second or third language. This is even as Crystal (2003) suggests that the non-native speakers of English outnumber natives by far. Based on this assertion, scholars investigated the linguistic features of English spoken outside the different countries tagged by Schneider (2003) as the outer circle varieties. For the fact that the peculiarities of these were so evident, linguists made investigations and subsequent comparison between the various non-native varieties of English such as NigE, MalE, Singaporean English and Brunei English. Among these investigations are Tan and Low (2010) study between MalE and Singaporean English, Hubais and Pillai (2010) of Omanis vowels, Pillai et al. (2010) of MalE and Deterding (2003) of Singapore English. In addition, the significance of selecting Malaysian and Nigerian is derived from the desire of putting norm orientation hypothesis to taste, as both productions indicate significant impacts of L1 on their pronunciation. More so, both are post-colonial Englishes with their respective L1 background influence as shown.

For the third research question which is for male and female speakers' differences in NigE and MalE, data were not normalized. Thus, these data need to be treated with caution. Hence, the absence of normalization is covered by considering the aggregate factors that calls for applying it. As highlighted by Lindblom (1990), Ladefoged and Broadbent (1957) as well as Traunmuller (1988), the need for the distinction between the linguistic and non-linguistic factors calls for normalization. In this research, however, linguistic factors are taken care by analyzing the effect of dialectal and sociolectal influences. This is achieved by a designed selection of respondents within the circumference of equal dialectal and sociolectal background. Having selected the respondents from the central Malaysian Peninsula and Northern Nigerian region, while restricting them to those at postgraduate level, the need for normalization may not arise.

1.9. Significance of the Research

Researchers' on different varieties of English as in first, second and foreign language have conducted studies on vowels sound realization. There is no published research on acoustic perception of the Hausa accented English. The rationale for examining the acoustic vowel features of Hausa speakers of NigE is to enable comparison with other varieties of English language. Thus, the findings of this research provide hints on how NigE accented vowels are produced acoustically and how drastically it differs from other varieties. As such, findings might therefore give a pedagogic decision on NigE pronunciation and vowels sound. The findings will also help researchers, academics and anyone interested in the pattern of NigE sounds as well. More so, the output of this research would put the norm

orientation theory to test as to whether the influence of L1 is significant on L2 new variety of English.

1.10. Scope and Limitation of the Study

The scope of the study is on the measurements of the formants and vowel length (duration) of the acoustic features of the NigE monophthongs. The study focuses on ten Hausa speakers of NigE, five (5) males and five (5) females, and ten (10) Malay speakers of MalE in equal number of each gender. Other sub varieties of NigE, MalE and diphthongs were not included and investigated. The limitation of this research is the word selection. The words are selected on *bVd* and *hVd* contexts, but two words are selected based on different context of pVd (which is a voiceless sound) in the *bVd* context. This selection is made to have a constant sequence of the reading list of the words.

While both males and females were chosen in each category to accommodate the possible variation in gender pronunciation, the respondents from Nigerian speakers were restricted to Hausa speakers, while those from Malaysia were restricted to central Malaysian Peninsular. This restriction was applied in order to take care of the effect that may surface due to differences in the native languages. The striking analogy and similarity of vowel length contrast between Hausa and English gives it (Hausa) an edge above the remaining two major ethnic groups. More so, Hausa tribe is the most populous amongst the three major ethnic groups in Nigeria. Because of structural differences in phonetic features between Hausa and English, it is envisaged that differences in vowel quality will be distinct due to variation in vowel inventory. The phonological representation of Hausa English is expected to serve as the yardstick for NigE because in addition to uniform variation of

vowel inventory with English, the majority of other languages have variation in vowel length-, which is not the case in Hausa Language.

The finding in this study is limited by the fact that the data examined is only on a small group of ethnic Hausa postgraduate speakers of NigE, and does not represent the whole NigE speakers in Nigeria. All the participants were from Northern part of Nigeria. With regards to the two (2) contexts in this study, *bVd* and *hVd,* there is a stop gap of the consonants stop, in initial and final position of *bVd* context, and only the final position in *hVd* context. This gap is a period of stop closure once a stop consonant is produced, where no voicing is present until the onset of the preceding vowel. This period occurs before the release, which may either be in silent for voiceless stop or have low amplitude for voiced stops (Kent & Read, 1992). In this stop period, there is a period of aspiration after the closure is release, especially when the stop consonant is in initial position. This aspiration follows immediately after the release of the closure. In word final position, the stop consonant usually is unrealized and no aspiration occurs, which is rarely observed in voiced stops. The VOT or voice onset time is an interval before the release of a consonant, which is usually a stop sound, with the start of the voicing for the following vowels (Ladefoged, 2003). Therefore, the voiced and voiceless stops have been found to differ in different aspects, the initial voiceless stops have greater VOT, where the following vowel has higher F0 than the voiced counterpart, while voiceless stops in final position are longer than the voiced counterparts. The duration of the preceding vowel in stop, voiced consonants are lengthened before voiced stops.

1.11. Organization of the Dissertation

This thesis has five (5) chapters. Chapter 1 gives a brief introductory explanation of the thesis, which provides ideas of the thesis: the background to the study, problem statements, research objectives, research questions, research significance and the scope and limitations of the research. Chapter 2 covers the reviews of related literatures on general NigE, pronunciation and vowel sounds. Chapter 3 reveals the general methods and methodology used in collecting the data and analysis of the data. Chapter 4 presents the discussion of the findings and Chapter 5 the last chapter, summarizes the findings of the study, which includes the conclusion, summary, the limitations and implications of this research.

CHAPTER 2

LITERATURE REVIEW

2.1. Introduction

This chapter discusses the existing literatures on NigE, MalE and acoustic study of vowels in different varieties of English as first, second or foreign languages. The first section discusses the basic background information about Nigeria. The second section provides the description of English in Nigeria and Malaysia. In addition, new Englishes frameworks were discussed. The third section discusses studies on NigE, previous studies on vowel sounds in NigE and MalE, Hausa vowels and studies on sound in other varieties of African English. While, the fourth section discusses the basic phonetic features of speech sounds and followed by the last section on studies of acoustic analysis of vowels.

2.2. An Overview of NigE

The term NigE is a "variety of English spoken and used by Nigerians" Adeniyi (2006). Eka (2000) views it as a "subset of English spoken and written by Nigerians". Okoro (2004) defines NigE as "the way Nigerians speak and write it". Bokamba (1982) view NigE from sub-continental point of view and refers to it as a variety of "West African Vernacular English" (WAVE). Jibril (1982) echoed this view; the position of Akere and Pride (1982) however differs from the above as they refers it as the "Standard NigE." (Odumuh, 1987; 1993), who asserted anchors this position, "there exists now a single super ordinate variety of Standard English in Nigeria, which can be regarded as 'NigE'.

However, on a realistic note, Odumus's (1987, 1993) assertion that "there exists now a single super ordinate variety of Standard English". Therefore, despite the variations in different kind of English spoken in Nigeria in terms of lexis and pronunciation, which have been influenced by the speakers' mother tongue, the Nigerian speakers of English are mutually intelligible. NigE therefore, is characterized by the unique features that distinguish it from other new varieties of world Englishes as well as the native English varieties

Brosnahan (1958) was among the first to have published work on NigE. The claim of the existence of NigE variety batched scholars into groups/ schools: the deviation and variation groups/schools. There appears to be a change in the perspective of scholars. Many of those in deviation school appear to be earlier scholars; while variation school came later. The deviation school asserts that the variety NigE does not officially exist, regarding it as just a chain of errors fortifying the peripheral mastery of the SBE by Nigerians. Other scholars with this view among many others are Vincent (1974) and Salami (1968). They maintained that NigE is inconsistent and as such, they upheld the SBE as the only acceptable English. The fingerprint of colonial stereotype is very clear in early writers on English Language as manifested in Vincent (1974) who stigmatizes NigE as "bad English." The same derogatory outlook was given by Salami (1968) who refers to it as "errors of usage." In another revelation, Vincent (1974) and Salami (1968) consider the users of NigE as either deviant or incorrect. While the variation school accommodates the existing standpoint by recognizing the distinct variety, a number of notable scholars such as Adegbija (2000), Adetugbo (1997), Bamgboṣe (2000) and Odumuh (1987) are within the school of thoughts. The school asserts the existence of a distinct variety or dialect in Nigeria, with its own

subtypes along the lines of basilectal "non-standard", mesolectal "general, close to standard" and acrolectal "Standard NigE" (Awonusi, 1987; Babatunde, 2001).

Similarly, one would be convinced by the following arguments presented by scholars on this issue, that NigE could be viewed as a variety of SBE and not a deviation. Cruttenden (2008:77) stated that English has been not only an international language but second, amalgam and additional language. Again, Brosnahan (1958) suggests that NigE is a variety that is believed to be internationally acceptable and intelligible, an opinion echoed by Banjo (1971) in his classification of variety III of NigE. However, NigE variety thus exists and has gained wide acceptance in academic circles. That suggests why Bamgbose (1998:4) claims that its "codification and acceptability are the most important requirements". As even Crystal (2003) suggests, the non-native speakers of English outnumber natives by far. Based on this assertion, it is believed that other varieties of English were tagged differently from BrE. In addition, English is viewed as the most popular language used or spoken worldwide. Therefore, it may be unwise to consider the language spoken or used by countries other than Britain as errors or bad English, as different varieties of English may be observed as what constitutes the term world Englishes. Bolton (2009:250) sees world Englishes as "English as an international language, global varieties of English, non native varieties of English, world Englishes, new Englishes alongside such more traditional terms as English as second language and foreign language. In second narrow sense the term is used to specifically refer to new englishes found in the Carribean and West Africa and East African societies such as Nigeria and Kenya and to such Asian Englishes as Hong Kong English, Indian, Malaysian and Singaporean and Philippine English''.

In view of Bolton's (2009) assertion of the world Englishes therefore, there is a proper consideration given toEnglish language used in countries other than the Great Britain. This is termed as varieties of English. Henceforth there is no room for such Vincent's stigmatization which termed NigE as erroneous or bad English.

Walsh (1967) was said to be among those who claimed that "regardless of the language of educated Nigerians, the English spoken by them have enough common feature to mark off a general type, which can be called NigE" as reported in Ogu (1992). Jowitt (1991) stated that NigE is real and identifiable; however, its characteristic forms are by no means the features of NigE users. However, going by the aforementioned, one observed that a general criticism dominates the academic arena on the use of NigE. Regardless of the criticism, the fundamental objective of using any language is communication.

NigE is a variety with distinctive linguistic characteristics that reflect the mixed variety of different languages across the country. Gut (2004) and Schneider (2007) affirmed the existence of NigE as a variety of new Englishes and revealed that there are differences in the spoken speech of the NigE. English language in Nigeria is considered as a second language based on Kachru's three circle of world Englishes, the inner, outer and expanding. According to Gut (2004) NigE is classified to be in the outer circle. However, in some minority tribes of the southeastern part of the country, English is close to replacing their mother tongue, taking the position of the first language. Nigeria has a multilingual setting with three major tribes having multiple divisions of regional dialects each. Hausa language for instance, has more than 16 different dialects, each with different lexicographical sound. This subdivision is five times fold or more in other tribes, making it difficult to make a

general statement or take a true representative sample in a population at random. Thus, English in Nigeria cannot be defined as a uniform variety.

Udofot (2004) distinguishes three main types of NigE variety, the "non-standard", "the standard" and the "sophisticated" varieties. These different classifications proposed by various linguists for both written and spoken English in Nigeria. Jowitt (1991) supported certain changes where he introduces the "concept of popular NigE". He suggested that the English usage in Nigeria is a combination of both standard form and the popular NigE forms, which is in turn composed of errors and variants. This opinion would be seen as similar to that provided by previous researchers, which claims that variety of NigE, both spoken and written comprises of common primary feature that are shared with all the other varieties, and indexical markers that are peculiar to that variety (Jowitt, 1991).

It is a second language status employed for official purposes and communication between heterolinguals group. This situation is observed in all English colonized nations like Singapore, Malaysia, India, Tanzania, Zimbabwe, Zambia, and Ghana and so on. They are in contrast to countries like United Kingdom, the United States of America, Australia, New Zealand and South Africa (the inner circle); English is used as the first language of communication in all ramifications and a nativized code, with noticeable environmental differences.

2.3. Studies on NigE

Numerous studies conducted by different researchers described various classifications of NigE variety using considerable factors. Some of these contributions include; written English by Adekunle (1974), spoken English by Brosnahan (1958), Ufomata (1990), close to world standard by Adeniran (1979), Banjo (1996), Intelligibility by Foluke (2012), Tiffen (1974) and varieties based on regions which include Hausa, Igbo and Yoruba English, by Gut (2004), Jibril (1982) and Jowitt (1991).

Investigations by Awonusi (1986), Bamgbose (1982), Eka (1985), Gut (2008), Jibril (1986), Jowitt (1991), Mesthrie (2008), Olaniyi and Josiah (2013) and Udofot (2004) classified NigE sounds based on different regions and educational level. Gut (2008), Jowitt (1991) and Ufomata (1996) maintained that the differences between the sounds in NigE lack phonemic vowel length and centralized vowels. Hence, this study examined the production of English vowels by educated Hausa speakers of NigE.

In a bid to scrutinize and examine what constitute the spoken NigE, a number of theoretical approaches have been proposed and adopted with considerable level of accuracy. One of the approaches is the sociolinguistic or variationist approach, which is explored by notable researchers like Brosnahan (1958), Banjo (1971), Eka (2000), Fakuade (1998), Jibril (1982), Odumuh (1987), Olajide and Olaniyi (2013) and Udofot (2004). In accordance with this popular approach, four isolated varieties of NigE were produced (Banjo, 1971; Eka, 2000; Fakuade, 1998; Udofot, 2004). A rather repulsive approach is the adoption of the Contrastive Analysis (CA) model whereby any nonstandard (deviant) forms of English is

regarded as error not only by low-level educated class, but even among the highly educated class (Aladeyomi & Adetunle, 2007).

Amongst the most prominent models that contribute in digesting the basic principles behind the explanation for the emergence of phonemic features in NigE is the Taxonomic Model, also known as Generative Phonology model (Awonusi, 2004 & Bobda, 2007). This model provides the basic rules of NigE phoneme. More so, Interlanguage Theory (IT) has been used to explain the emerging phonologies of NigE (Ajani, 2007 & Jowitt, 1991). In another development, Gut (2007) used the Norm Orientation theory in her bid to investigate final consonant clusters in NigE. The study investigated the influence of first language structure on the linguistic features of New Englishes. This research explores how a final consonant cluster is realized in two different varieties of English: NigE and Singaporean English.

Technological input is believed to be one of the reliable ways of assessment and in this regard, acoustic devices are used to display some spectrographic details by analyzing and indicating the features of NigE. A few studies on acoustic features of NigE on segmental and suprasegmental were conducted by Akinjobi (2009), Gibbon and Gut (2001), Gut (2002b), Olaniyi and Josiah (2013), Sunday (2011) and Udofot (2004). In addition to aforementioned contributions, several efforts on understanding the nature of NigE have been made and quite a useful literature is generated. Among these researches by Adetugbo (1977, 1987, 2004), Aladeyomi and Adetunde (2007), Awonusi (1986, 2004), Bamgbose (1982, 1995), Banjo (1971, 2004), Bobda (2007), Brosnahan (1958), Egbe (1979), Eka (1985, 2000), Ekong (1978, 1980), Gut (2004), Jibril (1979, 1982), Jowitt (1991, 2000) and Udofot (1996, 199, 2004, 2006). In line with this, while some investigations concentrated on parallel studies on written English in Nigeria Adesanoye (1976, 1980), Adesanoye

(1975), Odumuh (1987) others have focused on intelligibility studies Ekong (1980) and Tiffen (1974).

However, Josiah and Babatunde's (2011) discussion on the standard phoneme of this variety revealed that, numerous studies that are based on phonemicization in NigE are generally contradictory and inconsistent. They, therefore, maintained that the major problems of confronting phoneme description in NigE include the lack of coordination in research efforts, unspecified benchmarks for varieties differentiation and a general crisis of modeling. However, there is an inevitable need to bring up an appropriate coordination of research efforts. Their research gathered and studied different models on Standard NigE phonemes provided by linguists, compared the findings with the model of standardized Received Pronunciation (henceforth RP). They finally suggested that there are signs of an emerging national standard of NigE.

Bobda (2000a, 1995) viewed that the phonological component of African accents of Englishes is insufficiently documented. However, Bobda (2000a) studied some phonological features of African English accents, which includes countries like Nigeria, Cameroun, Kenya, Tanzania, and Uganda and so on. He claimed that the most common features of the vowel system in those African variety maintained the eight (8) vowels, which are /i, e, ɛ, a, ɔ, u, ə/. Therefore, the vowels in RP not included in those varieties are /ɪ, æ, ʌ, ɑː, ɜː/. Consequently, same vowels pattern that are shared among these varieties were restructured, which includes mergers of RP /ɪ/ and /iː/→ /i/, /ʊ/ and /uː/→ /u/ and /ɒ/ and /ɔː/→ /ɔ/. These vowel pairs are therefore homophones in some African variety. He further revealed some regional distinctiveness, mostly in the pronunciation of RP /ʌ/, /ɜː/ and /æ/ vowels. For instance, the Hausa speakers in Nigeria and Ghanaians replace RP /ʌ/

with /a/, the southern part of Nigeria /ɔ/ tends to dominate as the national norm as perceived outside the country. With countries such as Gambia, Sierra Leone, Cameroun, while mostly countries from East and South Africa substitute with /a/.

2.3.1 Linguistic Features of NigE

It is a well-recognized fact that different language speaking communities have different ways of expression that reflects the linguistic feature of certain language. The features of NigE are becoming more obvious. As studies by Adedimeji (2007), Atoye (1991), Bamiro (1991), Bobda (2000a) and Christiana-Oluremi (2013) discussed several salient features to justify the distinctiveness of NigE as a unique variety of English. The variety shows certain distinctive features from the social, ethnic and linguistic constraints (on phonological, lexical, syntactic pragmatics) posed by the second language context. English can be marked with any accent of native or non-native. Nigeria is large and populous, with many dialects of different indigenous languages, making the features on the phonological level uncommon among speakers of the NigE. With the foremost consideration of the lingual influence of the major languages in Nigeria, the phonological features of NigE can be said to reflect the two aspects; segmentals and suprasegmentals.

Having recognized it (NigE) as non-rhotic variety, the phonological feature of NigE as regards to vowel sounds has a reduced vowel system that is mainly found in the less educated varieties. This means that the qualities of certain vowels were reduced from their usual qualities, mostly in the case of the following vowel set, /e/→[ei], /o/→[u], /ə/→[æ], /u/→[u:]. As Jibril (1986) reveals, the basic Hausa English has 15-vowel system, while the basic Igbo and Yoruba have 11-vowel system each. The vowel system reflects the speakers'

native language, as any other (L2) variety of English (Gut, 2008). There is a distinction between short and long vowels apparent in the following vowel system /o: /→/o/ and /i: /→/ɪ/. The interference of sound is the negative transfer of what is obtained from the source languages in target language. The phonological interference is of five types. The phonemes of NigE show an interpretation, which is a phonological interference whereby a sound is closely realized to closed counterpart in English. For instance, /ʌ/ is realized as [ɔ], /ə/ as [ɑ], and /æ/ as [ɑ]. Consonant sounds on the other hand, are realized differently, the voiceless dental fricative sound is realized as [s] or [t] while the voiceless interdental fricative realized as [d] or [z]. The voiceless bilabial fricative and the voiceless stop /v/, /p/→ [f], while alveolar palatal fricative /ʃ/→[s]. There is a substitution of sounds absent in Nigerian languages, thus the tendency to match orthography with pronunciation.

Concerning the suprasegmental features, the syllable structure is nearly of the same length with equal stress pattern. More often than not, the final syllable is stressed. Ufomata (1996) and Alabi (2003) reveals that no difference between the strong and weak stress. Stress pattern of English words in NigE differs, thus there is stress misplacement.

As Jowitt (1991) and Bobda (2000a) observed, most studies on NigE throughout vowels are on impressionistic accounts, there is, therefore, a need for a phonetic analysis of the vowels in NigE (Mutonya, 2008). The fact that English language that was spoken in Nigeria exhibits distinctive features makes it susceptible for linguistic investigation. The extent of variations in NigE feature is so profound that they distinguish the spoken variety of the language from the RP. This observation correlates with Jowitt (1991) assertion where he opined that, as an L2 language, English defied nature undergoing through “gynecological re-processing”.

Studies by Adetugbo (1977, 2004), Awonusi (2004), Banjo (1971, 1993), Eka (1985, 2000), Josiah and Babatunde (2011), Jibril (1979, 1982) and Jowitt (1991) on NigE have shown that using RP as a spoken model, a practice that is devoid of basic justification. This standpoint is further strengthened by the recognition of the fact that being an L2 variety, the Nigerians spoken English cannot be considered as a substitute for British English, as most Nigerians in reality do not speak the BrE.

It is claimed that there is a quite clear distinction in the spoken NigE variety (Bobda, 2000b; Gut, 2008; Ufomata, 1996). In discussing the variations in NigE Adegbite and Akindele (1999) identified several phonological features that point out some differences in the speech of Nigerian speakers of English in terms of sounds, stress, syllable and intonation. Jowitt (1991) stated that in Nigeria, the introduction of teaching English language was not based on development of the Standard English, but rather the rise of communicative English. Therefore, there has been a basis for dialectal variation in Nigerian spoken English. Studies on the pronunciation of NigE as in Ajoke (2012), Akinjobi, Aladeyomi and Adetunde (2007), Banjo (1971, 1982, 1996), Cunningham (2012), Gut (2004, 2008), Jibril (1986), Jowitt (1991), Mesthrie and Bhatt (2008), Oladimeji (2013), Olaniyi (2014), Olaniyi and Josiah (2013), Bobda (2007), Taiwo (2009), Udofot (2003) and Ufomata (1996) are based on impressionistic account. However, these studies provide a descriptive background for this research.

Bobda (2000b) claims that the pronunciation of lexical set NURSE vowel /ɜ: / in West Africa are generally restructured to /ɔ, ɛ, a/, in which the substitution of those vowels may depend upon the age and educational level of a speaker. In most cases often conditioned by the orthography or ethnic basis of the speaker. For example, the Yoruba speakers generally

have the /ɔ/ sound for orthography <or, ur, our, ir, >, also variation may be observed between the /ɔ/ and /a/ and /ɛ/ and /e/ sounds. Tiffen (1974) has the same claims of /ɛ/ and /e/, as cited in Bobda (2000a). He further claims that the occurrence of one feature may be conditioned to the speaker's level of education; the /ɛ/ sound mostly found in speakers with acrolectal variety. Similarly, Igbo speakers pronounce /ɔ/ sound as well as the Yoruba speakers, but still make variation with /ɛ/ sound. For the Hausa speakers of English major characteristics of the nurse vowel /ɛ: / is the tendency to pronounce with /a/ sound.

Dunstan (1969) and Bamgbose (1971) stated that in the case of a phonemic distinction of /ɪ/ and /i:/ sound, most Yoruba and Igbo speakers of English make no distinction since it is not present in their first language. More so, generally nasalizes the vowels that are followed by nasal consonants. Gruyter (2004) cited in Jibril (1986) and Jowitt (1991) concerning the vowel sound of the educated Hausa English speakers reveals that the phonemic vowel length is inadequate. Occasionally, their pronunciation of vowel sounds seems to differ greatly from the native speakers' pronunciation. Bamgbose (1971) and Igboanusi (2006) assert that most of the phonetic characteristics observed in the NigE are traceable to the structural base of their local language and hence, transfer of features is eminent. An Igbo speaker of English, for example tends to transfer the vowel system of his first language into English. Kortmann, Schneider, Burridge, Mesthrie and Upton (2004) indicated that, except Nigeria all other countries in Africa share the five (5)-vowel system for long and short. Jibril (1986) and Jowitt (1991) found differences between the spoken varieties of English in Northern Nigeria and those spoken in the Southern part of the country. Gut (2004) summarizes vowels and consonants realization indicating a clear difference between Hausa English and the varieties spoken in the southern part of the country comprising of the Igbo

and Yoruba English. Bobda (1995) reveals that Nigeria's ultimate mixture of it size and the distinctive background of British colonists as well as their period of invasion makes for example, the Igbo English from the East distinctively from the Yoruba English from the west. While, in general the accents from the southern Nigeria are more different from the northern Hausa English (Bobda, 2000b).

Idowu (1999) pointed out that the NigE varieties evolves from the transfer of pattern of first language's sound, systems, speech, rhythm and local proverbs expressions into English. On the other hand, Banjo (1995) revealed that a social pressure brings about mix-ups, competition and perfection thereby reducing these differences between regional variations. Furthermore, Bamgbose (1982) convincingly argues that NigE has various characteristics at the levels of phonology and the lexicons, which cannot be explained as interference of phenomena.

Consistently with other varieties of English, it can be expected that there is a greater variation in pronunciation, especially in the segmentals of the acrolectal of NigE speakers between the different ethnic groups.

2.3.2 NigE Vowels

NigE is an accent of English spoken primarily in Nigeria with a different accent representing the three different geographical backgrounds; Hausa, Igbo and Yoruba and other minority languages that are spoken throughout the country. Though there are no standardize numbers of vowel inventories in NigE, it has been described as having 27 vowel inventories, comprising of eleven (11) monophthongs and sixteen (16) diphthongs.

In order to describe the standard NigE phonemes, a number of theoretical approaches have been proposed and adopted; the variationist or sociolinguistic approach in previous studies of Banjo (1971), Brosnahan (1958), Fakuade (1998), Jibril (1982) and Udofot (2004). This approach prompts differentiation in varieties, leading to the division of NigE into four (4) isolated varieties. Jibril (1982) identified the features that explain basic NigE phonemes. Olaniyi (2014) asserted that NigE sounds could be identified based on the different ethnic speakers of Hausa, Igbo and Yoruba languages. On this basis, there are fifteen vowel sounds of basic Hausa English, while there are eleven in Yoruba and Igbo English (Jibril, 1986). In contrast to number of vowels in basic Hausa and southern English speakers, there are fourteen vowels in educated Hausa English speakers and seven vowels in educated southern English speakers (Jibril, 1986; Jowitt, 1991). However, Jowitt (1991) sees NigE as having 11 vowel system, with eight basic monophthongs /ɪ, e, a, ɔ, u, o, oː eː/, while three diphthongs /aɪ, ɔɪ, aʊ/. The monophthongs realized by educated Hausa English speakers are ten: /ɪ, e, ɔ, ʊ, a, ə, ɑ, uː, aː iː/, the southern NigE realizes seven monophthongs: /ɪ, e, a, ɔ, ɛ, ʊ o/ (Gut, 2008).

However, Adetugbo (2004) identifies seven distinctive classification of vowels in NigE (ɪ, e, a, ɔ, u, e, o), where the /e/ and /o/ vowels were monophthongized from RP diphthongs /eɪ and /əʊ/. On account of Adetugbo findings, the NigE has six diphthongs that give a total several number of 13 vowels consisting of both monophthongs and diphthongs with no triphthongs. In Contrast with Eka (1985) findings, which assert the standard NigE consists of 19 vowels (11 monophthongs and 8 diphthongs) there is a difference of six (6) vowels between the two. Odumuh's (1987) finding is in agreement with Eka's, in which both studies were conducted using oscillomink records of an instrumental analysis. Ekong's

(1978) findings suggested that standard NigE consist of 18 vowels, 13 of monophthongs with one being marginal and six (6) diphthongs. Awonusi (2004) classified seven basic vowels, (7) marginal and three (3) diphthongs. Udofot (2004) also classified six (6) vowels, which include /ɪ, e, ɔ, ə, a. o/ and three (3) diphthongs /ɪe, ɪa and uɔ/, where /u/ vowel is omitted, though Eka and Udofot (1996) recognized it.

Based on these variations, it is clear to assert that there are no standardized numbers of vowel sounds in NigE as scholars Josiah and Babatunde (2011), Gut (2008), Jibril (1986) and Jowitt (1991) identified a different number of vowel sounds for the variety. It should be noted that, this variation in NigE vowels presents an issue on variety differentiation. It is obvious that different varieties were adopted in measuring standard NigE vowels. In Eka's (1985) and Odumuh (1987) they considered the acrolectal variety, Banjo's 1971 variety III where final year students were used as the participants for the study. Adetugbo (2004) adopts the variety II, while Awonusi (2004) considered the acrolectal variety. Udofot (2004) adopts the variety II as standard NigE using instrumental analysis and study the variety.

Researchers such as Awonusi (1987), Bamgbose **(**1982), Brosnahan (1958), Banjo (1979) and Jibril (1982) have supported certain criteria of differentiating the dialects of spoken English in Nigeria, which include linguistic, ethnic and educational level of the speakers. Therefore, speakers' educational background has been found to be a decisive factor influencing the variety of English spoken in Nigeria (Banjo 1971; Udofot 2003). Brosnahan (1958) and Udofot (1997) used educational factor as a yardstick for identifying NigE varieties, where different sub varieties were identified. In his classification, Brosnahan (1958) identified NigE based on levels from level I-IV. The level I variety is called the

Pidgin English, used by illiterates. His Level II is the variety used by high school graduates, and is characterized by some degree of communicative fluency and a wide range of lexical items. Level III is the primary school English. It is the English used by people with primary school education. Level IV is the university English and is used by the university graduates, linguistics features close to Standard English characterizes it.

In addition, the standard three tiered creole lectal continuum acrolect, mesolect and basilect (Bickerton, 1976) has been used to identify the lectal range of NigE (Awonusi, 1987). Where the basilectal NigE is described as the low or uneducated variety, which has local acceptability and lacks international intelligibility. The phonological, morphological, syntactic and semantics pattern of this lect is influenced by features of indigenous languages. The acrolectal NigE as Awonusi (1984) adds, the term may also be considered as standard NigE. At the segmental level, the features differed from RP phonetically, phonologically. The accent is marked by medium local social acceptability, it closely approximate, but not RP phonetically. Syntactically, this lect tolerates no variation from RP in written and formal usage. The mesolectal NigE is acceptable locally and has medium intelligibility. Phonologically it has considerable difference from RP. Syntactically, it is close to RP in written and formal usage, but maximally deviates in spoken and formal usage. This lect will fit into Brosnahan's secondary school English, and Banjo's level II (Ekpe, 2010). Gut (2004), Jibril (1982) and Jowitt (1991) identified varieties based on regions, the Hausa, Igbo and Yoruba English.

In general, the term 'educated' in educated NigE can mean either "having undergone some education" or, more often, "highly educated". Bamgbose (1982) uses it appropriately in the second sense among others. Therefore, educated NigE is the same as variety 3 (Standard

NigE, the acrolect variety), Jowitt (1991) and Brosnahan's level IV and Banjo's varieties III and IV will fall into the acrolectal variety (Ekpe, 2010).

Therefore, a number of models of the phoneme of spoken NigE were measured by linguists using different approaches and concluded that, the NigE phonemes are uncoordinated, imprecise and therefore not yet standardized. As in their study, Josiah and Babatunde (2011) try to investigate and generalize the previous findings of researchers on the standard phonemes of spoken English in Nigeria by isolating the pedagogical models. Their finding suggests that the phonemic description of NigE has been yet inadequate, but proposed two approaches; - application of the concept of eclecticism and communication accommodation theory. They also established that previous studies on phonemicization are generally discordant and hence argues that the main problem challenging phonemic differentiation includes a general crisis of modeling, lack of coordination in research efforts and undefined principles for variety differentiation. Hence, the vowel system of NigE reveals unlimited deals of disagreement among scholars.

However, the literature provided that the RP /iː/ and /ɪ/ vowels in NigE be neutralized to /i/, thus suggesting that the vowel quantity is midway between the long /iː/and the retracted /ɪ/ of RP. The RP front vowels /e, ɛ, ɜː/ seem to be more related to /e, eː ɛ/ in NigE. The RP front vowel /æ/ and back vowel /aː/ are neutralized to [a] in most cases, the RP back vowels /ɒ, ɔː/ are realized mostly as [ɔ] however, occasionally in standard NigE as /ɒ/. The RP /ʊ, uː/ vowels generally realized as [u], but at times remain as /uː/. The mid central vowels /ə, ʌ/ and mid front vowel /ɜː/ apparently in NigE are obliterated, rather are substituted with the vowels /a, ä, ɒ, ɔ, əː, eː e/ and in acrolectal variety, however, occasionally are substituted with /ʌ, ə, ɜː/ (Banjo, 1996; Bobda, 1995).

2.4. Studies on other Varieties of English in African

Studies in different varieties of African Englishes have been conducted among different scholars and researchers. In their research, Bobda (2000a) and Schmied (2008) explored the whole summary of the vowel system derived from speakers with African-language substrata. Their result revealed a striking intersects (mergers) and splits: Compared to West Africa, the distinction of /e/ sound in different form, as in (FACE and DRESS) is not observed (lost) in Eastern and Southern Africa. This is also true as in /o/ sound in (LOT/THOUGHT/ NORTH /CLOTH), which is different from (GOAT) in the West Africa. In his investigation, Bobda (2000b) has considered on the regional differences in NURSE vowel, which appeared as [a] in Uganda and Kenya and more, tilt towards [e] in the Southern parts of Africa. It was established that five (5) main vowels dominate East African English (EAfE) whereas seven (7) vowels dominates WAfE sharing five (5) with East Africa as opposed to 13 in SBE (Mutonya, 2008).

One of the vast New English researches on phonetics is that of Mesthrie and Bhatt (2008), their analysis is mainly on New Englishes in Africa, South and South-East Asia, which have the degree of intra speaker and stylistic variation. Using Wells (1982) lexical set, they express the new English system of stress short vowels in two ways. These new varieties are characterized as either maintaining the Standard English six-vowel system or presenting a reduced five-vowel system (with either TRAP-STRUT or LOT-STRUT merger). In contrast to this, the unstressed vowels in COMMA and LETTER exhibit an appreciable array of variation with respect to their realization. More so, they opined that African and South Asian English share a common feature, as in most of the New Englishes; length is

not distinctive and hence leading to mergers of long and short-paired vowels (Mesthrie and Bhatt, 2008).

Schmied (2008) claims that the phonology of EAfE is of importance because nonstandard pronunciation features seem to be the most persistent in African varieties that is they are retained even in the speech of the most educated speakers. While comparing the English phonemes system, most African languages differ with English language in few vowels contrast rather than consonants. However, the vowels of EAfE differ systematically, the failure for full coverage of English vowel continuum by underlying African system prompt vowels merger. Thus, the differences of length in vowels are leveled and are not phonetically used. In this regard, the vowels kit and fleece, goose and foot, tends to merge. The short vowels in EAfE are longer and more peripheral than in RP, especially /ɪ/ tends toward /iː/, /ʊ/ towards /u/, /ɒ/ towards /ɔː/ and /ʌ/ towards /æ/. The central vowels of strut, nurse and letter are avoided and tend half-open or open position of Bath and less often dress. This conforms to the tendency towards extreme articulatory positions of the tongue in general. These general observations on vowel pronunciation seem to hold for some African varieties and thus may not be extrapolated as a simple product of mother tongue interference. In contrast with West African, the English vowel system tends towards a basic seven-vowel system, East African varieties tend to have a basic five-vowel system. The deviation of the RP long central nurse vowel is the most significant parameter tending towards back vowel /ɔ/ in West African varieties. Surprisingly enough, it tilts towards a front vowel /a/ in Eastern Africa and toward /e/ in Southern African varieties. It should however be noted that these tendencies are neither uniform in a regional ethnic group nor across the lexicons.

In Ghanaian English (GhE), the 12 RP monophthongal vowels are reduced to five (5) in the system of most Ghanaian speakers, that is their English shows all possible mergers or substitution of the BrE monophthongs. These vowels are /i, ɛ, a, ɔ, u/, to these are added the half close /e/ and /o/ vowels, which result from the monophthongization of the BrE diphthongs /ei/ and /ou/, so that in total there are 7 GhE monophthongs, a system shared with other West African countries /i, e, ɛ, a, u, o, ɔ/.(Bobda, 2000b).

Some of the simplications of the monophthong system result from the tendency in GhE to neutralize length distinction present in RP, resulting in homophony of RP minimal pairs. There are three (3) such mergers of RP vowel oppositions: fleece-kit, goose-foot and thought-cloth mergers. /i, u, ɔ/. This process is a pan African process of English (Bobda, 2000a). Two other vowel mergers often result in GhE homophony, these result from a fusion of RP, /ɜː/-/ɛ/ and /ɑː/-/æ/-/ʌ/ vowels not primarily distinguished by degree of openness (laxness). However, RP length differences are more regularly, though not categorically maintained in the GhE.

Most West African languages do not have central vowel phoneme, the speakers of WAfE accordingly replace RP /ə, ɜː, ʌ/ by front and back vowels. The /ɛ/ in GhE is replaced for RP /ɜː/, which is a characteristic that sets GhE apart from other African Englishes. The GhE replaces the central vowel by /a/ and /ɔ/ and sometimes in a limited and predictable numbers of cases replaced by /ɛ/ (Bobda, 2000a). The cause of substitution of RP /ɜː/ by GhE is often attributed to L1 influence. The /ɑː, æ, ʌ/ mergers seem to be due to L1 transfer, as none of the Ghanaian languages have all the three vowels. Therefore the substitution of /a/ by /æ/ / is a feature found in all African Englishes East, West and South

(Bobda, 2000b). The GhE has /ɔ/ vowel to RP /ʌ/ and shares the /ʌ/ to /a/ with the Hausa English of Northern Nigeria while, the Yoruba's change to /ɔ/ vowel (Bobda, 2000b).

On the other hand, the kit vowel /ɪ/ in Cameroun English merges with the fleece vowel/ iː/. The dress vowel /e/ was split into two (2) /ɛ/ and /e/ vowels, while the TRAP vowel /æ/ is usually realized as /a/. Lot vowel /ɒ/ is realized as /ɔ/, which merges the thought and force vowels. The strut vowels /ʌ/ is characteristically rendered as /ɔ/, therefore, merges with the lot, thought and force vowels. The foot vowel /ʊ/ is realized as /u/, bath vowel /ɑː/ realized as /a/, as in trap while, cloth /ɒ/ is realized as /ɔ/. In CamE, the nurse vowel /ɜː/ has a radical split that is mostly conditioned by the spelling, /ɔ/ occurs for orthographic (Adegbile & Fasanmi, 2004) as in *work journey and purpose* in acrolectal speech. /ɛ/ vowel is the common realization of nurse vowel for words like *term, thirty*. The palm vowel /ɑː/ is realized as /a/ like in TRAP and START. Goat as /o/, goose vowel rendered as /u/ like foot [i, e, ɛ, a, ɔ, o, u] plus schwa appears. The mergers of thought, lot, north, force and Strut vowels and the splits of nurse and cure vowels. Therefore, the mergers create a new homophone in CamE (Bobda, 1995).

2.5. An Overview of MalE

English in Malaysia is used as acculturate to reflect the cultures and identity of the Malaysian and it not only consists of different sub varieties, but also is spoken in a number of accents (Gaudart, 2000). The accent ranges from more colloquial and ethnically marked accent to a Standard English. As Schneider (2003) and Kortmann et al. (2004) suggested that the MalE is undergoing the process of nativization, whereby the language is adapted to use in the local social and cultural setting resulting in changes in grammar, pronunciation

and vocabulary in which it resulted in a distinct variety in a language. The reports on MalE description (Baskaran, 2004; Morais, 2001; Platt & Weber, 1980) have divided the sub varieties into two to three categories, which cover all the sub varieties of English spoken by Malaysians. There is frequently no precise difference between those sub varieties of English. Instead, these sub varieties form a continuum from one to another. The sub varieties of MalE comprises of the acrolectal, mesolectal and basilectal, which speakers that are highly educated in English language typically use the acrolectal variety; those with low levels of education in English frequently use the basilectal, while the mesolectal is in between the acrolectal and mesolectal variety.

It is suggested that MalE has an acrolectal variety that has no much difference with the morpho-syntactics variation from Standard English and a more colloquial variety, with considerably more phonological, lexical and morpho-syntactic variation (Pillai et al., 2010). The MalE manifests its variation in accordance with the ethnic roots of the speakers Chinese, Malay, and Tamil (Kachru, Yamuna & Nelson, 2009). Zuraidah (2000) cited by Schneider (2003) and Kortmann et al. (2004) has characterized the phonology of MalE as merger of /iː/ and /ɪ/, [i], /uː/ and/ ʊ/, [u], /ɛ/ and /æ/, [ɛ], /ɒ/ and /ɔ/, [ɔ] and monophthongization of diphthongs as in coat, load, with [o], make, steak, with [e].

2.5.1. Previous Studies on MalE Vowels

Unlike NigE, previous studies in MalE cover a wider range of the acoustic studies as several acoustic investigations Ahmad (2005), Pillai (2014), Pillai et al. (2010), Shahidi and Amans (2011), Tan and Low (2010, 2014) and Yusnita, Paulraj, Yaacob and Shahriman (2013) focused on the phonology of MalE. However, earlier impressionist bodies of works

on this variety (Baskaran, 2004, 2005, 2008; Gaudart, 2000; Phoon & Margaret, 2009; Rajadurai, 2006) cover the perceptual studies and auditory perception of the MalE. The claims in the acoustic study however, indicate that there is a lack of vowel length distinction in the pronunciation features of MalE. Baskaran (2005) stated that the universal element of the Malaysian speakers of English is a phonemic realization of vowel, which is realized as an unstressed schwa in British English. Therefore, words such as /ə'pɒn/ in BrE tends to be realized as /ʌ'pɒn/ in MalE. Zuraidah (2000) reveals that there is a lack of distinction in vowel pairs, that is the two vowels pair such as /ɪ/ and /iː/ are realized as the same vowel with a vowel quality that is similar to the RP /i:/, but has less lengthening. The /ʊ/ and /u:/ vowel pairs are realized as [u] that is similar to RP /u:/, which has reduced length and stronger lip rounding. The vowel pair /æ/ and /e/ are realized as [e] sound, similar to RP that is more open, /ʌ/ and /a: / are realized as [a], /ɒ/ and /ɔ:/ realized as [o]. The vowels /ə/ and /ɜ:/ realized as [ə]. These vowel pair's sounds have resulted in different words realized as homophones. She further stated that the diphthong sound /eɪ/ is diphthongized to /e/.

Baskaran (2004) proposed that the long vowels in MalE tend to be shortened which is due to the influence of Bahasa Melayu that does not have long vowels in its inventory. Tan and Low (2010) confirm the earlier impressionist claims as in Baskaran (2004, 2005, 2008), Rajadurai (2010) and Zuraidah (2000) that the long and short vowels are partially merged. Their finding reveals that no noticeable difference is observed between the short and long vowels.

Therefore, the general description of MalE vowels is characterized by the lack of discrepancy in the vowel pairs with subjecting them amenable to the production of

monophthongs instead of RP diphthong sound (Baskaran, 2005; Rajadurai, 2004). Consequence upon lack of distinction between the short vowels and long vowels, the tendencies to shorten the long vowels is high in MalE instead of being paired words as they are words such as bard and bud, hod and horde are likely to be homophones in MalE (Pillai et al., 2010). Therefore, MalE has the following vowels /ɪ, e, ɑ, ə, ʊ, ɔ, i, o, ɒ, u, aɪ, ɔɪ, ʊɪ, iə/ (Baskaran, 2004).

2.6. Hausa Vowels

Hausa is structured using Subject-Verb-Object, (SVO) (Newman, 2000) It is a language that shows strong gender distinctions (Galadanci, 1976) Moreover, Hausa is a tonal language, which has lexical and distinctive grammatical and syntactical aspects in its phonological structure of tone (high, low, falling) and length (long vs. short). The syllable patterns of the language are of two types: the open and closed syllable. In standard Hausa language, there are five (5) vowel pairs of long and short vowels, which are phonemically distinctive. These vowel pairs are /iː/ and /ɪ/, /e/ and /eː/, /a/ and /aː/, /o/ and /oː/ as well as /u/ and /uː/ (Sani, 2005).

2.7. New Englishes Frameworks

Studies have proposed world English models and classifications in order to explain the differences found in the various varieties of Englishes in existence and in order to characterize the world English within one conceptual set. For instance, McArthur proposed the circle of world English in 1987, Gorlach the circle of model English in 1988, “Modiano’s centripetal circles of international English in 1999 and Kachru’s concentric

circles of world Englishes in 1985", and the Moag's life circle of non-native Englishes in 1992 and Schneider (2007) dynamic model for world Englishes. These world English models can be seen under two (2) schools of thought (Kachru, 1992). Firstly, it can be seen in terms of acquisitional framework and secondly, as part of a developmental cycle. The first deals with how English can be categorized as whether it is spoken as a first, second or foreign languages. This categorization goes with "the types of spread, the patterns of acquisition and the functional allocation of English in diverse cultural contexts" (Kachru, 1992). The latter attracts more attention because the searchlight for the developmental stages of the variety of Englishes is directed towards it.

Kachru's model of (1986) conceptualizes English as a world language consisting of the three (3) concentric circles. The three concentric circles are the Inner Circle, the Outer Circle and the Expanding Circle. The Inner circle constitutes countries where English is spoken as native language variety in the country. These include countries where English. is the mother tongue. The outer circle is where English is seen as a second language variety in the country, playing an important role being institutionalized as the country lingua franca. The ESL countries are where the earlier phases of spread of English were in non-native contexts. The expanding circle is found in countries where English is regarded as a foreign language playing no major role in the line of communication in the country

These circles are characterized as norm producing, where English language standard are determined by these countries, norm developing where the varieties of English has become institutionalized and is in the process of developing their own standards. And norm-dependent where users designated as performance varieties devoid of any official status and therefore, fully dependent on the set standards outlined by the ENL countries.

Quirk (1985) opined it as English as a native language countries which include Britain, USA, South Africa and Australia. English as second language countries, as in Nigeria, Malaysia, India, Ghana, Singapore, Zambia and so on and English as a foreign language countries as in China, Germany, Russia, Italy. English as a native language (ENL), refers to the language of people who are born and brought up in a society where English is traditionally the first language spoken (Jenkins, 2003). According to Kachru (1992) countries that consist of mainly UK, USA, Canada and New Zealand, which are traditionally cultural and linguistic base of English language. English as a second language stand for the language spoken in Britain colonized countries like Malaysia, Singapore, Nigeria, India and Zambia while, English as a foreign language stands for the language spoken in countries where traditionally English is only used as a diplomatic means of communication with other countries. Based on the aforementioned, the Kachru's model categorizes NigE and MalE under the outer concentric circle. The NigE and MalE varieties being a variety of new Englishes may be explained by a contributing component of the World Englishes Framework as Mesthrie and Bhatt (2008) highlights the existence of different varieties around the globe.

However, Schneider (2003) suggested a model, which investigates these new varieties of English - the dynamic model of New Englishes. This model does not refer specifically to any one formal model, but to the general concept of the developments of New Englishes in different characteristics phases in a uniform process resulting in a new language realization/formation. Moreover, the parties involved are somewhat influenced by similar parameters of the respective contact situation and this is where the entire identity reconstruction of the process was driven from. The model explains the development of new

English viz a viz the relationship between different kind of studies including computational, theoretical, descriptive or experimental studies. The suggestion in this model is that some synchronically observable differences between the varieties may be regarded as consecutive stages in a diachronic process. The five stages in which these varieties developed, includes *foundation, Exonormative stabilization Nativization, Endonormative stabilization and Differentiation* stages.

In relation to the Schneider's (2003) theoretical development, Gut (2007) proposed the Norm Orientation Hypothesis, which recognizes the relationship and mutual dependency between the development of linguistic structures and norm orientation of the speakers. This lays emphasis on how and why the advent of new Englishes takes the form in which they differ from each other and deviate with different degrees to the Standard English. The hypothesis states, "the spread of L1 structure in a new variety of English is crucially influenced by specific sociolinguistic settings". According to Gut's hypothesis the nativization of new Englishes takes two paths depending on whether the speakers get fully adapted (as in the case of New Zealand, Canada and USA) or just incorporated (as in the case of countries like Malaysia and Nigeria). Gut reported that the above assumption is in resonance with Sankoff (2002)

Notwithstanding, the fact that the hypothesis extends several findings and theories on the formation of new Englishes, it stands at par to several claims made about language contact and the development of the new Englishes. This is seen in its challenge to Thomason (2001) who predicted that "if speaker group shift to a language without continued contact with the native speaker groups, their version of the language including transfer features becomes fixed". Contrary to the above assertion, Gut admits that it seems that the loss of

contact with resident native speakers stimulates language change and leads to a spread of distinct linguistic features. Furthermore, Gut's perspective does not tally with Schneider's proposal that nativization stage has the heaviest effect on the restructure of the English language. On the contrary, Gut predicts that the heaviest restructuring takes place in the phase of endonormative stabilization. A phase described by Schneider (2007) as a carrier of a new regional identity that lost its former stigma and is positively evaluated. A cautious warning is however, issued by many researchers on using a mere description of structures without backing them up with frequency data. This, according to Gut leads to a false conclusion in common features of varieties of English.

It is exciting to note that the hypothesis proposed by Gut (2007) seems to be a new area of research, in that, a general pattern of modification is predicted in the differences observed between the old and new generation English speakers of Singapore.

2.8. The Segmentals

Phoneticians and phonologists investigate speech, and are able to describe an individual sound that makes up a particular language. This description establishes the fact that there is a wide range of different sounds in spoken human languages (Ladefoged & Madison, 1996). A set of sounds observed in a particular language is sound inventories of that language. Conventionally, every speech sound in a language is classified into two main groups: the vowels and consonants, which in turn are the segmentals of a sound. The unit of abstract sounds- the phonemes- comprises of the vowels and consonants in every spoken language of human beings, which occur in a permitted sequence.

In phonetics, the segmentals are the vowels and consonants (Ladefoged, 2001a). These are sounds produced by contraction in the vocal tract. The vowel sounds usually make use of the periodic voice source. In addition, specifically the vowels are quasi-periodic oscillation of the vocal folds that occurs when air is expelled from the lungs. Therefore, a vowel is a speech sound that is produced with a voicing and a vocal tract configuration (Ladefoged, 2001). While studying the segmental in a language, vowel and consonant sounds were investigated.

On the other hand, suprasegmental is considered the larger units of speeches such as the syllable, stress, tone and intonation. They are distinguished from the segmental in that, they are more concerned with more than vowels and consonants, (Fox, 2000). Therefore, while investigating the segmental sound, the most significant feature is to investigate the quality of vowels or consonants. For instance, all the vowel sounds are described with the same acoustic pattern or property such as the duration or formant pattern of that particular sound.

2.8.1. Vowel Sounds

Vowel sounds may be said on a variety of pitches, but they are distinguished from each other by two characteristic pitches associated with their overtones (Ladefoged, 1993). One of them corresponds roughly to the difference between front and back vowels. The other corresponds to what we called vowel height in articulatory terms. These characteristic overtones are called the formants of the vowels.

Vowels play a major role in the production of any speech sounds and are the most perceptible and the central sound of a syllable. Vowel sounds traditionally are described in

terms of their articulatory properties mainly based on auditory impressions. In acoustic phonetics, the descriptions of vowels are in terms of their acoustic properties, that is how the resultant sound transmits. The acoustic properties of vowel sounds are the formants frequency values at the "steady state", the acoustic resonance of the vocal tract, the duration and dynamic cues in formant transitions and the position of the jaw, lips and the tongue.

In languages, vowel inventory comprises of the phonological contrasting vowel segments. Here, a vowel sound is contrasted depending on the language under review. The common features that contrasted a vowel sound are the quality, length (duration), nasality and tone. Vowels are always voiced (that is, the vocal cords vibrate) and are classified as monophthongs, diphthongs and triphthongs.

2.8.2. Source-Filter Model of Speech Production

A source filter model in its most basic stated that the glottal pulses are the source of a vowel sound filtered by a vocal tract, which resulted in a vowel sound at the opening ends (the lips), (Fant, 1960; Johnson, 2004; Stevens, 1998). The various configurations of the vocal tract filter the source sound differently, creating different vowel sounds. It is how the source filtered according to the particular resonant responses of the vocal tract that contributes to a quality of a given vowel. The glottis, which is the source of a sound does not sound the same as that on the lips. This sound source consisted of a fundamental frequency (F0) and its harmonics. F0 is resulted from the rate at which the vocal folds produce their vibrating cycle (that is, the frequency at which the vocal folds are vibrating), and is the lowest frequency component of the resulting complex periodic wave, while the harmonics are integral multiples of F0. The air in the vocal tract in a certain shape will

vibrate maximally at certain frequencies. The harmonics of the source are filtered according to the transfer function of a particular vocal tract configuration. Specifically, the harmonics of the glottal source that are close to the frequency responses of the vocal tract are resonated (amplified), while those further away are reduced.

The output sound on the lips has the same harmonics as the sound source, but the amplitudes of the harmonics have been modified. It is the amplitude peaks in the frequency spectrum of the output vowel sound arising from this modification of the source sound filtered by a particular vocal tract configuration that determine a vowel quality. These amplitude peaks in the frequency spectrum are called formants. The formants are very important in defining vowel sounds because as the vocal tract varies its shape to produce different vowel sounds, the frequencies of the formants changes as well. Formants are usually numbered upward from the lowest resonant frequency; thus, the lowest formant is the first formant (F1), the second lowest formant is the second formant (F2), the third lowest formant is the third formant (F3) and so on. For a vowel sound, the general source is the vibration of the vocal folds in the larynx, which is filtered by the completely vocal tract tube between the larynx and the lips.

2.9. Acoustic Characteristics of Vowels

Vowel quality is considered as the acoustic property that is responsible for the major distinction at the lowest hierarchy in English (Beckman & Edward, 1994). In articulatory phonetics, three features are used to characterize vowels, the vowel height, the degree of backness and the degree of lip position. In acoustic phonetics, the description of vowels is different. The different qualities of a vowel sound arise from the different shape of the

vocal tract made by speakers and thus are identified by different formant frequencies. The lowest two (2) formants, F1and F2 are the most prominent formants for defining a vowel quality and are distinguished between vowel sounds (Peterson & Barney, 1952; Ladefoged, 2001; Cohen, Sils & Hart, 1967; Pols, Van der Kamp & Plomp, 1969). F1 and F2 are essential acoustic features since these determine vowel quality. Furthermore, a third formant (F3) is also significant in describing some vowels because it is affected by the shape of the constriction in the vocal tract as well as vocal tract length, which can have an effect on whether a vowel is perceived as front or back (Jackson and McGowan, 2012; Fujisaki & Kawashima, 1968; Slawson, 1968). The acoustic descriptions of the vowels in different accents of Englishes make use of spectral properties to determine the quality of a vowel sound. That is, how an individual vowel differs from one another in their formant frequencies and how formant frequencies differ between speakers of different accents and age groups. Ahmad (2005), Pillai (2014), Pillai et al. (2010), Tan and Low (2010) have exploited this general acoustic approach broadly to describe the vowels in accents of MalE as in previous investigations. In addition with other varieties of English in first, second or foreign language as in studies of Bilal, Mahmood and Saleem (2011), Chen and Wang (2011), Ferragne and Pellegrino (2010), Hawkins and Midgley (2005), Hillenbrand et al. (1995), Khalil (2014), Mutonya (2008), Tsukada (2002) and Yang (1996). Frequently, the formants afar from F3 (F4, F5, F6 and so on) are less advantageous in revealing vowel-specific information and tend to reveal speaker-specific information such as voice timbre (Sundberg, 1970).

Vowels sounds are associated with acoustic patterns because of the steady articulation in line with their configuration. Hinging on the aforementioned, vowels sounds are

characterized by the first two formants. Movement of tongue during the production of a vowel defines the formants frequency of vowel's value. In accordance with (Kent & Read 1992; 2002), it can be asserted that the vertical (measured as the tongue height) and horizontal (measured as the tongue advancement) motion of the tongue gave rise to the formation of (F1) formant frequency and (F2) formant frequency respectively. Stevens (1998) supported by Ladefoged (2001a) opined that, by moving the body of the tongue, it causes the F2 to increase while movement of the tongue body backward resulted in lower F2. However, while conquering with Ladefoged, Hayward (2000) added that lip-rounding position affects the production of the sound.

It is generally accepted that there is a relationship between tongue position, affecting the size and shape of the vocal tract, and F1 and F2 frequencies (Raphael, Borden & Harris, 2007). A decreasing F1 frequency is associated with an increase in the height at which there is maximum constriction (For example, from high in the oral cavity to lower in the pharyngeal cavity). Besides, a decreasing F2 frequency relates to the increasing length of the oral cavity (For example, a larger oral cavity by moving the tongue downwards and/or backwards resulting in a smaller pharyngeal cavity).

To demonstrate the relationship between F1 and F2 and the shape of the vocal tract, consider the close vowel [i], and the open vowel [a] typically, [i] exhibit a relatively low F1 frequency and a relatively high F2 frequency. (Raphael et al., 2007). The tongue is raised in the oral cavity toward the front, which pulls the tongue root from the pharyngeal cavity, with the jaw moving upward to create a narrower mouth opening at the lips. The space in the oral cavity becomes relatively smaller while space in the pharyngeal cavity increases. A larger pharyngeal cavity resonates to lower frequencies, producing a relatively low F1

frequency and, at the same time, the relatively small length (constriction) of the oral cavity results in resonances at higher frequencies, generating a relatively high F2 frequency. The vowel [a], on the other hand, typically has a relatively high F1 frequency and a relatively low F2 frequency. In the articulation of [a], the tongue and jaw are lowered which pushes the tongue root downward, thereby increasing the size of the oral cavity but reducing the size of the pharyngeal cavity, creating a constriction. The relatively small pharyngeal cavity resonates to higher frequencies than a larger pharyngeal cavity for [i], leading to a relatively high F1 frequency. Likewise, the relatively long oral cavity resonates to lower frequencies than the relatively small oral cavity for [i], so the result is a relatively low F2 frequency (Raphael et al., 2007).

As per the source-filter model, two important aspects of vowel production are the (1) glottal source and (2) the configuration of the vocal tract. A third important acoustic property of vowels is (3) vowel duration, which observably varies across the different vowels in accents of Englishes. A vowel can also differ from one another in term of duration. Vowel duration is frequently mentioned in the descriptions of accents of MalE and different English vowels (Aitken, 1981; Clopper, Pisoni & De Jong, 2005; Jacewicz, Fox & Salmon, 2007; Mack, 1982; Pillai et al., 2010; Umeda, 1975). Therefore, a vowel duration is the time taken a given vowel sound lasts for and it is often described relatively to the duration of other vowel sounds in a given vowel inventory. In different accents of Englishes, some vowels are systematically longer than others are, as noted in acoustic descriptions of vowels in different varieties (Adank, Van Hout & Smith, 2004; Hillenbrand et al., 1995) and MalE in (Pillai et al., 2010). In addition to the systematic variation, vowel duration can be affected by speaking rate, stress, intonation, the place of the vowel sound in an utterance

(Klatt, 1976) as well as the consonants surrounding the vowel sound (Van Leussen, Williams & Escudero, 2011). Vowel duration is a prominent acoustic property because systematically it varies across vowels in different accents of English. As cited in Tan (2011), there are various views on the accurate acoustic description of vowel sounds. The 3 models characterizing the vowels are:

1. Simple vowel target assumes that all the vowels that exist in a standard form remain unchanged across the context, which is defined by a point in the F1 and F2 plane. The limitation of this model is that all the vowels that are auditory perceived as similar, can be different in the formant frequency values.
2. The elaborated target model accounts the speaker's normalization through transforming the vowels formant to perceptual space, and the space has dimensions scaled in the Bark transform. This attempt to model the normalization of acoustic data performed by auditory system may be used to help in overcoming the need to consider different speakers characteristics (Kent & Read, 1992). To chart the vowels using the F1 and F2 measurement of the vowels after the dimensions have been scaled in the Bark scaled transform, the modified version was recommended by Deterding (2003) and Hayward (2000).
3. The dynamic specification model, which is proposed by Strange (1987) considers the nature of formant transitions in and out of a vowel steady state and the duration of the steady state. However, the robustness of this model have not been validated (Assmann Nearey & Hogan, 1982; Diehl, McCusker & Chapman, 1981).

2.9.1. The Quality of Vowels

Generally, vowel sounds are characterized by pitch and periodic signals. Different vowel sounds have different timbres, thus the vowels have different harmonic amplitudes in their spectra. The same vowel can be spoken on different pitches; different vowels can be spoken on the same pitch. Therefore, a pitch must be set independently from the vowel quality. A vowel quality is determined mostly by the tongue position: front-back position with open-close dimension. In addition, a vowel quality can also be affected by the position of other articulators including the lips, jaws and the velum. Acoustically, a vowel sound can be identified and classified based on the information obtained from F1 and F2 measured values. The main acoustic structural application correlates with the measurement of vowel quality, which in turn corresponds to formant frequencies. However, the observed variation of formant values as spoken by different speakers is wide.

For the consonant sounds, the acoustic description is based on the specific acoustic properties such as the period of silence associated with the complete blockage of the vocal tract (Kent & Read, 1992). The theory of acoustic invariance of phoneme is essential in the study of the acoustic quality of sounds (vowels and consonants), that contributed to the notion that an invariant property which is linked to phonetic features or identity like manner of articulation exists and this is similar across languages, speakers and contexts. Based on the assumption that invariant quality of vowels and consonants exists.

2.9.2. The Duration of Vowels

Vowels may be distinguished not only by resonances, but also in terms of duration. This is due to the phonemic nature of vowel length in many languages (Ainsworth, 1972; Klatt, 1976; Ladefoged & Maddieson, 1990; Lehiste & Peterson, 1961; Lindau, 1975). The major difference between the short and the long vowels is simply one of total vowel duration, however, the difference is relative rather than absolute, as contextual and prosodic factors will affect the ultimate length of the vowel.

2.10. Acoustic Studies of English Vowels

Instrumental studies of vowels in different varieties of English have been conducted, most of which investigated the formant analysis of the monophthongs and diphthongs. The investigations focused on the patterns of vowel quality in different varieties of English, either as a mother tongue, second language or as a foreign language.

For instance, Deterding (2007) studied the monophthongs of Southern BrE where he investigated the BBC database of five male and five female speeches. The first two formants of the twelve monophthongs sound were measured. The findings suggested that there is apparently lack of contrast between the back vowel /o / and /u/ sound.

Similarly, Sharbawi (2006) studied ten Brunei and seven British female speakers where the findings indicated a contrast between /ʌ/ and /a:/ vowel. It was suggested that the back vowels /u:/ and /ʊ/ and /ɔ:/ and /ɒ/ are more back and less open in the BrE than in Brunei English.

Mutonya (2008) conducted a similar study of vowel production of African speakers of three countries (Ghana, Kenya and Zimbabwe) and found that vowel qualities are similar between the speakers. The results also indicated that there is lack of vowel contrast between vowel pairs lowering or fronting of /ʌ/ and /ɜ:/ that contributed to the perception of a regional African accent.

Hawkins and Midgley (2005) described the formant frequencies of the monophthongs vowel in stressed monosyllable of male RP speakers in different age groups. The age group was included to satisfy different application in research needs. These age groups investigated in this study are 18-24 years, 25-40 years, 41-60 years and 61-80 years. The measurements show that there is difference between some age groups, but the difference is not much significant.

Similarly, Pillai et al. (2010) emphasizes the distribution and nature of MalE vowels, based on her findings that Malay English vowels occupy more vowel space and the vowels are less contrasted. However, a substantial contrast in duration was found in the vowel pairs, while difference in terms of vowel quality not inclusive.

Ferragne and Pellegrino (2010) aimed at obtaining a current picture of acoustic description of vowel variation of male speakers in 13 accents of the British Isle. The study is a formant-based investigation that provides the F1 and F2 measurement. The study focuses on phonetic realization and systematic phenomenon. It provides detail information on automatic formant measurement, which adopts a semi-automatic method. The accent of the British Isles corpus includes records from fourteen areas covering the British Isles. Their findings illustrate the spectrogram and probability density within dialect variation that

occur both at inter and intra individual level. On the systemic level, however, considerable variations between speakers were observed in some accents.

Tan and Low (2010) studied the MalE vowels in terms of duration and quality of 10 ethnic Malay Malaysian and compared with the ten ethnically Malay from Singapore. The findings reveal that the measured vowel duration showed the Malaysian speakers differentiated between the long and short vowel pairs in citation form for all the vowels, except the /ɒ - ɔː/ vowel pair, while all the vowel pairs were differentiated by the Singaporean speakers. With regard to vowel space, this study found that the male Singaporean speaker's vowel space was significantly more peripheral than male MalE speakers were. No categorical separations were found between all the vowel pairs in MalE, although the /ɔː/ has higher F1 and F2 values, suggesting that the vowel is less back and more open.

Rajadurai (2006) studied the vowels in MalE with three (3) educated Malaysian. Her findings indicate that the educated Malaysian has six vowels of the short monophthongs that are a high front vowel /ɪ/, amid front vowel /ɛ/, which represents the /e/ and /æ/ vowels, although /æ/ had more lengthening, a low central vowel /ʌ/, amid central vowel /ə/, a low back vowel /ɒ/ and a high back vowel /u/.

Ahmad (2005) studies the length differences in MalE between short and long vowels with particular reference to /ɪ, iː/ and /ʊ, uː/. The study was conducted instrumentally of five Malay speakers of Malaysia. However, the findings reveal that these vowels were not differentiated as produced by the speakers.

Fourakis (1991) studied the production of nine American vowels in *bVd* and *hVd* contexts. However, the durational measurement results showed vowels produced in *bVd* were longer than those in *hVd* were. The finding echoes Peterson and Lehiste (1960) study where no effects of prevocalic consonants on vowel duration were observed.

2.11. Conclusion

As highlighted, Nigeria being the most populous African Nation with three major ethnic identities is not free of differential status socially, economically and otherwise. The Northern part of the country dominated by Hausa speaking community is a deficit in knowledge based research as compared to its southern counterparts. This is caused by the wide gap of over four-decade difference in acquiring western education between the two regions (Mathews, 2002). Consequently, a handful of researchers from the southern part conducted reflect researches on the pronunciation and phonology by Ajoke (2012), Akande (2007), Akinjobi (2009), Igboanusi (2000, 2006), Nkamigbo (2011) and Przezdziecki (2005). Going by the aforementioned, it becomes apparently imperative to investigate the acoustic perception of Hausa accented English to fill up the research gap created because of the lowest ebb of research in the Hausa area.

The term NigE, as a variety of new English was coined first by McArthur in the 1980s and was classified in the outer circle on the basis of Kachru (1986)'s inner, outer and expanded circles. In 2007, the Schneider's proposal became a hypothesis and due to rapid development of linguistic features, Gut in 2007 came up with her hypothesis. The two hypotheses agree with one another on the influence of L1 on L2 (English), but differ in perception of stage at which the highest impact is attained. While Schneider maintained that

the highest impact of L1 influence lies at nativization stage, Gut rather sees the stage at endonormative stabilization. The variation is also evident in the discordance with Thomson (2001) over the result of the loss of contact with resident native speakers where he admits the occurrence of fixed transfer in language and Gut asserts the formation of a distinct linguistic feature. This chronological chain of modification by researchers is a clear indication of interest and development of the understanding of features of language transfer and changes from one medium to another. The development also indicates the presence of open-ended gap of knowledge waiting to be filled by researchers.

Study on the core vowel structure of Hausa revealed only five vowels whereas those of English are 12. This indicates vowel differentiation with that of Hausa language falling short of English by seven vowels. Considering the vowel pairs in Hausa, the total vowels are 10 and still, they fall short of English vowels by two vowels.

As knowledge is a dynamic entity, it is important to keep on reviewing hypothesis and theories to ascertain their applicability or otherwise. To this end, this research is significant as its output is expected to be used for putting norm orientation theory to test as to whether the influence of L1 is significant on L2 new variety of English. More so, the findings will give a pedagogic decision on NigE pronunciation and vowel sounds as well as help the researchers, academics and anyone interested in the pattern of NigE sounds.

CHAPTER 3

RESEARCH METHODOLOGY

3.1. Introduction

While the previous chapter presented a review of literature, this section provides a detailed explanation on the research methodology. The chapter categorizes the three (3) research questions, which provide the motivation for this study. Each of the three questions is addressed by an instrumental study and this chapter introduces the methodology for the questions. This study is an acoustic study of vowel sounds distribution of Hausa speakers of NigE. To address the research questions, this study exploited data elicited from two groups of Hausa speakers of NigE and Malay speakers of MalE and an acoustic study of the obtained data resulted in a description of the quality of English vowels produced by both Hausa and Malay speakers. A detailed methodology used to answer the research questions is explained in this section.

3.2. Research Design

As a descriptive study on the English vowel pronunciation, a quantitative approach was adopted so that an acoustic analysis is conducted on the data using PRAAT version 5.3.81 (Boersma and Weenik, 2014). It is not well understood how systematically categorized the vowels of NigE are. While studies were being carried out to findout quality and duration of the vowels, in different varieties of English as first, second or foreign language as in Bilal et al. (2011), Deterding (2003), Hillenbrand et al. (1995), Hoffmann (2011), Khalil (2014),

Mutonya (2008), Olaniyi and Josiah (2013), Pillai et al. (2010) and Salbrina (2006), none of the studies has tackled the acoustic of NigE of Hausa speakers. This could be the first attempt to describe that of NigE specifically the Hausa speakers.

For acoustics and acoustic comparisons, this research adopts established methods used in previous studies such as Adank et al. (2004), Ali (2013), Chen and Wang (2011), Khalil (2014), Pillai et al. (2010), Tan and Low (2010) and Yusnita et al. (2013). Whereas the first research question addresses an issue relating to vowel production; vowel distribution in NigE and MalE, the second research question focuses on the vowel contrast of the five vowel pairs produced by Hausa speakers of NigE and Malay of MalE. Similarly, question three targets the similarities and differences in the vowel realization between males and females for both varieties. Although Pillai (2014), Pillai et al. (2010) and Tan and Low (2010) are recent empirical investigations on MalE vowels, new data on MalE was recorded to provide a primary source of data and to collaborate that of the NigE.

3.3. Norm Orientation Hypothesis and its Prediction

The norm orientation hypothesis, which is proposed by Gut (2007) stated that "the spread of L1 structure in a new variety of English is crucially influenced by specific sociolinguistic settings". In agreement with this theory, Grove (2010) asserts, "speakers of second language variety are typically oriented towards an existing local norms". In other words, the inductive influence of the first language (L1) on second language variety is greatly shaped by sociolinguistic setting of a medium within the parameter of the existing local norms. Therefore, according to Gut, this theory accentuates its significance on the mutual dependency of two inclusive factors; "the developments of linguistic structures and norm

orientation of the speakers". In accordance with Gut, the norm orientation hypothesis asserts that the 'nativization' of New English is categorized into two. The first is a situation where the phonology of the evolving New English variety resulting in dialect mixing among the settlers because of the prolonged dominant stay of native English speakers. Ultimately, this scenario does not manifest any first language structures of the recessive indigenous population. Such situation is observed in countries like Australia, Canada, New Zealand and USA. The second scenario is that, where only a handful of the native speakers stays in the area, resulting in the manifestation of the phonological features of the indigenous languages in the evolving new English variety. Therefore, considering this theory, NigE is akin to second language (L2) learners English because of the norm orientation in the country.

Considering the socio-educational background of the respondents (postgraduate students), the category in which they fall could never be below endonormative stabilization. This is in line with Gut (2007) assertion discussed above, hence the applicability of the Norm Orientation Hypothesis to this research. More so, the hypothesis is applied on the account of Gut assertion, that "the spread of L1 structure in a new variety of English is crucially influenced by specific sociolinguistic setting". To ensure that the respondents are at an equivalent phase, the selection of postgraduate students ensures that they are from similar sociolinguistic backgrounds. Phonetically, the vowel variation between English and two languages in this research (Hausa and Malay) is a factor of consideration.

Since the contexts used both consonants and vowels of the test phrases from English, it warrants the possibility of L1 influence in production, hence the observed variation is as indicated by Gut's hypothesis. The hypothesis will be used for interpreting the results by

identifying the vowel length as well as quality and deducing the output with the corresponding vowels in L1 structure of the respondents. If the output falls, exact or within near linguistic features of the respondents L1 structure, then the influence of L1 is vivid.

Though the attitude towards accepting and using English in Nigeria are mixed, out of the 20% who speaks English in the country (Gut, 2004), many prefer it on account of its ethno politically neutrality, hence use it in place of any indigenous language for the country's decision-making processes. Some Nigerians considered English as the language of the elite (Jowitt, 1991). Some have a divergent opinion rejecting it as the language of colonialism, which alienates Nigerians from their roots relegating their mother tongue languages to mere cultural identity. However, despite the existence of a repugnant treatment of English by some, its position as a lingua franca makes it more valuable with a potential for material and social gain advantages (Adekunle, 1995).

However, the process of incorporating the structural properties of post-colonial English speakers' first language into any emerging variety of English is sometimes related to transfer in second language acquisition. For instance, Schneider's (2003) five-stage model of the evolution of the New Englishes proposes that the phonology of new English will show features in which many linguists try to be able to identify as the transfer of phenomena from the phonology of indigenous languages.

3.3.1 The Study Variables

For the purpose of this study, each vowel category of the two varieties will be explained. There are twenty-seven NigE vowels are (27) vowel category, which are /i/, /a: /, /a/, /ɔ/, /ɔ: /, /u/, /u: /, /ɛ/, /ɛ: /, /e/, /e: /, /ɒ/, /ɒ: /, /o/, /ai/, /ɔi/, /ɔɪ/, /ou/, /au/, /ao/, /ɪe/, /ia/, /iə/ /uɒ/, /ua/, /uɔ/ and /ɛə/, (Olaniyi & Josiah, 2013). Similarly, MalE has nine vowels as /ə/, /ʊ/, /i/, / u/, /e/, /o/, /a/ /ʊə/ (Pillai, 2014; Zuraidah, 1997). Both varieties have vowels that are classified as monophthongs and diphthongs. The vowel inventory of the MalE has earlier been classified by previous investigations Pillai (2014), Pillai et al. (2010) and Tan and Low (2010) based on acoustic phonetic characteristics, while that for the NigE, only impressionist reports are available, so far. The monophthongs for MalE, according to the investigations are nine (9), (Pillai et al., 2010; Tan & Low, 2010), whereas those for NigE are ten (10) (Josiah & Babatunde, 2011).

3.3.2 The Acoustic Property

The most defining acoustic properties of vowels are the vowel duration and formants frequency, F0 and the first three formants. The monophthongs shows vowel formants that are not always completely static, for instance in varieties of American English, as in Hillenbrand et al. (1995) and Jacewicz and Fox (2012), but they can still be described in terms of their steady-state formant characteristics or vowel target. (Stack, Strange, Jenkins, Clarke & Trent, 2006; Strange, 2007; Strange, Weber, Levy, Shafiro, Hisagi & Nishi, 2007; Van Leussen et al., 2011). For the present study, the vowel duration and first two formants were measured. In order to find out the vowel quality and duration of the monophthongs, as

well as extent in which the vowel pairs are typically contrasted in terms of quality and duration.

Many phonetic factors can influence the acoustic properties of vowel sounds. In this study, vowels produced by speakers of both varieties were compared, to minimize phonetic variation as much as possible within and across the vowels in the vowel inventories under study. Thus, the phonetic context can be considered to consist of several variables. The first is vocal tract size, which is typically related to gender. The second is the consonantal context, that is, the consonants closest to the vowel. The third relates to stress and syllable number. A stressed closed monosyllable (CVC) are possible in accents of English and all the vowels may seem to be in this situation, except for schwa, which is not measured in this study.

The justification for using word structure of CVC in closed monosyllable words is not only for a more naturalistic setting for speakers to produce various vowel sounds (rather than in isolation), but to also provide a clearer indication where the vowel is located in the waveform of the syllable in subsequent acoustic analyses. Additionally, using stressed syllables avoids any possible vowel reduction or undershoot that can occur. Finally, the utterance type should be kept constant as this can also lead to vowel reduction or formants undershoot.

3.4. Participants

The speech data obtained from 24 speakers of NigE and MalE participants, all the respondents were recorded at the studio of the Faculty of Languages and Linguistics, University of Malaya. Out of the total 24 respondents, (20) speech samples were selected for this study. The reason behind chosen the (20) respondents is that the two (2) speakers out of the four (4) are MalE speakers. These speakers were from the Eastern part of Malaysia (Kelantan and Kedah), which is not within the scope of this study, only speakers from central Malaysian peninsular were selected. While the other two (2) were NigE speakers, (to have equal number of both groups). Therefore, their data were discarded and removed.

The criteria used for the selection of the speakers for both varieties was chosen to annul the effect of sex, age, native language, other languages spoken and level of education. All the participants were bilingual speakers, with no hearing or speech disorder. All were postgraduate students in University of Malaya, only one (1) NigE participant was from University of Technology Malaysia (UTM). All were pursuing their masters or Ph.D. programs from different faculties mostly were in second year of their programs, ranging in age from 24-40 years. The participants were split into two (2) groups of equal size, in which one group of the NigE speakers and the other for MalE speakers. There were an equal number of males and females in both groups, that is, five (5) males and five (5) females in each group. All the participants selected in this study, did not have a trace of American influenced English or accent. Both varieties are non-rhotic.

3.4.1 Hausa Speakers

All the 10 respondents for NigE are ranged from 25 – 40 years of age with an average age of 30. Five of the respondents are males and five are females, who speak Hausa as their native language. Similarly, all respondents speak English as their second language and are in fact, taught in English throughout their education. The 1976 Nigerian National Policy on Education states that all school subjects should be taught in English starting from primary class 3 up to the university level. In fact, English in Nigeria is used as the medium of instruction, official language and national lingua Franca. All of the speakers were born and brought up in northern Nigerian states of Kano, Bauchi, Gombe, Jigawa and Katsina, where Hausa is a lingua franca and English is a medium of instruction and an official language. All of them obtained Bachelor Degrees from Nigerian Universities in various fields of study. Respondents have lived in northern Nigeria for the majority of their lives, and Malaysia is the country they had visited. Furthermore, two of the respondents speak some Arabic, which could be seen as their third language. As table 3.1 shows, all respondents are Masters and Ph.D. students in different faculties in the University of Malaya, most of them in their second year of study. On the basis of their level of education, speakers are assumed to speak the standard NigE as suggested by Gut (2002a) or the variety II NigE as Udofot (1997) calls it. Table 3.1 shows the background information of the NigE speakers.

From the educational level point of view, the NigE speakers selected were the ones considered the standard NigE speakers in accordance with the criteria used by Udofot (1997) in classifying the NigE variety. The speakers under the category are required to have a minimum of tertiary education. Prior to this, Eka and Udofot (1996) opined that standard NigE speakers should have a minimum of tertiary education. Thereafter, the criterion was

adopted by Gut (2002b) and Gibbon and Gut (2001). Here, all the NigE respondents have a Nigerian university degree and currently pursuing their masters or PhD education. For the MalE speakers, however, the speakers have a minimum requirement for the MUET score band 4. Therefore, the speakers are considered as competent users and have a satisfactory command of the language. With these, the speakers are observed to be competent in both reading and spoken English.

Table 3.1: Background of NigE Speakers

Speakers	**Sex**	**Age**	**1st Lang spoken**	**Others languages**	**Educational level**	**Discipline**
A	Male	26	Hausa		ML	Linguistics
B	Male	37	Hausa		M.L	Linguistics
C	Male	27	Hausa		M.Sc.	Comp. Sci.
D	Male	25	Hausa	Arabic	M.Sc.	Engineering
E	Male	29	Hausa		M.Sc.	Comp. Sci.
F	Female	39	Hausa		M.Sc.	Comp. Sci.
G	Female	32	Hausa		M.Sc.	Engineering
H	Female	26	Hausa	Arabic	M.Sc.	Comp. Sci.
I	Female	28	Hausa		M.L	Linguistics
J	Female	32	Hausa		M.Ed.	Education
Average		**30**				

M.L Master of Linguistics, M.Ed. Master of Education, M.sc Master of Science M.eng. Master of Engineering

3.4.2 Malay Speakers

For MalE, 12 speakers were selected and recorded. Out of the 12, only 10 speech samples were selected for this study. The speakers' age ranges from 24-39 years with an average age of 27.1. Of the 10 respondents, five (5) are females and five (5) are males. The speakers are postgraduate students at various faculties of the University of Malaya. All the MalE

participants are Malays who speak Malay as first language and English as a second language. Respondents were born and raised in the region of central peninsular Malaysia; in terms of background factors, all were very similar. According to the Malaysia Department of Statistics (2010), Malaysia has a population of 28.6 million; Malay natives form the majority of the Malaysian population with (65.1 %), Chinese (26.0 %) and Indians (7.7 %), and other indigenous people such as Portuguese Eurasians and Chinese Babas. Based on this, Malay speakers were chosen to represent the speakers of MalE. Additionally, there could be less variation factors of other languages spoken between the other two ethnic groups that can influence their speech. For instance, most Chinese and Indians are usually trilingual with either Chinese or any of the Indian languages as a native language, Malay and English as other languages. On the contrary, Malay natives, depending largely on their level of education (Pillai et al., 2010) have a tendency of being mono or bilinguals with Malay as first language and English as a second language as the case may be. Similarly, previous investigations by Ahmad (2005), Tan and Low (2010) and Zuraidah (2000) used Malay native speakers in describing the phonology of MalE.

From the selection, it could be understood that respondents in this investigation shares similar linguistic background, and this could help in reducing the influence of other languages in the English pronunciation. Table 3.2 shows the background of the MalE speakers.

Table 3.2: Background of MalE Speakers

Speakers	Sex	Age	1st Lang spoken	Muet Result	Educational level	Discipline
A	Male	24	Malay	Band 4	M.L	Linguistics
B	Male	26	Malay	Band 4	M.L	Fine Arts
C	Male	31	Malay	Band 4	M.Sc.	Geology
D	Male	39	Malay	TOEFL	M.L	Linguistics
E	Male	24	Malay	Band 5	M.Sc.	Geology
F	Female	24	Malay	Band 4	M.L.	Linguistics
G	Female	27	Malay	Band4	M.L.	Linguistics
H	Female	28	Malay	Band 4	M.L.	Modern Lang
I	Female	24	Malay	Band 4	M. Sc.	Geology
J	Female	24	Malay	Band 4	M.Sc.	Geology
Average		**27.1**				

M.L Master of Linguistics, MFA. Master of Fine arts, M.S Master of Geology M A. Master of Modern Languages

The Malaysian University English Test (MUET) is an English language proficiency test mostly done for university admission in public schools and recognized only in Malaysia and Singapore. It is a prerequisite for obtaining admission into public and private universities, which is developed and administered by the Malaysian Examination council. However, the universities set different target band score for different courses; for example, most universities in Malaysia fixed a minimal requirement of a band 3 MUET in most courses, while law and medicine courses are required to obtain a band 5 score. The minimum MUET scores for university entrance is a score of Band 3 although some universities require higher scores for programs such as English studies and teaching English as a Second Language. The tests of proficiency were measured in terms of the four (4) skill

areas; the listening, speaking, reading and writing. Each of these sub-test of MUET is scored separately, the listening and speaking module carries 45 maximum score each, 75 for writing and 135 for reading comprehension. The sub-test scores are then averaged to obtain the overall band score (Othman & Nordin, 2013). Therefore, the MUET scores are graded into six different bands, band 6 as the highest score, whereas band 1 the lowest.

Those with Bands 6 are considered as very good users of command of the language. They are highly expressive, fluent, accurate and appropriate language users and functions extremely well in the language.

Band 5 is a good user that has good command of the language. Band 5 expresses, fluent, accurate and appropriate language, but with minor inaccuracies. The score band 5 has a good understanding of language, contexts, and functions well in the language.

Band 4 is a competent user that has satisfactory command of the language. He is satisfactorily expressive and fluent, appropriate language, but with occasional inaccuracies. Band 4 has a satisfactory understanding of language and contexts and functions satisfactorily in the language.

Band 3 is a modest user of command of the language. This band is modestly expressive and fluent, appropriate language, but with noticeable inaccuracies. Modest understanding of language and contexts and were able to function modestly in the language.

Band 2 is limited user with limited command of the language. The band 2 lacks expressiveness, fluency and appropriacy, inaccurate use of the language resulting in breakdown in communication. This band has limited understanding of the language and contexts and limited ability to function in the language.

Band 1 is extremely limited user with poor command of the language. This band were unable to use language to express ideas, inaccurate use of the language resulting in frequent breakdowns in communication It has little or poor understanding of language and contexts. Moreover, is hardly able to function in the language.

3.5. Stimuli/Instrument

The speech material used in this study is a list of monosyllabic words with CVC structure of the eleven (11) monophthong sounds in '*hVd*' and '*bVd*' contexts. These monophthongs are /e/, /ɒ/, /ʊ/, /ɪ/, /ɑː/, /ʌ/, /æ/, /ɔː/, /ɜː/, /iː/, /uː/. Wells (1982) refers to these sets of vowels as lexical sets, which he presented in the following order of lexical items: DRESS, LOT, FOOT, KIT, BATH, STRUT, TRAP, THOUGHT, NURSE, FLEECE and GOOSE. The phonological environments in which the selected target vowels occur were restricted. Therefore, the target vowels occur only in stressed syllable of a content word (word list reading). However, these test words were embedded in carrier phrases and the target vowels were given in a phrase as:

Please say bead again *please say heed again*

The contexts selected were frequently used in acoustic studies of vowels as in Cox (2006), Fourakis (1991), Hillenbrand et al. (1995), Pillai et al. (2012) and Yang (1996). These contexts should not show the effect of coarticulation of the preceding consonant sounds, because /h/ sound is a voiceless variant of the following vowel sound. Alveolar / d/ also has relatively little influence on the formants of the preceding vowel. It minimizes the effect of co-articulation. Therefore, the onset and offset of the targeted vowels can be determined on

the spectrogram and waveform from the dark bars corresponding vowel formants, as shown in Figure 3.1.

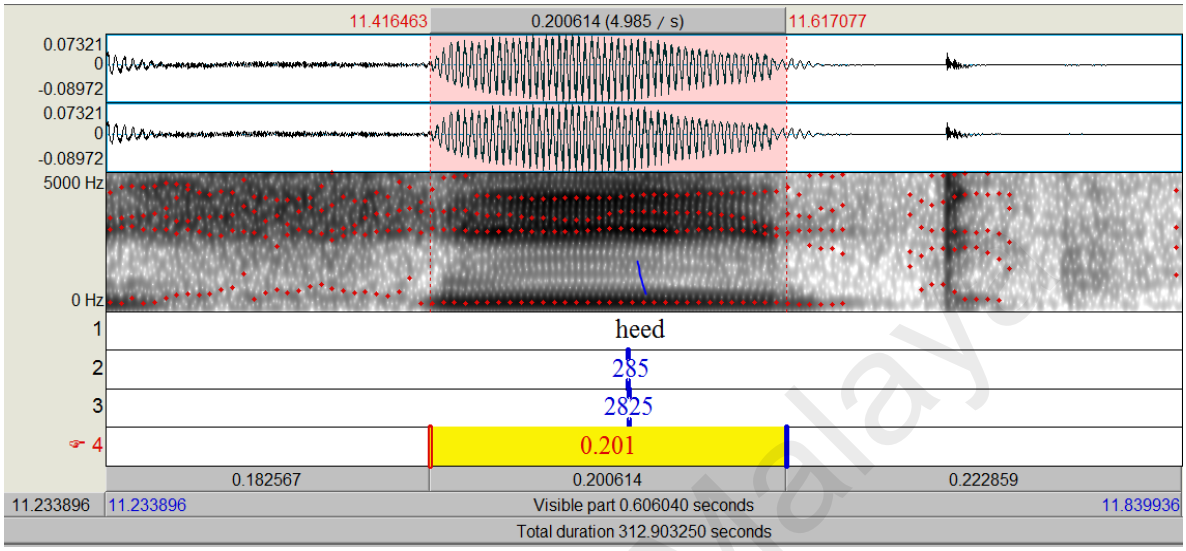

Figure 3.1: Spectrum of the word heed

The *bVd* and *hVd* context were selected, as different studies that were concerned with the influence of place of articulation of prevocalic consonants generally did not find significant effects on vowel duration. In studies, such as Peterson and Lehiste (1960) noted the influence of the initial consonant upon the durations appeared to be negligible for American English. Also, (Suomi, 1976) as cited in Steinlen (2005) reported that for British English, prevocalic consonant showed almost no effect on vowel duration. Strange, Edman and Jenkins (1979) concluded that the effect of prevocalic consonants on vowel duration was rather small. Therefore, the rationale for selecting the two contexts *bVd* and *hVd* in this study lies on the effort of identifying any difference that may be found since previous studies above were all conducted on LI speakers, rather than L2 speakers.

Therefore, the two phonetic contexts of *bVd* and *hVd* were used as previous studies conducted revealed that in terms of duration, there is no significant difference between the two (2) contexts. These studies, however were conducted on L1 speakers and hence the need for carrying the analysis using the same context in L2 speakers. It is however important to note that while using *hVd* context, the initial position of "h" is voiceless, in contrast, the initial position of *bVd* is voiced causing vocal cord vibration. The fact that consciously prepared response on speech influence one's response (as caution is taken) warrants the use of two contexts. However, when a spontaneous response is designed in the research, one context is enough for analysis since the response is subconsciously given.

Having recognized the fact that this study is conducted to see if the finding would support previous research on L1 in *hVd* and *bVd* contexts, exclusive context analysis will be conducted. This stands for analyzing the *hVd* context alone without any comparison with *bVd* and vice versa.

All additional and ungrammatically produced tokens were ignored and hence not included in these analyses. A number of 1272 vowel tokens were extracted for the analysis. The Table 3.3 shows the words that contain the vowels, which were chosen for the measurements and analysis in both *bVd* and *hVd* contexts. The vowels measured were underlined.

Table 3.3: Monophthongs in *bVd* and *hVd* Measured

Vowels	*bVd*	*hVd*
ɪ	B***i***d	H***i***d
iː	H***ee***d	B***ea***d
e	B***e***d	H***ea***d
æ	B***a***d	H***a***d
ʌ	B***u***d	H***u***d
ɑː	B***ar***d	H***ar***d
ɒ	P***o***d	H***o***d
ɔː	B***oar***d	H***or***de
ʊ	P***u***t	H***oo***d
uː	B***oo***t	w***ho***'d
ɜː	B***ir***d	H***ear***d

3.6. Recordings

Ladefoged (2001) suggested that an acoustic data requires a good recording environment so as to minimize background noise. As such, all respondents were recorded in a very quiet room at the Studio of the Faculty of Languages and Linguistics, University of Malaya. This, therefore, helped in providing the required quality speech samples for the acoustic analysis. To ensure that there are an adequate number of the vowel tokens, it was necessary to make use of the reading phrases that the participants read thrice, in order to have accurate tokens. The phrases used in this investigation were adopted from previous (Hillenbrand et al., 1995; Pillai, 2014; Strange, 2007), and the reading was conducted in a

citation form. However, this reading data is similar in terms of stress, speaking rate and the phonological environment, and this would support the measurements in the durations of the vowel pairs. The designated read phrases are attached in Appendix A.

The participants' pronunciation was recorded using a microphone and two different recording instruments, a digital recorder (Sony digital HD Video Camera recorder (HDV) Model 1080i) and an analogue pro A sound card. All these recorders were measured using the same sample at 44,100 Hz and 16 bits. The microphone was placed approximately five inches away from the participants' mouth. For the recordings with a digital recorder, after the recordings were completed, they were transferred to an audio CD, and being converted from WMA to WAV, with the use of software "switch sound file convert software". The conversion into WAV files was necessary because PRAAT only reads and recognizes sound files saved as WAV. To ensure good quality recording for the instrumental analysis, recordings were done at a sample rate of 44,100Hz (Ladefoged, 2003).

On the other hand, the analogue recordings were done directly to the instrument and saved as WAV files, into the computer. For the test words, supporting words were given to help the participants pronounce the target words correctly. A total number of 1,272 vowel tokens were extracted for the analysis. The recordings approximately took 10 – 15 minutes for each participant. Although all the participants were made to understand that their speech is going to be used for a phonetic research, they were not told that the research was specifically focusing on vowels, and on particular target words. This would therefore, help in making the speech samples as natural as possible.

3.7. Data Collection

The participants' personal details, informed consent, the date and time of the recording were appropriately sought for. The researcher developed an awareness of a guideline that involves discussions about the research with the respondents in a different session. Adequate facts about this study were brought to the speakers at a discussion level by providing them (speakers) with many opportunities to express their opinion on the subject matter ensuring that, they understood the information. The speakers were then given the right to participate at their own volition before the issuance of the consent form.

The informed consent form is attached in Appendix B. Participants were given the phrases in advanced so that they could be familiar with the items on the data sheet. Before the recordings began, the participants were given as many practice sentences to read as necessary, in order to ensure that they understood the reading phrases and produced the target vowels. Twenty-two (22) phrases were recorded for each participant that is, each of the 20 participants randomly repeated the phrase 3 times each. The researcher instructed the participants to read the phrases aloud as close to their normal speech style and speech rate as possible. They were also instructed to take a pause of 3 – 5 seconds after each phrase, while a break is given after every 15 sentences. If participants made a mistake, for instances, showed hesitation or misread any of the phrases, they were asked to reread the whole phrases stimulus. This task takes the participants 10-15 minutes to complete. Hence, the ungrammatical or imprecise produced phrases were discarded and therefore not included in the analysis.

Two-filler phrases were used at the beginning and end of the two (2) contexts phrases (*bVd* and *hVd*), to distract the participants' attention on the target vowels and beginning and end effects of reading (Pillai, 2012). In a few cases, where some of the words were misread or pronounced wrongly, the tokens were removed or omitted from this data

3.8. Data Analysis

The research data was analyzed using free computer software for an instrumental analysis known as PRAAT version 5.3.81 (Boersma and Weenik, 2014). The words containing the vowels were orthographically transcribed using PRAAT scripts (Lennes, 2002) to segment the words automatically via pause. Thereby, the words were identified from the spectrograms in Praat in which the targeted vowels were extracted. The vowels were auditory inspected for the measurement of the first two formants and the durations (Kent, 2002; Ladefoged, 2001b; Maxwell & Fletcher, 2009; Pillai et al., 2010). Analysis was done by estimating the first two formants; using linear predictive coding (LPC) analysis overlaid on the digital spectrograms. The frequencies of the first and second formant were measured for each vowel token. The measurements were done with the formants tracker function; however, they were sometimes measured manually when it is necessary. A spectrogram was made for each word in which the targeted vowels were extracted. Manual measurements were done to counter-check for errors like identifying a high fundamental frequency as formants (Ladefoged, 2003). The formant analysis of vowels normally requires measurements of the first two formants, F1 and F2, and at times the third formant F3, if the vowels being investigated are r-coloured or high-front vowels (Hayward, 2000; Kent & Read, 1992; Ladefoged, 2003). However, for the location of the instrumental

measurements of the formants frequency is at its steady state of formants visible in the vowel's spectrogram that is the midpoint of the vowel as in Harrington, Palethorpenand Watson (2000).

The most significant acoustic properties to describe vowel sounds are vowel durations and the formant frequencies (F0, F1, F2 and F3). Vowels are traditionally associated with well-defined acoustic patterns as well as a steady rate of articulatory configuration, which are characterized by the two formants (Hayward, 2000). The F1 and F2 plots have a high correlation with the traditional quadrilateral vowels. The F1 is inversely to vowel height (Ladefoged, 2003) and F2 shows backness and rounding (Hayward, 2000). To derive the speakers' vowel quadrilateral, the mean values of the first and second formants of each speaker were calculated and the overall average was calculated for males and females separately. The vowels were charted after the dimensions have scaled through the auditory bark scale that is commonly used in acoustic study. A bark scale is a nonlinear transformation of frequency that corresponds to the analysis that is done by the ear (Kent & Read, 1992). The purpose of using the bark scale is to transform the vowel formants measurements into a perceptual space to enable a visual representation of how the sounds are perceived, (Hayward, 2000; Tan & Low, 2010). Therefore, the distance between the formants values of the plot will be similar to how the distances between the vowel qualities are perceived auditory. For plotting the formants, Zwicker and Terhardt (1980) suggested a formula, which can be converted to the bark scale. The values are converted from Hertz to auditory bark scale, which is used in previous studies by Deterding (2003), Pillai et al. (2010), Tan and Low (2010) used for acoustic measurements. The formula is:

$$Z=13 \arctan (0.00076F) + 3.5 \arctan (F/7500)^2.$$

Where F is the frequency in Hertz and Z is the frequency in Bark.

The presentation of vowel quality is made in formant plot where F2 is directly plotted against F1. The F1 signifies the open-close quality of the vowels while, the F2 replicates the front-back quality of a vowel (Hayward, 2014; Ladefoged, 2001b; Tan & Low, 2011). In order, to normalize the speakers' differences, particularly males and females formant frequencies, the front/back dimension in terms of F2 - F1 were represented (Deterding, 1997). In this present study, the vowels template in Deterding (2003) and Pillai et al. (2010) was adapted to generate the vowels of NigE and MalE.

Scatter plots of the vowels were plotted from the measurements obtained from males and females for both varieties. The standard lexical sets of Well's (1982) were used for the description of the NigE and MalE. These lexical sets are useful and have been used in studies such as Baskaran (2008), Bobda (2000a), Mesthrie and Bhatt (2008) and Schmied (2008). For monophthong sounds, the F1 and F2 were measured at the steady-state part of the vowels (vowel midpoint). Figure 3.1 shows the spectrum of an extracted vowel midpoint. The formant values of the measurements (F1 and F2) for both males and females utterances were recorded and calculated separately in Excel spreadsheet. Finally, the average of males and females were calculated for F1 and F2 values.

The spectrograms showed steady states between vowel onset and offset points, but some showed continuous changes in the formant frequencies across the entire vowel, making it difficult to identify a consistent time point for the spectral analysis. Vowel onset and offset were determined by observing both the spectrogram and the amplitude tracing. On the spectrogram, each vowel tended to begin with a glottal pulse and clear formant bars

following the weak noise of [h] on the *hVd* context. On the amplitude tracing, each vowel was represented by a periodic oscillation at about 40 dB preceded and followed by a nonperiodic consonant waveform.

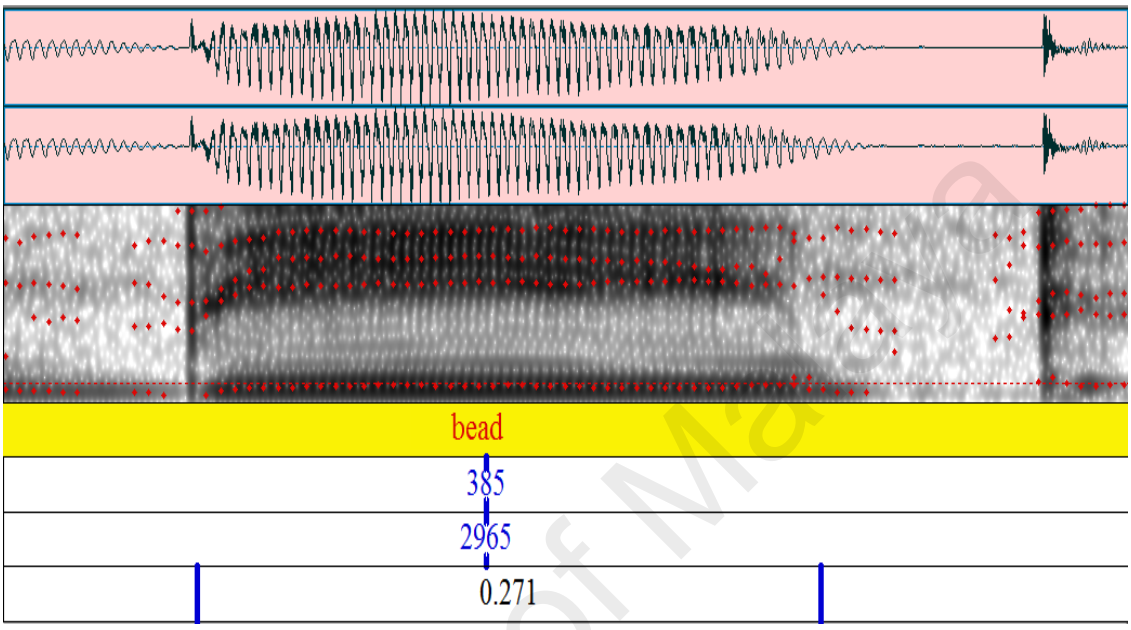

Figure 3.2: Spectrum of the /i:/ Vowel mid-point

For the *bVd* context, vowel onset was identified as the point where the 40 dB threshold was crossed. Vowel offset was assigned to the point where the amplitude fell and the formant bars terminated on the spectrogram.

The total duration of the vowels was measured from the onset and offset to determine the duration of each vowel. The vowel formant frequencies were measured using one-third of the vowel spectrogram. Spectral analysis tools were utilized for automatic computation of formant values, while the visual spectrographic display was provided for verification. The aforementioned methods were in agreement with one another. F0 was gathered from

computer estimates by an autocorrelation method while checking its validity against the duration of a vocal fold pulse on the waveform.

While a wide variation is observed on the formant values of the same vowel produced by one participant, a crosscheck was conducted by analyzing the spectrograms on comparative scale of all the three tokens of that speaker.

For measurement reliability, two round measurements of two-month interval on a portion of twenty-five (25) percentage of the tokens were taken. A Pearson correlation test was conducted, in order to find out the relationship between the first and second measurements. The results for both contexts, *bVd* and *hVd* showed that there are no significant differences between the first measurement and the second measurement.

For the *bVd* tokens, the Pearson correlation indicated there is a positive correlation between the two measurements *(r =0.992 for F1; r = 0.995 for F2).* The *hVd* tokens however, the Pearson correlation showed a strong positive relationship between the two (2) measurements *(r = 0.987 for F1; r = 0.951 for F2).*

However, acoustically, there are differences in the speakers' speech. These variations in males and females (diagnosis of sources of speaker variation) production have been attributed to linguistic factors such as dialectal and sociolectal differences. In addition, the non-linguistic factors such as physical anatomy, age, gender and emotional state of the speaker (Ladefoged & Broadbent, 1957; Traunmuller, 1988). Some of the non-linguistic factors are systematic and their effects may be theoretically separated from linguistically relevant properties of speech by systematic transformations; other factors may be minimized by methods of statistical inference (Fujisaki, 1972). The goal of factoring out

these nonlinguistic factors is to allow a linguistically relevant acoustic specification of the vowel qualities of any given language. This procedure has been called ‘‘normalization’’ (Fant, 1968). Efforts to normalize the vowel qualities of different speakers can generally be divided into auditory-based (Miller, 1989; Syrdal & Gopal, 1986) and articulatory based (Fant, 1975; Nordström & Lindblom, 1975) proposals for speaker normalization. Therefore, for gender differences in sex, age and vocal tract ratio, the speakers' data in this study were analyzed separately. As Yang (1996) reveals that "there are gender differences in the vocal tract ratio".

In acoustic analyses of vowels, or any other speech sounds for that matter, phonetic variation needs to be accounted for. For example, the different size of the vocal tracts and different voice properties exhibited between male and female speakers result in inherently different resonance characteristics and F0 frequencies, significantly influencing the spectral properties of vowels. Furthermore, vowel segments are particularly affected by what sounds precede and follow them (referred to as coarticulation). Thus, interpreting speech sounds as a distinct segment is a problematic notion because there are not always obviously clear-cut boundaries between individual sounds in the acoustic signal. Additionally, speech style and speech rate, for instance clear speech or rapid speech have an impact on the resulting acoustic properties of speech sounds. A useful perspective for examining phonetic variation is to observe it between speakers' inter-speaker variation and within speakers' intra-speaker variation (Lindblom, 1990). Therefore, the most significant inter-speaker factor in which the acoustic properties of vowel sounds can vary is a condition of whether an adult male pronounces the vowel or an adult female. As the glottis, the size and the length of the vocal tract are the source and filter of the vowel sound. The differences in

anatomy and physiology (the glottis and vocal tract) affect F0 and the resulting resonant frequencies. For the adult females' the vocal folds typically vibrate at a rate twice of that of males. This resulted in the adult female's voice to show higher F0 and widely more harmonious than the adult males. Typically, the distance between the glottis to the lip along the vocal tract for the males is longer than the females; this is because of vocal tract size. A sound pronounced by the females regardless of the configuration will resonate to different frequencies and thus the amplitude peaks for the females will be at a higher frequency (formant frequency). Therefore, a smaller vocal tract will generate higher resonant frequencies (Peterson & Barney, 1952).

3.9. Conclusion

In this chapter, we have discussed the methods used in conducting the study, which includes the research design of the study, the theory adopted, the participants, the instruments used, the method of recordings, data collection as well as the analysis of the data of this study.

CHAPTER 4

FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents and discusses the findings of an acoustic study of NigE vowels that were carried out on the data of the present study. Firstly, by looking at the acoustic features of English monophthongs by Hausa speakers, secondly the extent to which there is a difference in vowel quality and length and thirdly, the vowels realization of males and females differences and similarities between NigE and MalE speakers.

As earlier discussed in chapter 1, this study tends to address the following research questions:

1. What are the acoustic features of English monophthong vowels as produced by Hausa speakers?
2. To what extent is there a vowel contrast in terms of vowel quality and length?
3. To what extent is there a difference in vowel realization in males and females speech and between NigE and MalE speakers?

4.1.1 Vowel Quality in NigE and MalE

As explained in *3.6*, the F1 and F2 frequencies that were measured at the mid-point were converted to the bark scale based on Zwicker and Terhardt (1980). However, the data of MalE speakers were used to compare the differences and similarities between the two (2) varieties. Table 4.1 shows the overall average for the F1 and F2 values obtained from male

and female speakers in "*bVd*" context for NigE and MalE. The results for males and females were presented separately. Therefore, Figures 4.1 to 4.4 shows the whole formant plots of males and females in NigE and MalE for the vowels in *bVd* context after converting to Bark scale and plotted on F1 and F2 charts.

Table 4.1: The average formants frequencies for NigE and MalE monophthongs in *bVd*

	Nigerian English				Malaysian English			
	Male		Female		Male		Female	
	F1 (Hz)	F2 (Hz)	F1 (Hz)	F2 (Hz)	F1 (Hz)	F2 (Hz)	F1 (Hz)	F2 (Hz)
ɪ	291	2260	309	2723	331	2261	347	2536
iː	280	2194	342	2574	307	2349	339	2544
e	483	1926	552	2077	640	1819	602	2205
æ	654	1426	711	1617	661	1778	594	2143
ʌ	602	1407	621	1352	704	1367	744	1575
ɑː	661	1378	691	1468	713	1157	747	1438
ɒ	576	1122	664	1112	682	1052	629	1114
ɔː	563	1106	544	1141	563	994	621	1088
ʊ	377	1078	381	1049	377	1057	401	1062
uː	309	967	337	835	361	1009	400	1016
ɜː	602	1563	590	1558	501	1470	489	1596
Average	511	1493	522	1591	531	1483	538	1665

SD = Standard Deviation

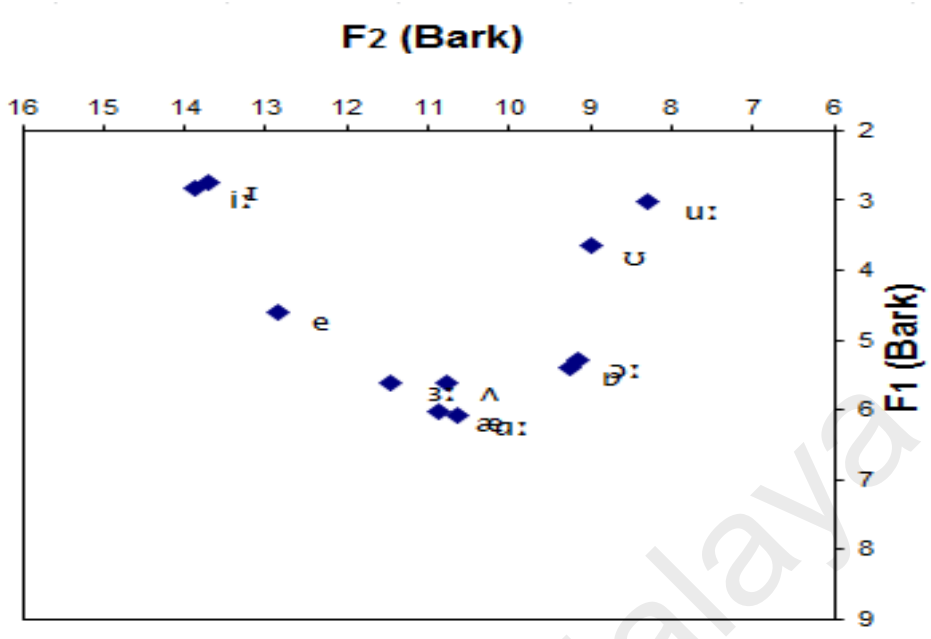

Figure 4.1: Formant plot for average males NigE vowels *bVd* context

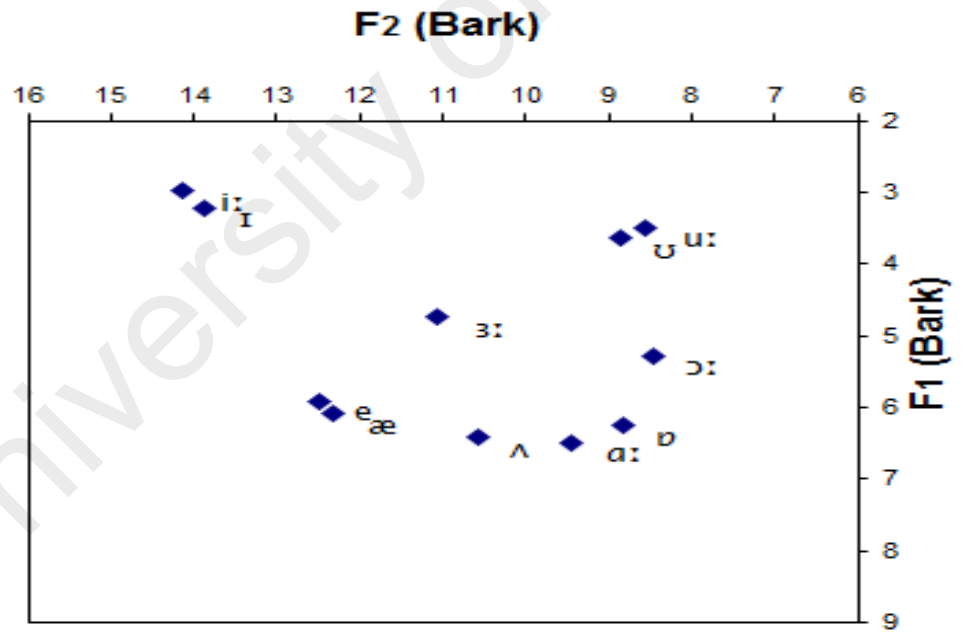

Figure 4.2: Formant plot for average males MalE vowels *bVd* context

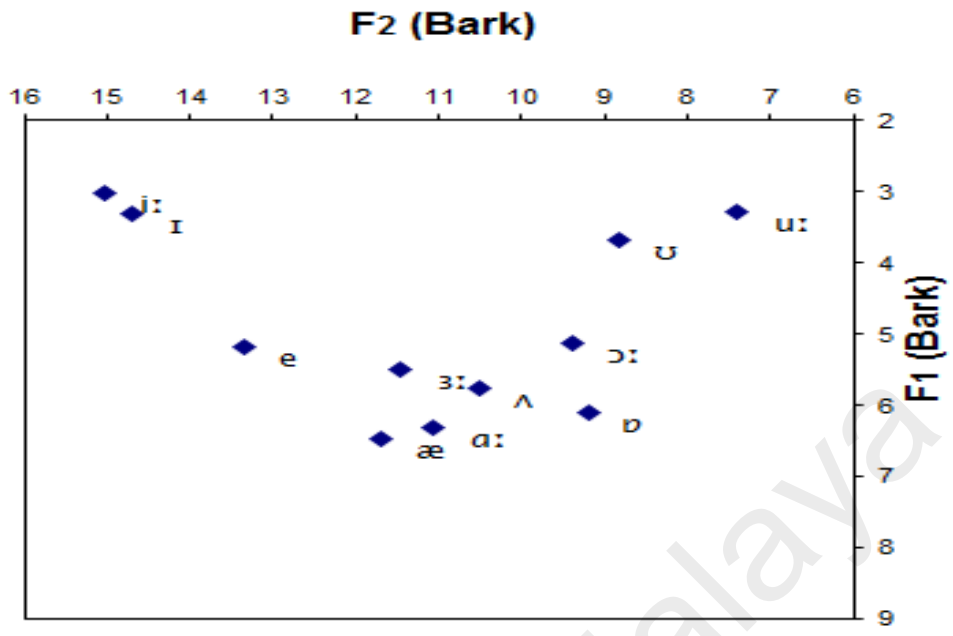

Figure 4.3: Formant plot for average females NigE vowels *bVd* context

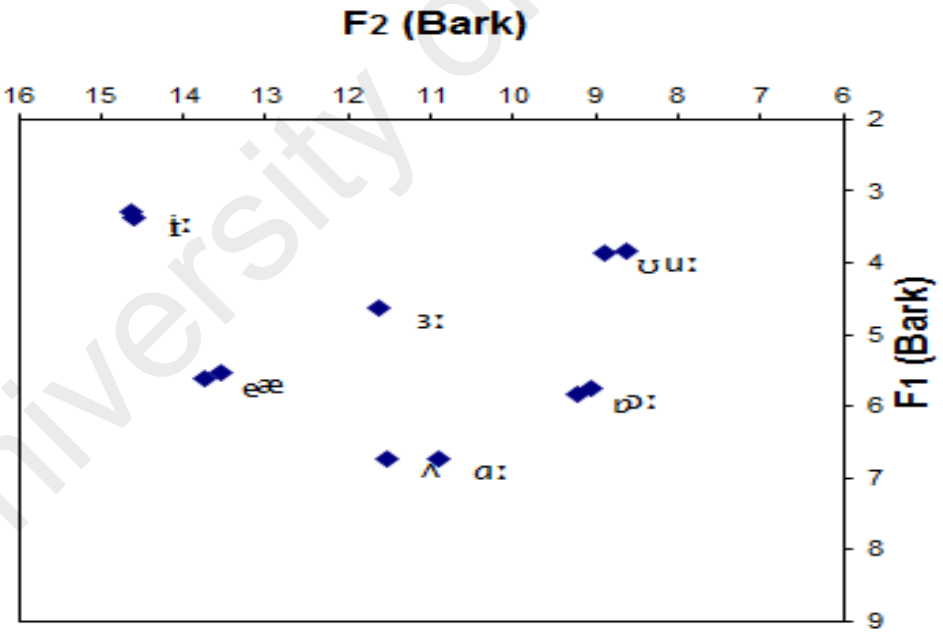

Figure 4.4: Formant plot for average females MalE vowels *bVd* context

The figures generally indicate that the vowel quadrilateral of male speakers of NigE appears to be more central compared to that of male MalE speakers, which occupied more vowel space in the vowel plots. This is evident as the method adopted by Deterding (1997) was used where the centroid is taken to be the average of the F1 and F2 values of all the vowels, except the central vowel /ɜː/. The distance of each vowel from the centroid was obtained using the Euclidean distance, in order to determine the average distance of all the vowels from the centroid, and therefore to show how peripheral or central the vowels of the speakers are in the vowel quadrilateral. Based on the calculation of the average distance of each vowel, it was found that the Euclidean distance of male NigE speakers is 5.92, while that of male MalE speakers is 6.35. This indicates that the vowel space of male NigE speakers is more central than that of male MalE speakers. However, a *t-test* was carried out and the result showed the difference is not statistically significant (t = 1.84, df = 9, ns paired sample, two-tailed).

For the female speakers' vowel space, the average distance of the vowel from the centroid of NigE speakers is an average of 6.11, and MalE speakers are 6.68. This suggests that the vowel space of the MalE female speakers is more peripheral compared to females NigE. Therefore, the *t-test* result showed marginally significant differences between female NigE and female MalE speakers (t = 2.64, df = 9, $p < 0.01$, paired sample, two-tailed). However, the results of the *t-test* confirmed that the vowel space of male NigE speakers is more central than that of males MalE. While the vowel space appeared to be peripheral for both female speakers, the *t-test* results indicated that this could not be claimed that the vowel space for the females were different.

As can be seen in the Figures 4.1 to 4.4, /ɪ/ - /iː/ and /ʌ/ - /ɑː/ vowels produced by males and females were quite close for both NigE and MalE. However, there is a lack of contrast between the vowels, indicating the possibility of conflation in these vowels. Therefore, the words bid-bead and bud-bard were realized with almost the same vowel approximation to one another. Conversely, more contrast was realized between the front vowels /e/ - /æ/ and back vowels /ʊ/ - /uː/ for the NigE speakers. The /ɒ/ - /ɔː/ vowels appear to be closer for males NigE, while a little further apart for the females. While /ɜː/ vowel for NigE speakers was shifted towards /ʌ, æ, ɑː/, it was more specific for the male speakers appearing as though it is the same vowel.

For the MalE speakers, there is no contrast between front vowels /e/ - /æ/ and back vowels /ʊ/ - /uː/. A marked difference in MalE between the speakers was seen in back vowels /ɒ/ - /ɔː/, where less contrast was observed in males and no contrast was seen in females. Synchronically, /ɜː/ vowel was produced more central and fronted in MalE. Consequently, the F1 and F2 values obtained and the generated formant plots indicate that the female speakers seemed to have more spread out vowel space as compared to males' vowel space, while the vowel space for male speakers of NigE and MalE appears to be quite similar.

For the *hVd* context, Table 4.2 lists the males and females formant frequencies averaged values obtained for F1 and F2 in *hVd* context for NigE and MalE. Figures 4.5 and 4.6 show the whole formant plots for the male NigE and MalE speakers, while Figures 4.7 and 4.8 show the formant plots for the female speakers in NigE and MalE. The average values for each participant's recorded vowels were shown in Appendix C.

Table 4.2: The Average Formants Frequencies for NigE and MalE Monophthongs in *hVd*

	Nigerian English				Malaysian English			
	Males		Females		Males		Females	
	F1 (Hz)	F2 (Hz)	F1 (Hz)	F2 (Hz)	F1 (Hz)	F2 (Hz)	F1 (Hz)	F2 (Hz)
ɪ	278	2204	340	2625	337	2265	351	2577
iː	274	2241	308	2835	324	2313	358	2596
e	471	1971	584	2273	526	2022	587	2267
æ	657	1496	767	1708	651	1817	637	2227
ʌ	618	1347	672	1331	579	1535	835	1763
ɑː	689	1451	752	1552	788	1275	801	1514
ɒ	548	1159	621	1187	619	1031	657	1239
ɔː	538	1123	603	1149	637	1017	685	1201
ʊ	317	1076	330	945	359	1001	433	1106
uː	326	1040	349	883	371	963	401	1091
ɜː	551	1674	664	1602	540	1530	518	1795
Average	479	1526	545	1645	521	1524	569	1761

SD = Standard Deviation

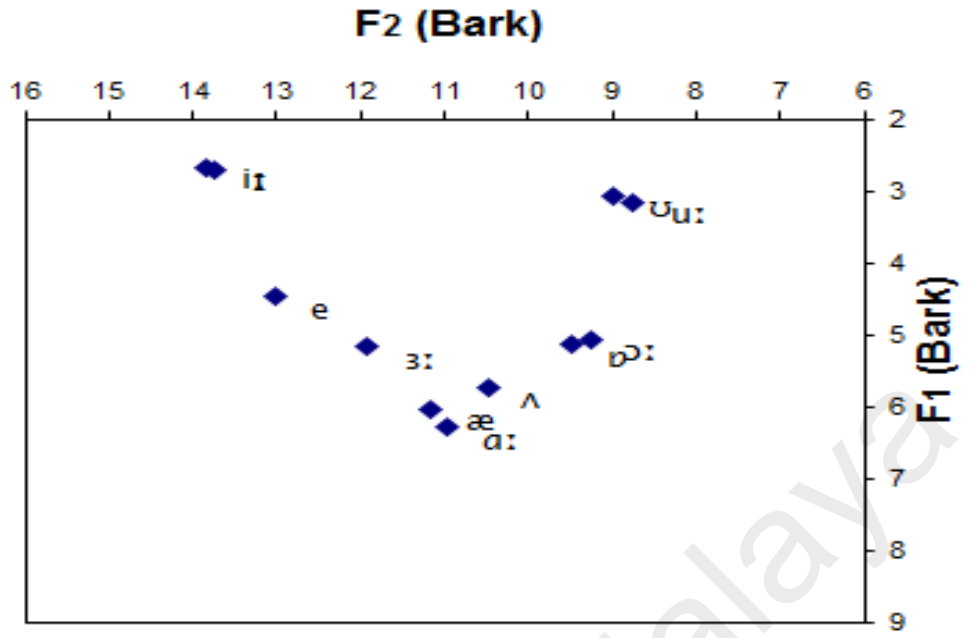

Figure 4.5: Formants plot for average males NigE vowels *hVd* context

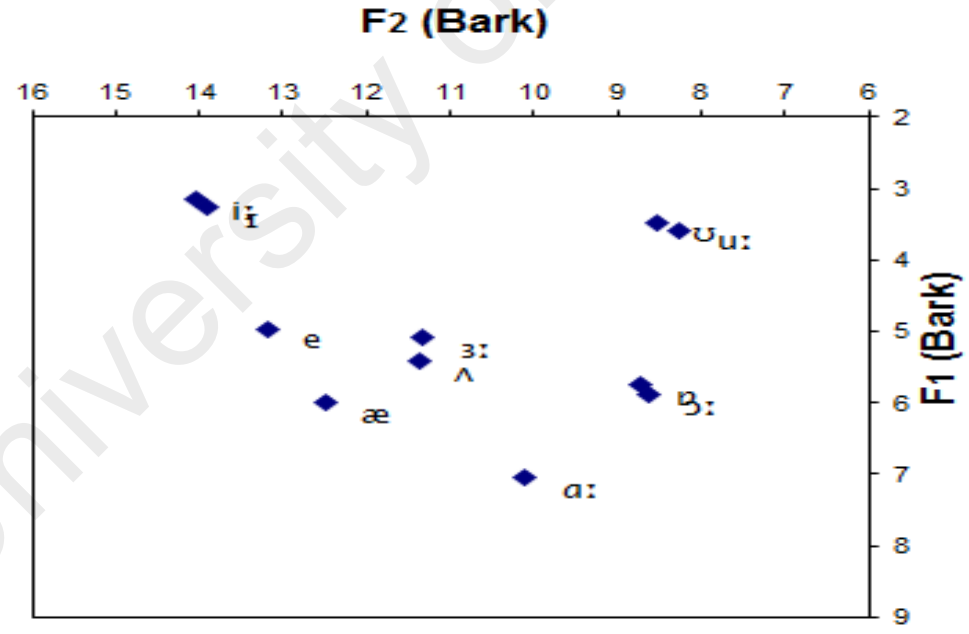

Figure 4.6: Formants plot for average males MalE vowels *hVd* context

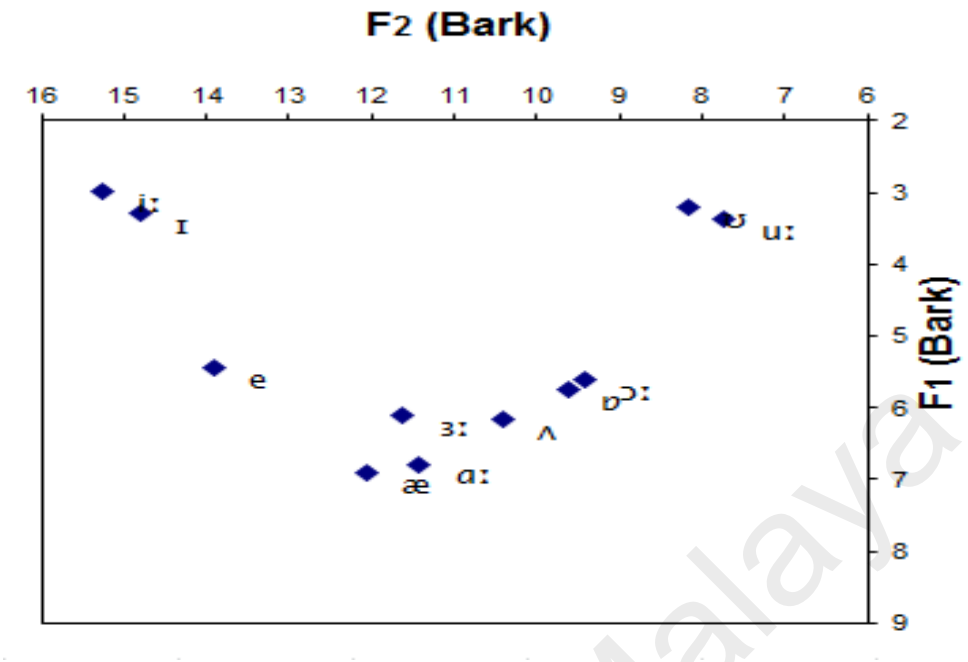

Figure 4.7: Formant plot for average females NigE vowels *hVd* context

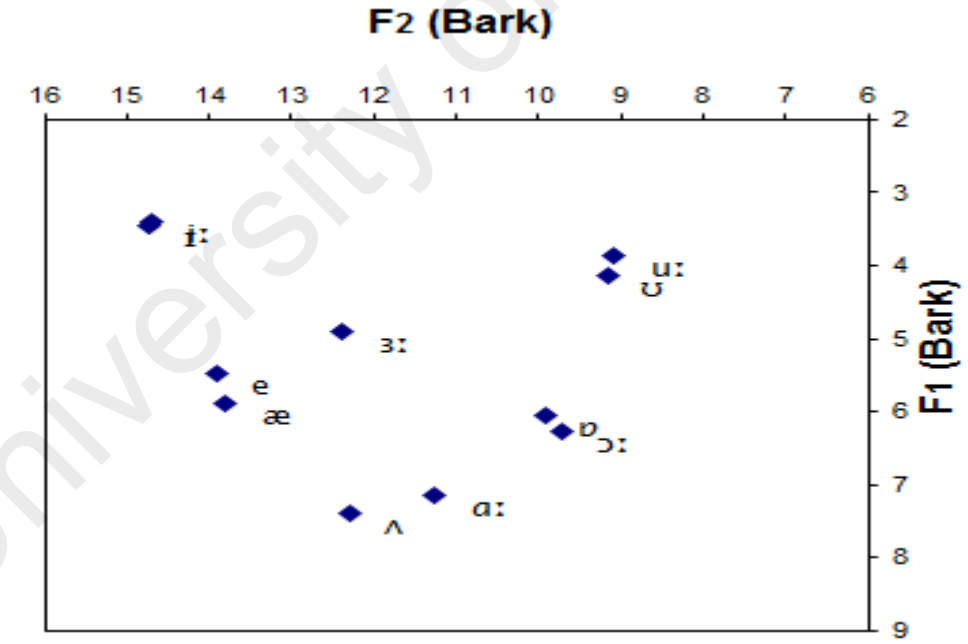

Figure 4.8: Formant plot for average females MalE vowels *hVd* context

The average distance of the vowels from the centroid of male NigE speakers is 5.98 and for males MalE is 6.35, it shows that the vowel space for males NigE is more compact than that of male MalE speakers. However, *t-test* that was done showed no significant difference between male speakers of NigE and MalE (t (9) = 1.78 $p < 0.05$. For the female speakers, however, the average distance from the centroid for the vowels produced by each group was calculated as females NigE is 6.26 and females MalE has 6.76, suggesting that the females MalE has more peripheral vowel space than female NigE speakers. A *t-test* shows no significant difference between the average Euclidean distances from the centroid for the females NigE and MalE speakers (t(9) = 1.84 $p < 0.05$.

As presented in Figures 4.5 to 4.8, for male and female speakers in NigE and MalE in hVd context, it can be seen that there is a lack of contrast between the vowels /ɪ/ and /iː/, /ʌ/ and /ɑː/, /ɒ/ and /ɔː/ as well as /ʊ/ and /uː/. This is similar to *bVd* context results obtained for the /ɪ/ - /iː/ and /ʌ/ - /ɑː/ vowels. For NigE speakers, however, the front vowels /e/ and /æ/ were contrasted, which seems to be more similar to the *bVd* context. The /e/ and /æ/ vowels for MalE speakers lack contrast, which is quite similar to the *bVd* context. In contrast, /ɜː/ vowel in *hVd* context is produced little closer to /ʌ, æ, ɑː/ in NigE compared to *bVd* context, while for MalE speakers, it is produced central and less fronted as compared to *bVd* context.

The F1 and F2 values obtained and the formant plots showed that generally, the MalE female speakers seem to have a more peripheral vowel space as compared to the female NigE speakers, while the vowel space for MalE male speakers appears to be quite similar to NigE male speakers. Although for males NigE, there appears to be more compact.

In NigE /ɪ, iː/ and /ʌ, ɑː/ vowels were not contrasted in the (2) contexts, this is in agreement with Adetugbo (2004), Gut (2008) and Udofot's (2004) findings of /ɪ, iː/ vowel neutralization, and Bobda's (2000a) finding where /ʌ/ was realized as /ɑː/ in NigE. More so, the finding is similar to Mesthrie and Bhatt's (2008) on mergers of /æ, ʌ/ and /ɒ, ʌ/ vowels. Similar findings were reported for MalE as in Pillai (2010, 2014) and Tan and Low (2010) where lack of contrast was realized between /ɪ/ - /iː/ and /e/ - /æ/ vowels. This finding is however at par with the above MalE finding in back vowel /ʊ/ - /uː/indicating lack of contrast between the vowels wherein their findings indicated contrast.

However, based on the formant data of NigE speakers, it indicates that there is a tendency of having lower tongue position and back vowels. In the contexts, '*bVd* and *hVd*' the vowels occupy relatively quite similar position. Therefore, the *bVd* context has a more spread out vowels, based on the calculation of the average Euclidean distance results.

4.1.2 Vowels Length

This section reports the durational results of the measurements for the vowel sounds in NigE and MalE. That is the vowel duration (length) in the realization of the monophthongs for both contexts "*bVd* and *hVd*". The result of the overall measurements of the duration as itemized in Table 4.3 shows the mean durations of the eleven (11) monophthongs examined in this study for the males' and females realization in milliseconds (ms).

Table 4.3: Mean durational values in NigE and MalE *bVd* context

	NigE		MalE	
Vowels	**Males**	**Females**	**Males**	**Females**
ɪ	126	153	141	114
iː	217	220	167	121
e	173	180	195	141
æ	169	203	203	135
ʌ	134	170	152	139
ɑː	201	226	206	159
ɒ	150	153	178	132
ɔː	210	211	215	163
ʊ	107	107	141	111
uː	158	162	163	119
ɜː	203	237	204	151
Average	172	184	179	135

In terms of vowel length (duration) in *bVd* context, NigE speakers seem to differentiate between the /ɪ/ and /iː/ vowel pairs as shown in Table 4.4, where the mean length for males /iː/ vowel being 217 ms and 126 ms for /ɪ/. The result of the *t-test* done and confirmed that there were significant difference between /ɪ/ and /iː/ vowels in NigE for males and females (t (12) = -5.38, p < 0.001; t (14) = -7.02, p < 0.001). However, female speakers do differentiate in length contrast in all the vowel pairs of /ɪ/ - /iː/, /e/ - /æ/, /ʌ/ - /ɑː/, /ɒ/ - /ɔː/ and /ʊ/ - /uː/, with an averaged 153 ms for /ɪ/, 220 ms for / iː/, 170 ms for /ʌ/ and 226 ms for /ɑː/. The MalE male speakers do contrasted /ɪ/ - /iː/ ʌ/ - /ɑː/, /ɒ/ - /ɔː/ and /ʊ/ - /uː/, vowels

with 141 ms for /ɪ/ and 167 ms for /iː/ while the females had 114 for /ɪ/ and 121 for /iː/. Subsequently, /ɜː/ vowel has an average of 204 ms for males and 151 ms for females. The research revealed that NigE realization in /ɜː/ vowel for males has an average of 185 ms and 207 ms for females.

Table 4.4: Mean durational values in NigE and MalE *hVd* context

	NigE		MalE	
Vowels	**Males**	**Females**	**Males**	**Females**
ɪ	114	159	112	105
iː	168	203	147	113
e	149	156	136	123
æ	133	158	142	116
ʌ	108	154	129	107
ɑː	153	201	153	141
ɒ	125	151	133	125
ɔː	149	188	163	133
ʊ	145	172	158	118
uː	163	197	152	115
ɜː	185	207	169	123

In *hVd* context, differences were realized between the short and long vowels in all the vowel pairs, excluding the /e/ and /æ/ vowel pair of the NigE speakers. Based on the *t-test* done and the results reported, the males do differentiate in all vowel pairs length, except for /e - æ/ and /ʊ - uː/ vowels. Therefore, the male speakers have an overall average of 114 ms for /ɪ/ and 168 for /iː/ where female speakers have an average of 159 ms for /ɪ/ and 203 ms

for /iː/, the paired samples *t-test* report ($t(12) = -5.77$, $p < 0.001$; $t(14) = -7.92$, $p < 0.001$). The /e/ vowel has 149 ms and 133 ms for /æ/ in male speakers, the females have 156 ms for /e/ and 158 ms being for /æ/. For MalE speakers, all the vowels were contrasted with an exception of /e, æ/ and /ʊ, uː/ vowels which exhibit an average of 158 for males /ʊ/ and /118/ ms for females in /ʊ/, while /uː/ has an average of 152 for males and 115 for female.

Paired *t-test* results confirmed significant differences for NigE speakers in all vowels except /e and æ/ vowels, ($t(14) = 1.40$, $p < 0.0.5$; $t(14) = -0.35$, $p < 0.0.5$), which are not differentiated and /ʊ and uː/ vowels for males, ($t(14) = 1.50$, $p < 0.0.5$), where no significant difference was found. However, marginal significant difference was found for females ($t(14) = 2.24$ $p < 0.01$). For MalE speakers, the difference between the mean duration of /ɪ, iː/ was marginally significant ($t(14) = -3.83$, $p < 0.0.5$; $t(14) = -2.65$, $p < 0.0.5$). No statistical difference was found in /e, æ/ ($t(14) = -1.45$, $p < 0.0.5$; $t(14) = 1.02$, $p < 0.0.5$) and /ʊ, uː/ vowels ($t(14) = 0.47$, $p < 0.0.5$; $t(14) = 0.53$, $p < 0.0.5$). On the contrary, marginal difference was found in /ʌ, ɑː/ vowels for females ($t(14) = -6.62$, $p < 0.0.1$), while no statistical difference for males ($t(14) = -1.34$, $p < 0.0.5$). This shows that in terms of length contrast of the vowel pairs in both contexts, male and female speakers in NigE discern between long and short-paired vowels.

Hinging on the aforementioned observations and considering the fact of the lack of differentiation in vowel length of /e – æ /, it may be suggested that NigE and MalE speakers in the two contexts "*bVd* and *hVd*" produced and realized /e – æ/ vowel pair with some conflation in terms of length contrast. As Pillai et al. (2010) suggested, /e/ and /æ/ vowels in MalE were not distinguished, and indicated that in English, the vowels were not contrasted in relation to length, this is therefore, also anticipated in NigE. Though the same

realization is exhibited in NigE impressionist studies of Udofot (2004), Gut (2008) and Cumming (2012) found that Hausa speakers of NigE tends to exaggerate length contrast between vowels.

4.2 Vowel Quality Contrast in NigE and MalE

To obtain a clearer picture as to what extent is there a vowel contrast between typically paired vowels in NigE and MalE. The results for long and short vowel pairs were presented. Therefore, the scatter plots of /ɪ/ and /iː/, /e/ and /æ/, /ʌ/ and /ɑː/, /ɒ/ and /ɔː/ as well as /ʊ/ and /uː/ for males and females were generated separately. However, in order to verify the results, separate paired samples *t-test* was conducted between each of the vowel pair of long and short in *bVd* and *hVd* contexts to further study the differences and to find out if there are significant differences between all vowel pairs in contexts.

Figures 4.9 to 4.12 are the scatter plots of NigE and MalE male and female speakers for /ɪ/ and /iː/ vowel pair in *bVd* context, where the distribution of each vowel produced by individual speaker was presented. These Figures showed an overlapping distribution, indicating lack of contrast between the vowel pair. Based on the examination of the scatter plots, the vowels display a lot of merging in their quality, these vowels showed an overlap in the realization of /ɪ/ and /iː/ vowels for both NigE and MalE, thus suggesting that the vowels were produced similar to each other. However, the results of the paired *t-test* that were done for the F1 and F2 values of the vowels maintain that, there is no difference in the realization of /ɪ, iː/ vowel pair for MalE speakers ($t(14) = 0.81$, $p < 0.05$, $t(14) = -0.57$, $p < 0.05$). Except for the males speaker's F1, in which the paired samples *t-test* results indicate a significant difference in F1 values ($t(10 = 2.71$, $p < 0.01$). However, significant

differences were found in the average values of NigE males and females F1 ($t(12) = -0.93$, $p < 0.01$, $t(14) = 2.03$, $p < 0.01$). Ultimately, no differences were found in their F2 average values (t(12 =-2.40, $p < 0.05$, ($t(14) = -3.48$, $p < 0.05$). Table 4.5 is a summary of the *t-test* results done for the /ɪ/ and /iː/ vowel values for all the speaker's F1 and F2 in *bVd* context. This finding is similar to Tan's (2010) finding on /ɪ, iː/ vowels in MalE.

Table 4.5: t-test results for F1 and F2 values for /ɪ - iː/ vowels in *bVd* context

	Male NigE F1	Male NigE F2	Male MalE F1	Male MalE F2	Females NigE F1	Females NigE F2	Females MalE F1	Females MalE F2
df=	12	12	10	10	14	14	14	14
t=	-.933***	-2.403**	2.710**	-1.721***	2.003***	-3.477**	.806***	-.572***

(*: p < 0.001; **: p < 0.01; ***: p < 0.05…) df = 14, 10, Two sampled two tailed

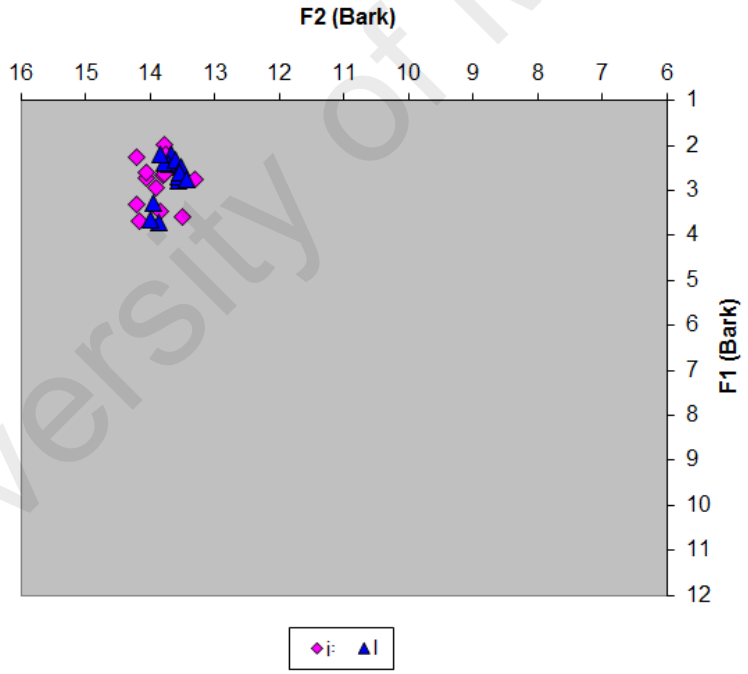

Figure 4.9: Scatter plot of NigE male speakers /ɪ/ and /iː/ vowels in *bVd* context

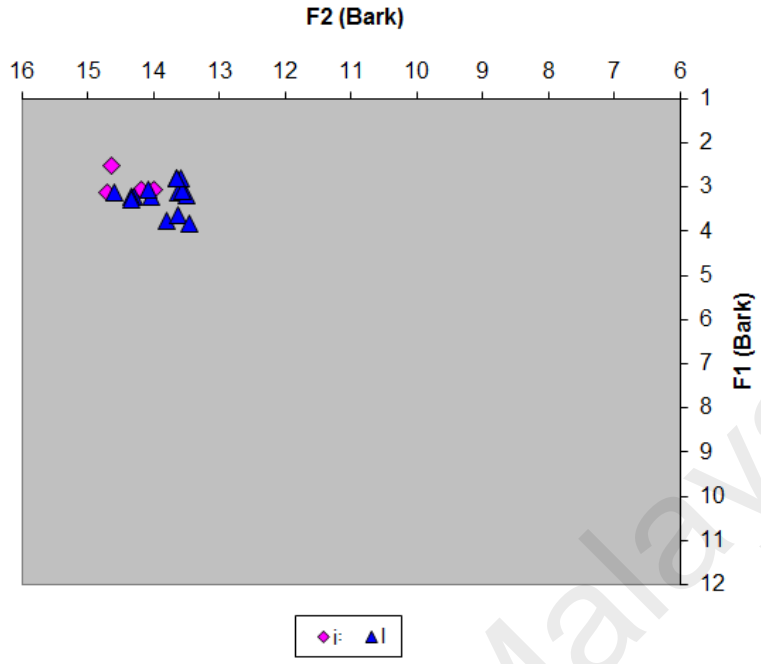

Figure 4.10: Scatter plot of MalE male speakers /ɪ/ and /iː/ vowels in *bVd* context

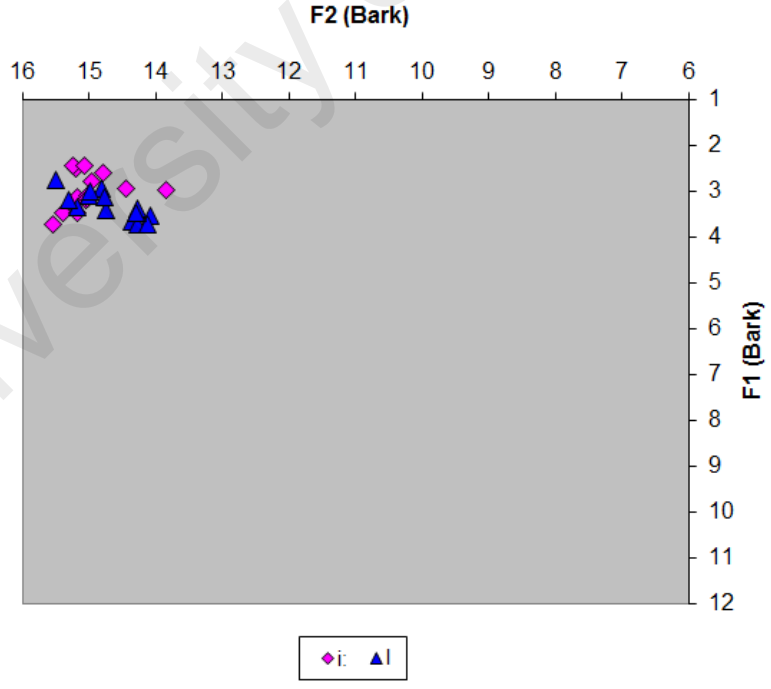

Figure 4.11: Scatter plot of NigE female speakers /ɪ/ and /iː/ vowels in *bVd* context

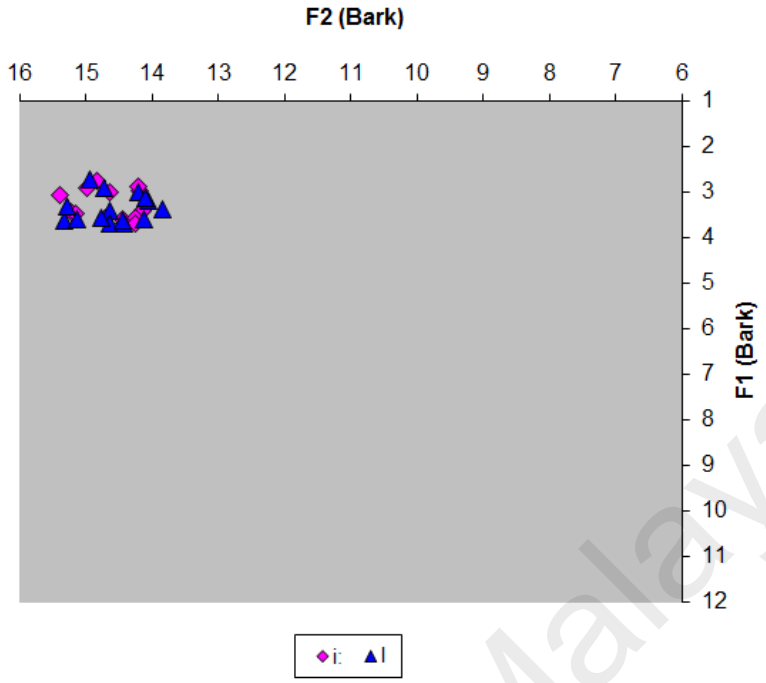

Figure 4.12: Scatter plot of MalE female speakers /ɪ/ and /iː/ vowels in *bVd* context

For the vowel pair /e/ and /æ/ in NigE and MalE, the Figures 4.13 to 4.16 shows the scatter plots for male and female speakers in *bVd* context. An investigation of the scatter plots shows contrast in the quality of this vowel pair, which indicates an overlapping distribution differences between the speakers of NigE and MalE in realizing the vowels. There is a divergence in the quality of these vowels produced by the speakers. Therefore, NigE and MalE speakers realize the vowel pair differently. This may be as a result of lack of /æ/ vowel in both Malaysian and Nigerian L1 making these varieties to pronounce it close to the nearest vowel in their language. This finding corresponds with the assertion of the Norm Orientation Hypothesis, since each category of respondents realized the vowel differently. Figures 4.13 and 4.15 of NigE speakers, however, show greater difference between the vowels, the speakers seem to have contrast in the realization of /e/ and /æ/. That is, there are categorical differences between the vowels indicating no overlaps in the

vowel pair as compared to MalE speakers, which shows an overlapping distribution between the vowels in Figures 4.14 and 4.16. In order to verify this observation, paired samples *t-test* were conducted and Table 4.6 summarizes the *t-test* results. As can be seen from the Table, the results confirm that there are significant differences between the two varieties in the realization of /e - æ/ vowel pair. For the NigE realization, the result reveals significant difference for the F1 and F2 values, ($t(14) = -13.50$, $p < 0.001$, $t(14) = 27.12$, $p < 0.001$), ($t(14) = -17.33$, $p < 0.001$, $t(14) = 7.93$, $p < 0.001$), indicating that the vowels were produced differently. While for the MalE realization, no significant difference was found between the F1 and F2 values. ($t(14) = -1.12$, $p < 0.05$; $t(14) = 1.68$, $p < 0.05$), ($t(14) = 0.38$, $p < 0.05$, $t(14) = 1.99$, $p < 0.05$). However, referring back to Figure 4.1 to 4.4 based on the examination of the whole formant plots, it reveals that there appears to have some differences in the realization of front vowel pair /e/ and /æ/ between male and female NigE and MalE speakers. While in Figures 4.1 and 4.3, there appeared to be differences in the realization of this vowel pair, the MalE speakers seemed to produce these vowels with conflation. Therefore, with a comparison of the scatter plots in Figures 4.13 to 4.16 for the vowel pair /e –æ/ in *bVd* context, it shows that while all NigE speakers differentiate between the front vowels, some overlaps is realized in the MalE speakers.

Table 4.6: t-test results of F1 and F2 values of /e - æ/ for vowels in *bVd* context

	Male NigE F1	Male NigE F2	Male MalE F1	Male MalE F2	Females NigE F1	Females NigE F2	Females MalE F1	Females MalE F2
df=	14	14	14	14	14	14	14	14
t=	-13.500*	27.121*	-1.123***	1.683***	-17.337*	7.935*	.376***	1.989***

(*: p < 0.001; **: p < 0.01; ***: p < 0.05…) df = 14, Two sample assuming equal variance, two tailed.

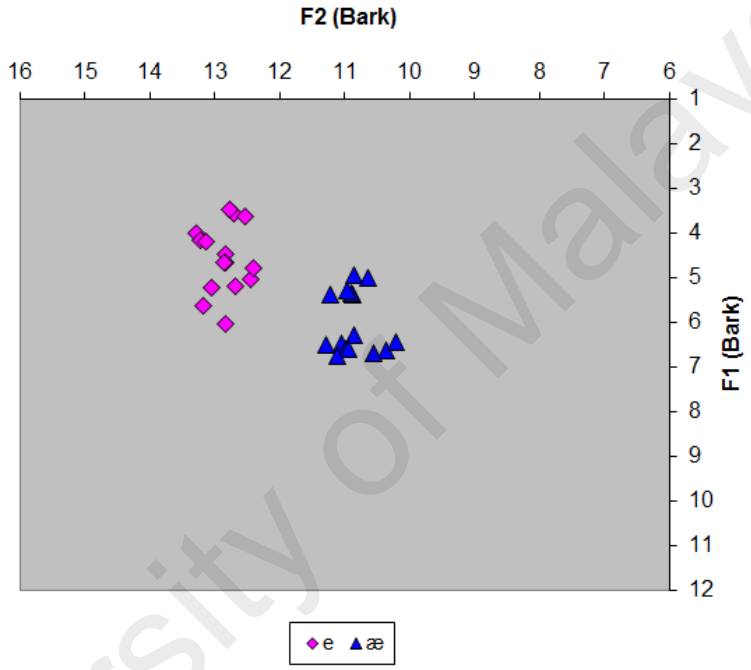

Figure 4.13: Scatter plot of NigE male speakers /e/ and /æ/ *bVd* context

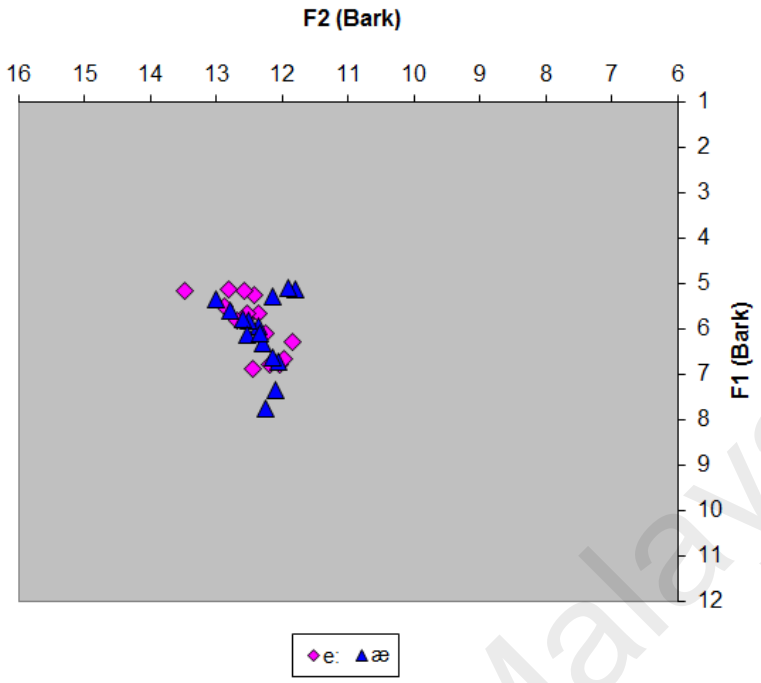

Figure 4.14: Scatter plot of MalE male speakers /e/ and /æ/ *bVd* context

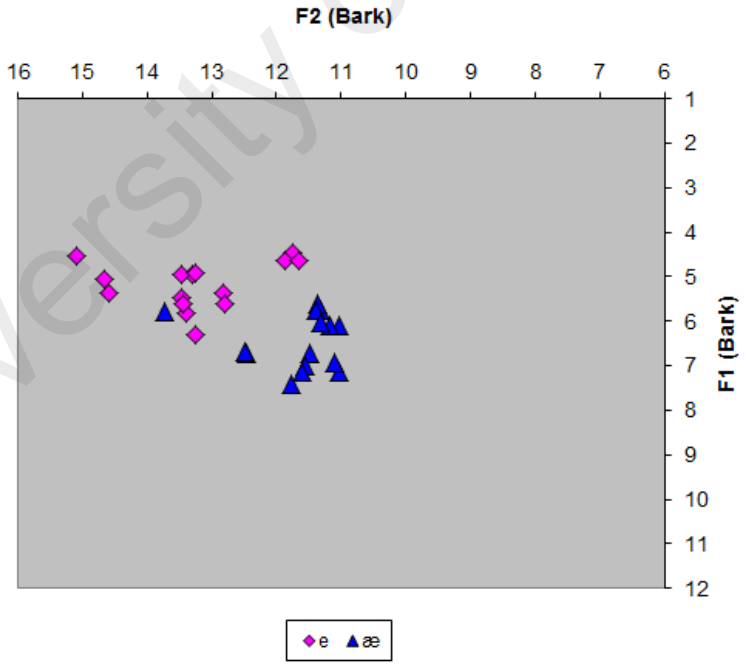

Figure 4.15: Scatter plot of NigE female speakers /e/ and /æ/ vowels *bVd* context

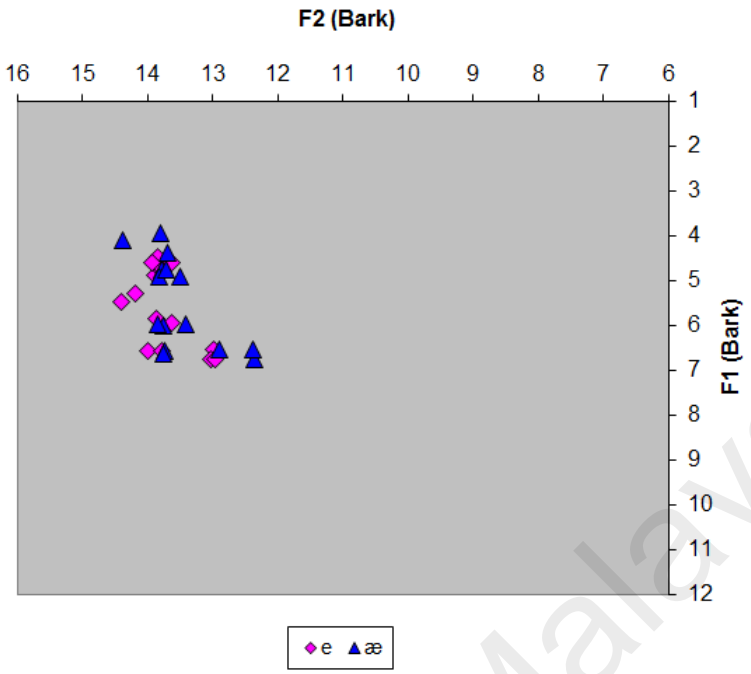

Figure 4.16: Scatter plot of MalE female speakers /e/ and /æ/ *bVd* context

Figures 4.17 to 4.20 indicate the scatter plots of /ʌ/ and /ɑː/ vowels produced by male and female NigE and MalE speakers in *bVd* context respectively. Table 4.7 is the result summary of *t-test* done for F1 and F2 values. Once more, the scatter plots somewhat showed the existence of overlaps in the realization of /ʌ/ and /ɑː/ vowels in NigE and MalE speakers. An examination of these in Figures 4.17 to 4.20 show the speakers produces /ʌ/ and /ɑː/ vowels closer to one another between all speakers. The values in Figure 4.19 as produced by females NigE indicate lack of categorical separation between these vowels. However, significant difference was found in paired *t-test* results conducted in Table 4.7 for both F1 and F2 values $t(14) = -2.25$, $p < 0.01$, $t(14) = -2.37$, $p < 0.01$), therefore females NigE speakers realized /ʌ/ and /ɑː/ vowels differently in terms of vowel height and degree of backness. An overlap is seen in Figure 4.18 for males NigE wherein the vowels were not

differentiated. This is established by the *t-test* result as no significant difference was found for both F1 and F2 values. ($t(11) = -0.65$, $p < 0.05$, $t(11) = 1.31$, $p < 0.05$).

For MalE speakers however, although there is still overlap seen between the vowels, some differences were found in terms of degree of retraction between /ʌ/ and /ɑː/ vowels realization. These vowels were realized differently in terms of F2 values. The *t-test* results confirm that no significant differences were found for both speakers in terms of their F1 values ($t(12) = -0.07$, $p < 0.05$, $t(12)$, $t(11) = 0.02$, $p < 0.05$), while significant differences were found between the F2 average values of the vowels. ($t(12) = 12.57$, $p < 0.001$, $t(11) = 2.83$, $p < 0.01$). However, referring back to Figure 4.1 to 4.4, based on the examination of the whole formant plots, it reveals that these vowels appeared to have been produced quite closer for both NigE and MalE speakers. In comparison with the scatter plots in Figures 4.17 to 4.20, some differences in the realization of /ʌ/ and /ɑː / vowels in *bVd* context for male and female in NigE and MalE speakers were seen. Therefore, while all the MalE speakers differentiate these vowels in terms of F2 values, an overlap is seen for the males NigE as no differences were realized between the two vowels for both F1 and F2. The females NigE did differentiate between these vowels as verified by the paired samples *t-test* result. This suggests that while all MalE differentiate only in their F2, the female NigE speakers did differentiate /ʌ/ and /ɑː/ in terms of vowel height and backness.

Table 4.7: t-test results of F1 and F2 values of /ʌ - ɑː/ for vowels in *bVd* context

	Male NigE F1	Male NigE F2	Male MalE F1	Male MalE F2	Females NigE F1	Females NigE F2	Females MalE F1	Females MalE F2
df=	11	11	12	12	14	14	11	11
t=	-.655***	1.306***	.067***	12.568*	-2.247**	-2.373**	.024***	2.835**

(*: p < 0.001; **: p < 0.01; ***: p < 0.05…) df = 14, 12, 11 Two sample, two tailed.

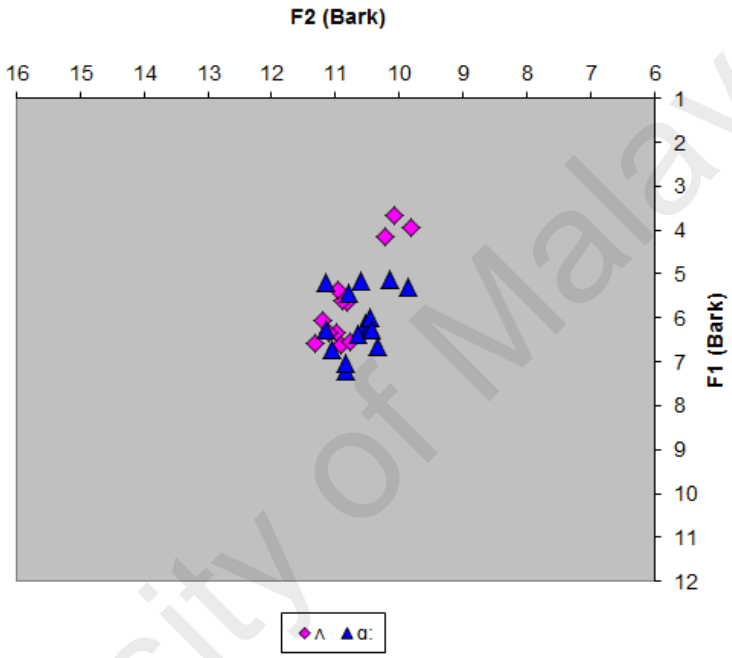

Figure 4.17: Scatter plot of NigE male speakers /ʌ/ and /ɑː/ *bVd* context

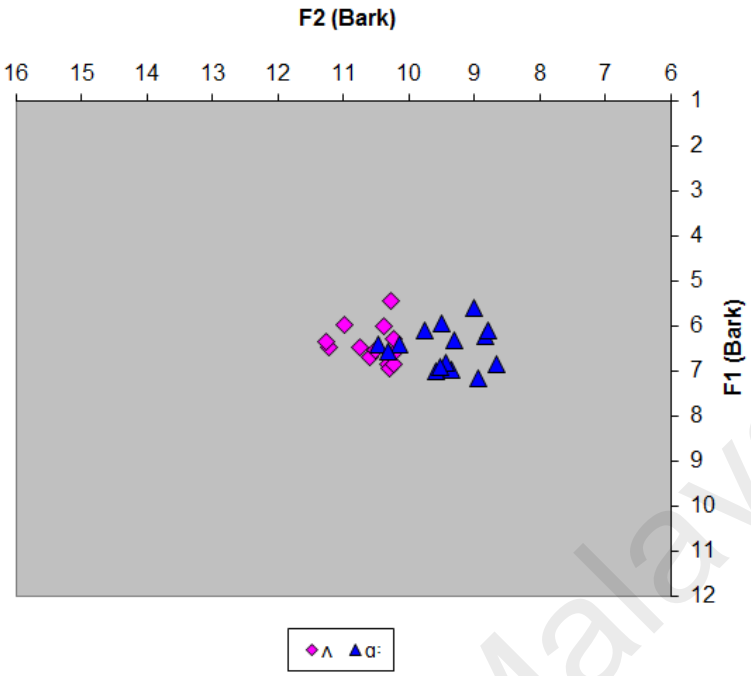

Figure 4.18: Scatter plot of MalE male speakers /ʌ/ and /ɑː/ vowels *bVd* context

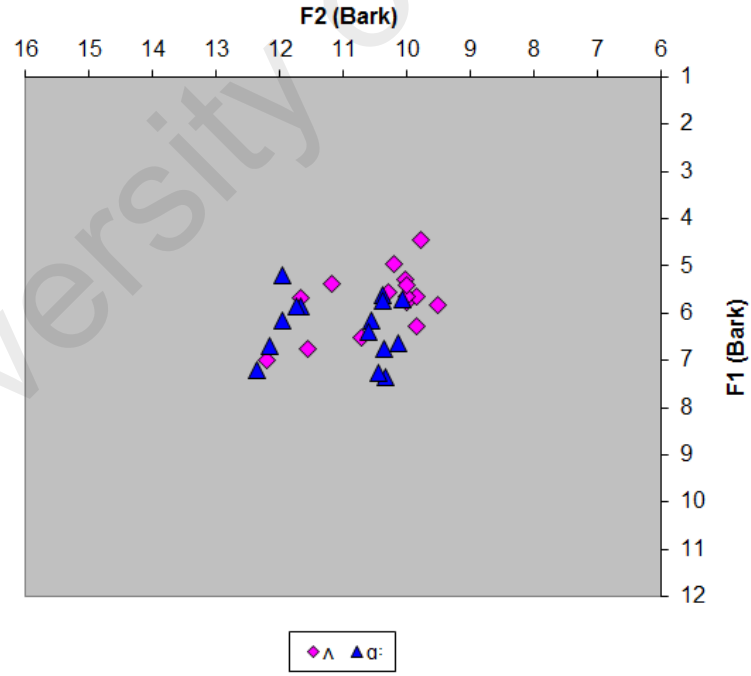

Figure 4.19: Scatter plot of NigE female speakers /ʌ/ and /ɑː/ *bVd* context

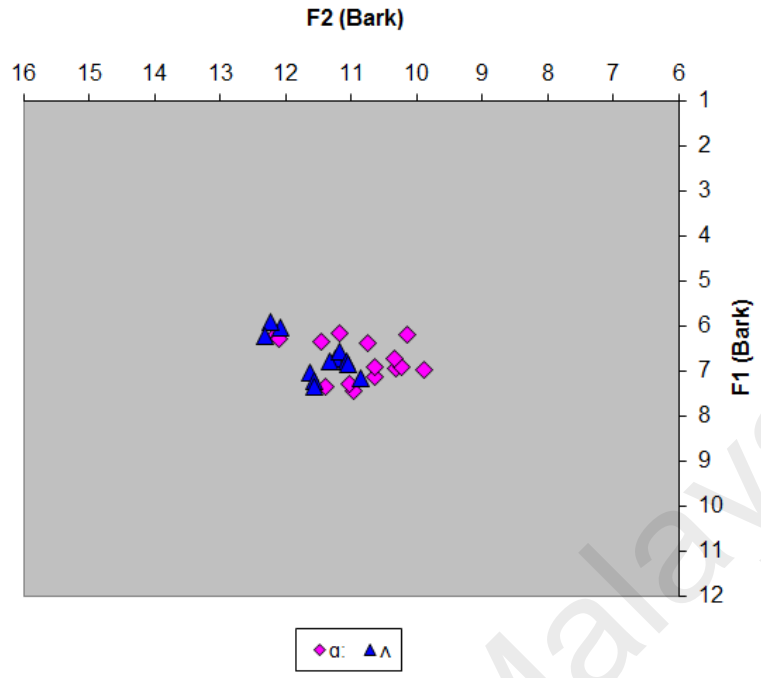

Figure 4.20: Scatter plot of MalE female speakers /ʌ/ and /ɑː/ vowels *bVd* context

Figures 4.21 to 4.24 are the scatter plots for /ɒ/ and /ɔː/ vowels realization by NigE and MalE speakers. Table 4.8 provides the summary of the *t-test* results that were done for the F1 and F2 values of the paired vowels produced by all the speakers. These Figures show a great deal of overlaps between the vowels. As examined from the Figures, the scatter plots showed an overlaps between all the speakers for /ɒ/ and /ɔː/ vowels realization. However, females NigE paired *t-test* results, maintained that there is a significant difference between the F1 values ($t(14) = 5.30$, $p < 0.01$), but not for the F2 ($t(14) = 0.60$, $p < 0.05$). For the males NigE and females MalE /ɒ/ and /ɔː/, paired *t-test* result reveals that no significant differences were found for both F1 and F2 values indicating that these vowels were produced almost similar to one another ($t(14) = 0.55$, $p < 0.05$, $t(14) = 1.19$, $p < 0.05$), $t(14) = 0.75$, $p < 0.05$, $t(14) = 1.34$, $p < 0.05$). The *t-test* results in Table 4.8 for males MalE

concludes that there is a significant difference between the F1 and F2 values ($t(14) = 5.40$, $p < 0.001$, $t(14) = 2.40$, $p < 0.01$), indicating these vowels were produced differently.

The conclusion for /ɒ/ and /ɔː/ vowels suggests that in terms of vowel quality, there are some distinctions between this vowel pair in NigE and MalE. For male NigE and female MalE speakers, there is no distinction between /ɒ/ and /ɔː/ vowels realization, but there was a difference in terms of F1 for the female NigE speakers. The males MalE did maintain some overlaps in the vowel pair, but still the paired *t-test* result confirms that the male speakers' realization, statistical differences were found for both F1 and F2 average values. For the overall formant plots of /ɒ/ and/ɔː/ vowels in Figures 4.1 to 4.4, show that NigE and MalE speakers realize this vowel pair almost similar. The scatter plots in Figures 4.21 to.4.24 show all the speakers had realization of this vowel pair that overlapped. Yet, the *t-test* result confirms some differences in the realization of these vowels between the speakers.

Table 4.8: t-test results of F1 and F2 values of /ɒ - ɔː/ for vowels in *bVd* context

	Male NigE F1	Male NigE F2	Male MalE F1	Male MalE F2	Females NigE F1	Females NigE F2	Females MalE F1	Females MalE F2
df=	14	14	14	14	14	14	14	14
t=	.548***	1.189***	5.405*	2. 403**	5.297*	-.595***	.746***	1.339***

(*: p < 0.001; **: p < 0.01; ***: p < 0.05…) df = 14, Two sample assuming equal variance, two tailed.

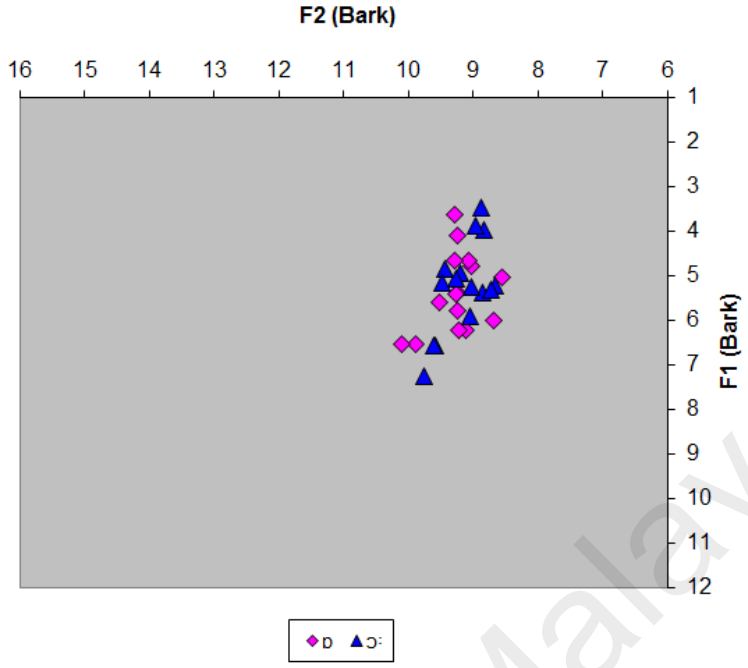

Figure 4.21: Scatter plot of NigE male speakers /ɒ/ and /ɔː/ *bVd* context

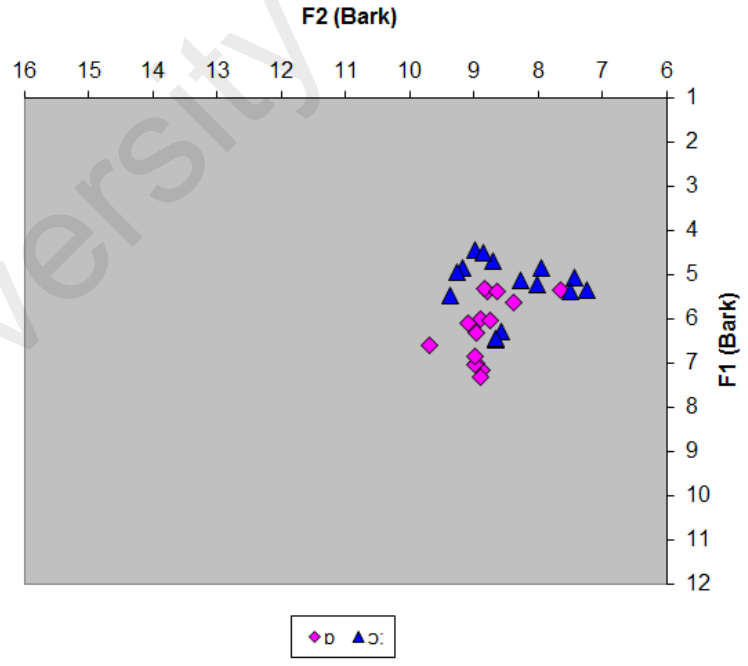

Figure 4.22: Scatter plot of MalE male speakers /ɒ/ and /ɔː/ *bVd* context

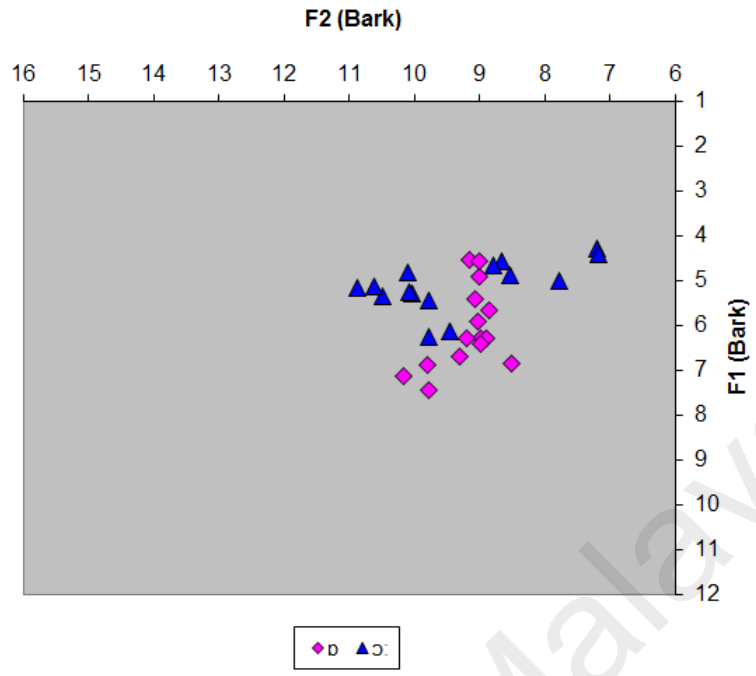

Figure 4.23: Scatter plot of NigE female speakers /ɒ/ and /ɔː/ *bVd* context

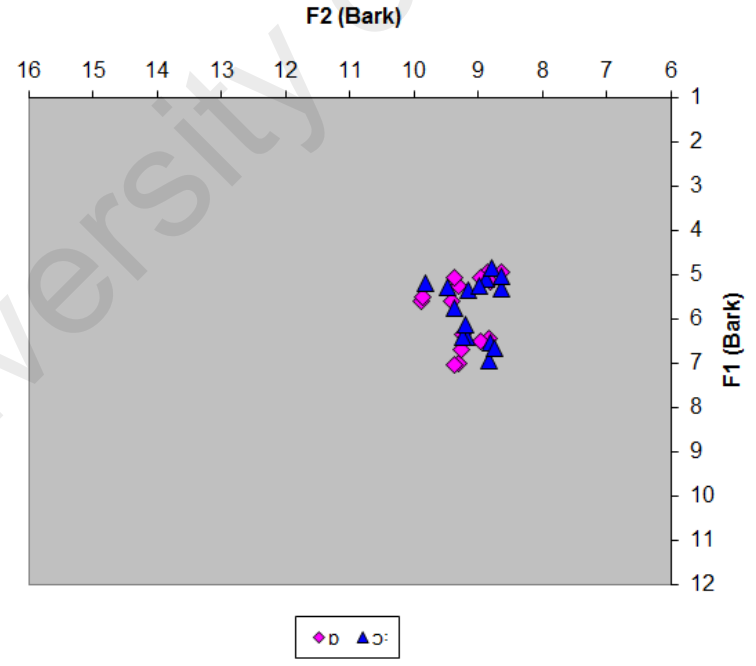

Figure 4.24: Scatter plot of MalE female speakers /ɒ/ and /ɔː/ *bVd* context

The Figures 4.25 to 4.28 indicate the scatter plots of /ʊ/ and /uː/ vowels for NigE and MalE speakers and Table 4.9 summarizes the *t-test* results for the F1 and F2 values. Based on the illustrated Figures, it is seen that Figures 4.25 and 4.27 for NigE speakers show a clear-cut difference, suggesting there is categorical separation between /ʊ/ and /uː/ vowels. The *t-test* results conclude that significant differences were found for F1 and F2 values for males and females in NigE ($t(14) = 3.61$, $p < 0.01$, $t(14) = 2.47$, $p < 0.01$), $t(14) = 2.17$, $p < 0.01$, $t(14) = 8.79$, $p < 0.001$). Therefore, these vowels were produced differently for both groups of speakers in terms of height, backness and lip rounding. On the contrary, the females MalE *t-test* result shows no significant difference between /ʊ/ and /uː/ vowels for F1 and F2 values ($t(14) = 0.16$, $p < 0.05$, $t(14) = 1.57$, $p < 0.05$). Contrary to this, the *t-test* results for the male MalE speakers reveal significant differences for F1 and F2 values ($t(14) = 2.79$, $p < 0.01$, $t(14) = 2.96$, $p < 0.01$). Whereas the scatter plots in Figures 4.26 and 4.28 realization for females' indicate an overlaps between the vowels, there is a tendency of conflation between the vowel pair. Overall formant plots in Figures 4.1 – 4.4 show that NigE speakers did differentiate /ʊ/ and /uː/ vowels, and thus the scatter plots figures confirm this.

Table 4.9: t-test results of F1 and F2 values of /ʊ - uː/ for vowels in *bVd* context

	Male NigE F1	Male NigE F2	Male MalE F1	Male MalE F2	Females NigE F1	Females NigE F2	Females MalE F1	Females MalE F2
df=	14	14	14	14	14	14	14	14
t=	3.607**	2.467**	2.790**	2.961**	2.616**	8.782*	.167***	1.571***

(*: p < 0.001; **: p < 0.01; ***: p < 0.05…) df = 14, Two sample assuming equal variance, two tailed

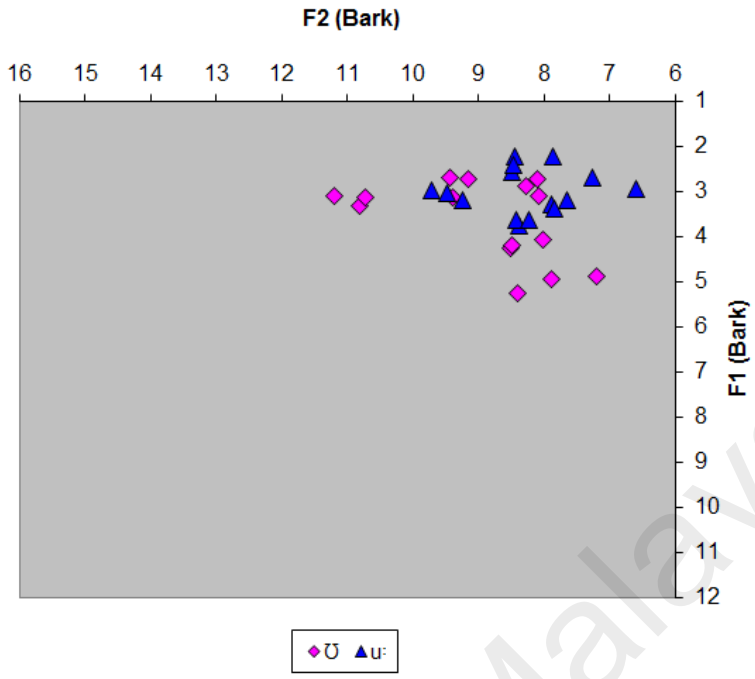

Figure 4.25: Scatter plot of NigE male speakers /ʊ/ and /uː/ *bVd* context

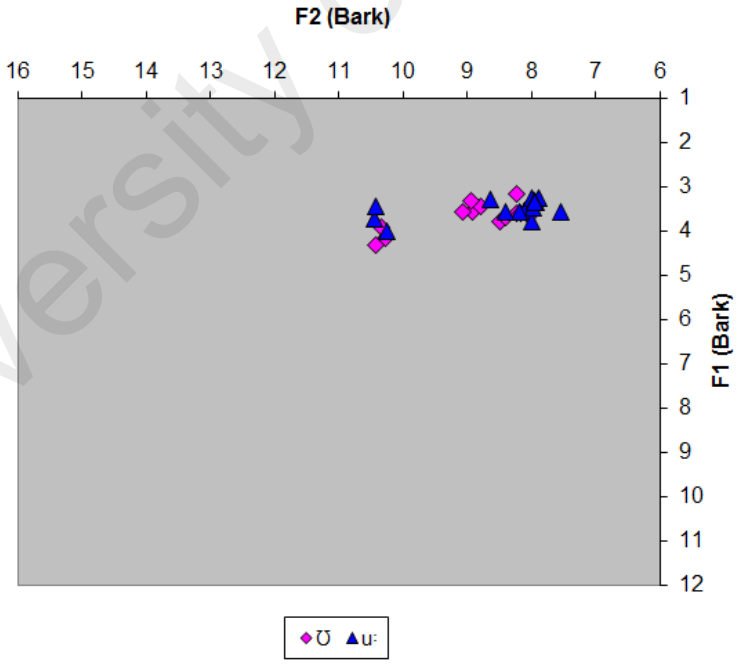

Figure 4.26: Scatter plot of MalE male speakers /ʊ/ and /uː/ *bVd* context

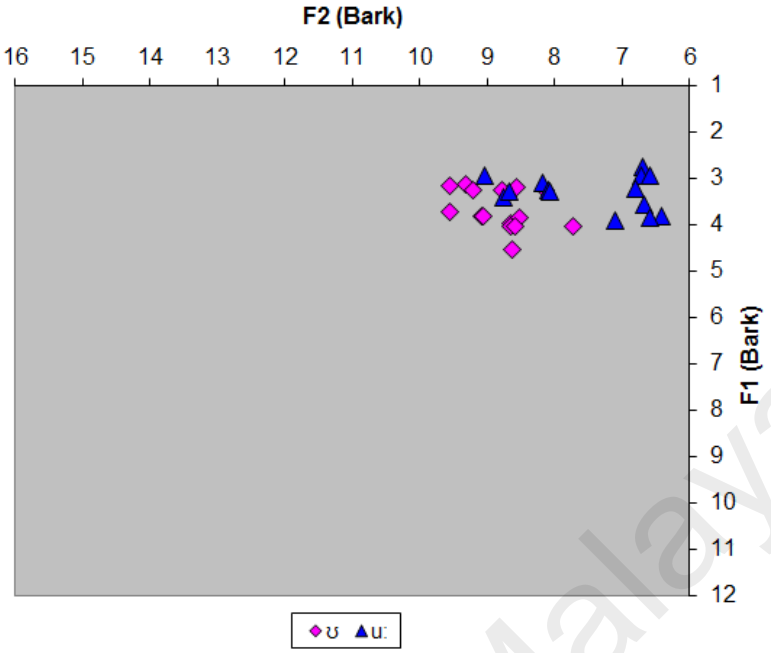

Figure 4.27: Scatter plot of NigE female speakers /ʊ/ and uː/ *bVd* context

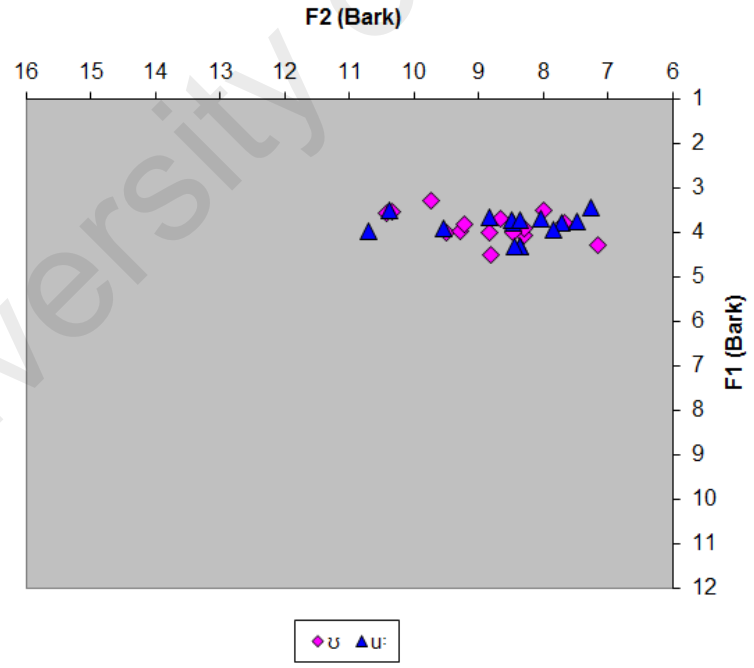

Figure 4.28: Scatter plot of MalE female speakers /ʊ/ and /uː/ *bVd* context

In *hVd* context, the figures 4.29 to 4.32 show the scatter plots of /ɪ/ and /iː/ vowel pair for male and female speakers in NigE and MalE. Table 4.10 summarizes the results for *t-test* done for all speakers' F1 and F2 values. From the investigation of the scatter plots, it is demonstrated that, there is generally an overlap between /ɪ - iː/ vowels pair realization for all speakers. Based on the examination of the vowel pair in the Figures it shows that the scatter plots of /ɪ/ and /iː/ in NigE and MalE are quite similar, suggesting that they were produced similarly to each other and tendencies to merge as one vowel sound. The *t-test* done for the F1 and F2 values for the vowel pair confirms that there are no significant differences in the realization of the vowel pair for all speakers ($t(14) = 0.49$, $p < 0.05$, $t(14) = -1.37$, $p < 0.05$), $t(12) = 0.98$, $p < 0.05$, $t(12) = -1.43$ $p < 0.05$), $t(10) = 0.77$, $p < 0.05$, $t(10) = 0.12$, $p < 0.05$). This implies that, statistical differences were not found for F1 and F2 values. However, the females NigE *t-test* result shows significant differences between the F1 and F2 values ($t(14) = 2.37$, $p < 0.01$, $t(14) = -3.17$, $p < 0.01$). Quantitatively, F1 values are inversely proportional to vowel height; F2 values are inversely proportional to backness. Therefore, the females did differentiate /ɪ/ and /iː/ vowels in terms of frontness and vowel height. In contrast, no differences were observed in MalE female speakers.

In both contexts, it is suggested that NigE speakers do produce the /ɪ/ and /iː/ vowels slightly different from one another particularly the female speakers, differences were realized in their F1 and F2. For MalE speakers, it implies that these vowels were realized similarly to each other. The present finding is in concordance with Pillai et al. (2010) and Tan and Low (2010). On NigE findings, although previous studies were on the impressionist basis as Bobda (2000a), Jowitt (1991) and Gut (2004) maintained that these

vowels were merged. Also on CamE, Bobda (2000c) claims that /ɪ, iː/ vowels were merged as one. This presents finding differs with previous studies on NigE.

Table 4.10: t-test results of F1 and F2 values of /ɪ - iː/ for vowels in *hVd* context

	Male NigE F1	Male NigE F2	Male MalE F1	Male MalE F2	Females NigE F1	Females NigE F2	Females MalE F1	Females MalE F2
df=	14	14	12	12	14	14	10	10
t=	.488***	-1.368***	.982***	-1.429***	2.373**	-3.168**	.769***	.117***

(*: p < 0.001; **: p < 0.01; ***: p < 0.05…) df = 14, Two sample assuming equal variance, two tailed.

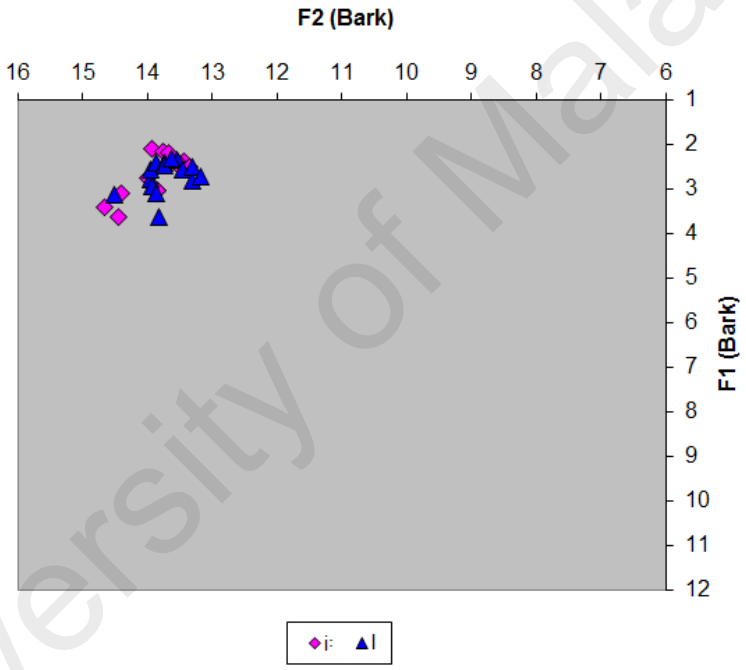

Figure 4.29: Scatter plot of NigE male speakers' /ɪ/ and /iː/ vowels in *hVd* context

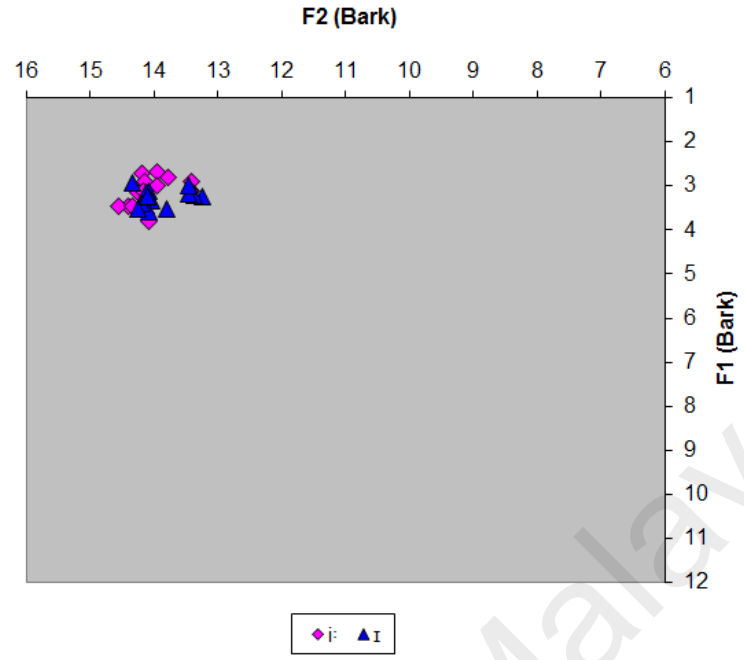

Figure 4.30: Scatter plot of MalE male speakers' /ɪ/ and /iː/ vowels in *hVd* context

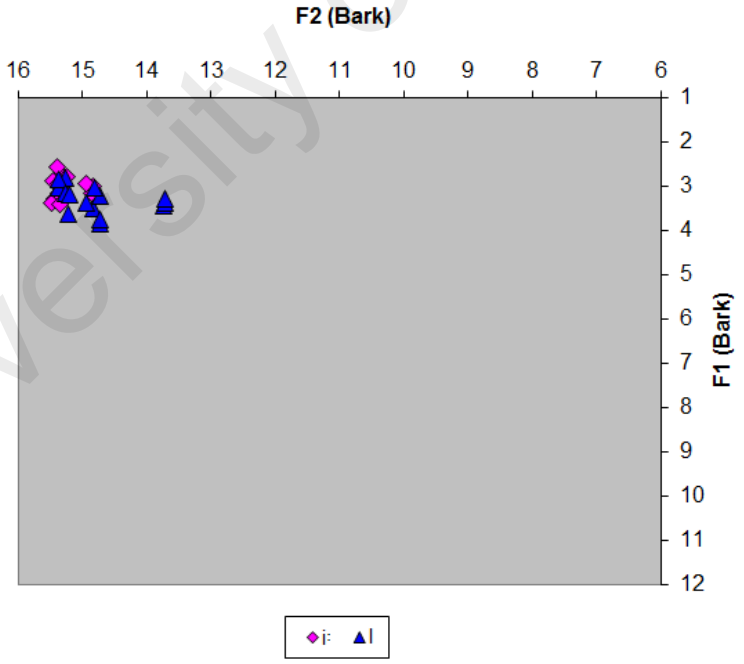

Figure 4.31: Scatter plot of NigE female speakers' /ɪ/ and /iː/ vowels in *hVd* context

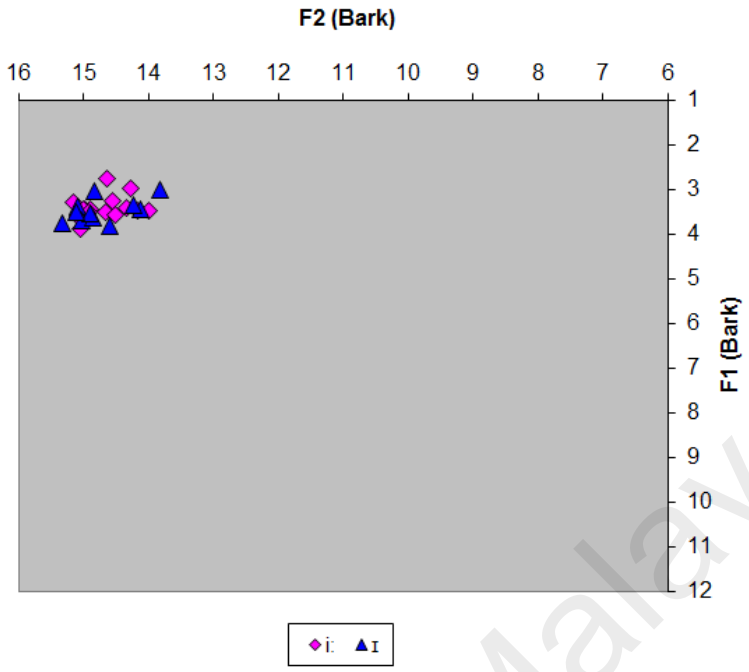

Figure 4.32: Scatter plot of MalE female speakers' /ɪ/ and /iː/ vowels in *hVd* context

Figures 4.33 to 4.36 show the scatter plots of /e/ and /æ/ vowels produced by male and female NigE and MalE speakers in *hVd* context. On the distribution of these individual vowels, it is clear from the Figures that there is a lot of categorical separation between the vowels meaning, though, there appears to be a significant overlaps in Figures 4.34 and 4.36 of MalE speakers. Based on the scatter plots examination in Figures 4.33 and 4.35 of male and female NigE speakers, there is a great deal of separations between /e/ and /æ/ vowels indicating difference in the quality of these vowels. To verify this, *t-test* was conducted where the F1 values of /e/ were compared with F1 values of /æ/ and F2 values of /e/ were compared with F2 values of /æ/ respectively. The average formant frequencies and *t-test* results implied that, /e/ had a higher realization than /æ/ but is less fronted in NigE. The result in Table 4.11 reveals a highly significant difference in F1 and F2 values for both speakers in NigE ($t(14) = -7.87$, $p < 0.001$, $t(14) = 15.15$, $p < 0.001$), $t(14) = -7.99$, $p <$

0.001, $t(14) = 10.32$, $p < 0.001$). For MalE speakers, the *t-test* result shows that MalE female speakers' /e/ and /æ/ vowels are conflated. The results for the realization of /e/ and /æ/ vowels in MalE confirms Tan (2011) and Pillai et al. (2010) findings and meanwhile, in MalE scatter plots examination, even though there is little marginal separation between the vowels, an overlaps are specifically realized for the male speakers. The *t-test* result for males MalE indicated that there is a significant difference between the F1 and F2 values ($t(14) = -3.81$, $p < 0.01$, $t(14) = 6.33$, $p < 0.001$), while the females result shows no difference in both F1 and F2 average values ($t(14) = 1.76$, $p < 0.05$, $t(14) = 0.48$, $p < 0.05$). With these, it should be concluded that both male and female NigE speakers do produce /e/ and /æ/ vowels differently in both contexts. Even though these vowels were produced differently from one another, it should be acknowledged that, they have different quality. For males MalE, these vowels were realized with no difference in terms of their F1 and F2.

Table 4.11: t-test results of F1 and F2 values for /e - æ/ vowels in *hVd* context

	Male NigE F1	Male NigE F2	Male MalE F1	Male MalE F2	Females NigE F1	Females NigE F2	Females MalE F1	Females MalE F2
df=	14	14	14	14	14	14	14	14
t=	-7.873*	15.153*	-3.809**	6.332*	-7.993*	10.317*	1.764***	.484***

(*: p < 0.001; **: p < 0.01; ***: p < 0.05…) df = 14, Two sample assuming equal variance, two tailed.

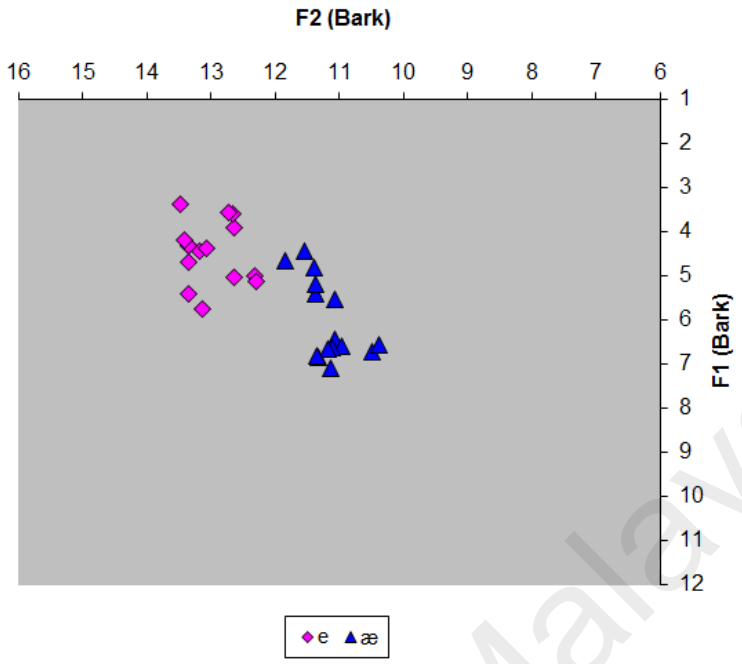

Figure 4.33: Scatter plot of NigE male speakers' /e/ and /æ/ vowels in *hVd* context

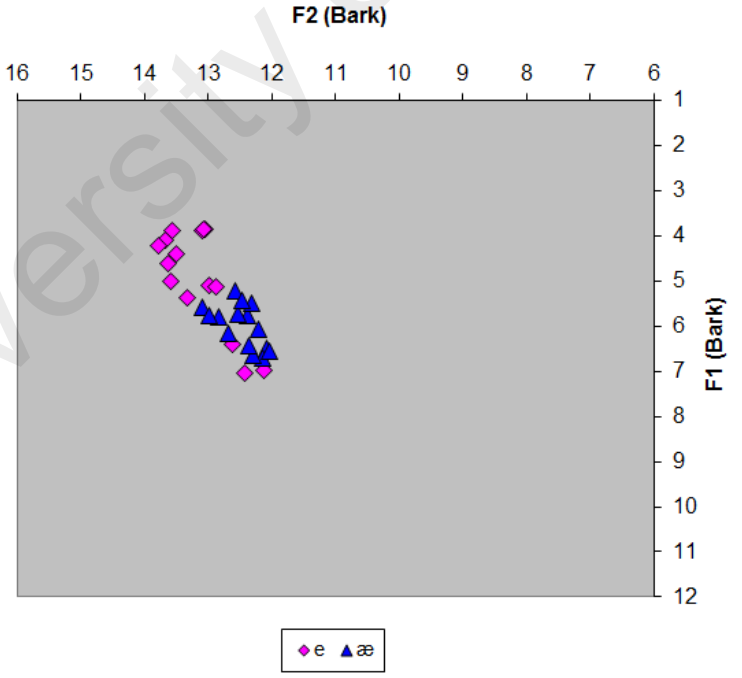

Figure 4.34: Scatter plot of MalE male speakers' /e/ and /æ/ vowels in *hVd* context

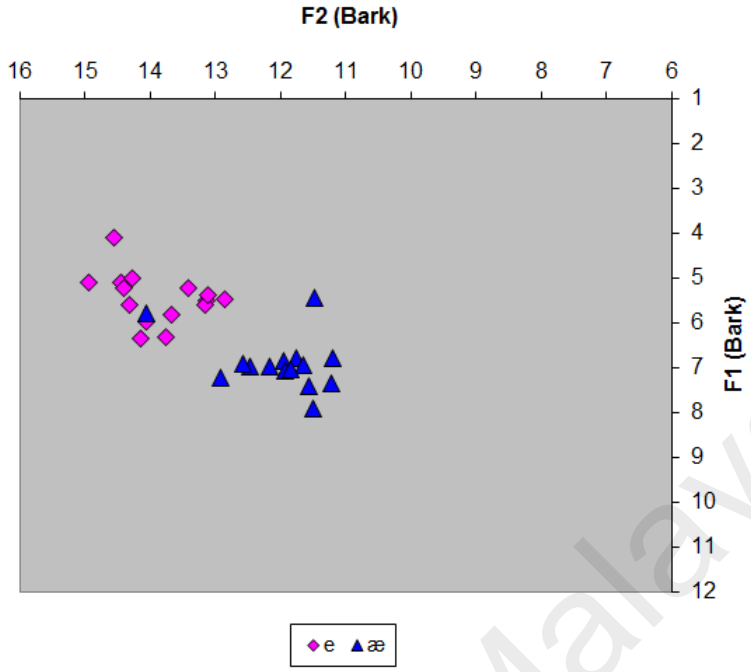

Figure 4.35: Scatter plot of NigE female speakers' /e/ and /æ/ vowels in *hVd* context

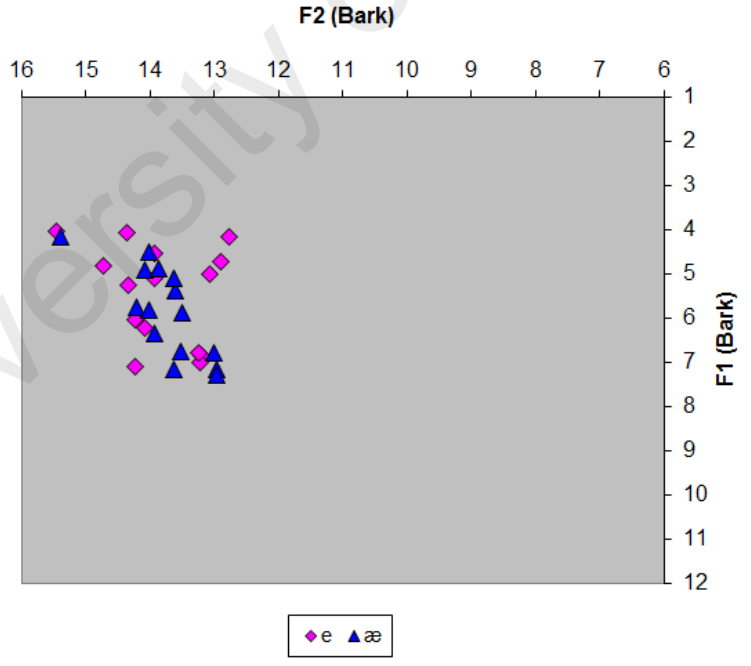

Figure 4.36: Scatter plot of MalE female speakers' /e/ and /æ/ vowels in *hVd* context

The /ʌ/ and /ɑː/ vowels in Figures 4.45 to 4.48 show the scatter plots of male and female NigE and MalE speakers' distribution in *hVd* context. Based on the examination of the Figures, it appears that there is a dispersion of /ʌ/ and /ɑː/ vowels for all the speakers in NigE and MalE. The Figure 4.45 of males NigE shows a little overlap between the vowels, while Figure 4.47 for females' vowels shows categorical separation indicating a higher degree of variation between the vowels. Table 4.12 summarizes the *t-test* results, which concludes that in NigE, no significant difference was found in the F1 average values of /ʌ/ and /ɑː/ vowels ($t(10) = -0.72$, $p < 0.05$; $t(10) = -1.45$, $p < 0.05$), signifying similar height position of the vowels in vowel space. Conversely, a significant difference was found between the F2 average values of /ʌ/ and /ɑː/ vowels ($t(10) = -2.57$, $p < 0.01$; $t(10) = -4.94$, $p < 0.01$). The Figures 4.46 and 4.48 for males and females MalE seemed to differentiate these vowels, however slight overlaps is seen in the female's distribution. Verification of the paired samples *t-test* result confirms that the MalE males and females have significant differences in the F1 average values ($t(5) = 2.94$, $p < 0.01$; $t(5) = 2.73$, $p < 0.01$) and thus, suggesting a similar front position of /ʌ - ɑː/ vowels in the vowel space. This shows that in terms of vowel height, the vowels were differentiated. For the F2 values, however, no significant difference was found between the two vowels for group of speakers ($t(5) = 1.72$, $p < 0.05$; $t(5) = 2.27$, $p < 0.05$). In line with previous studies, the present findings reveal a remarkable concordia and variation. The finding in this research is in agreement with Tan's (2011) in terms of F1, but differs in F2. In Deterding's (1997) findings of British English, these vowels were not differentiated in terms of quality, but differentiated predominantly in length.

Table 4.12: t-test results of F1 and F2 values for /ʌ - ɑː/ vowels in *hVd* context

	Male NigE F1	Male NigE F2	Male MalE F1	Male MalE F2	Females NigE F1	Females NigE F2	Females MalE F1	Females MalE F2
df=	10	10	5	5	10	10	5	5
t=	-.716***	-2.571**	2.941**	1.716***	-1.449***	-4.939**	2.727**	2.265***

(*: p < 0.001; **: p < 0.05; ***: p < 0.05…) df = 10, 5, Two sample two tailed

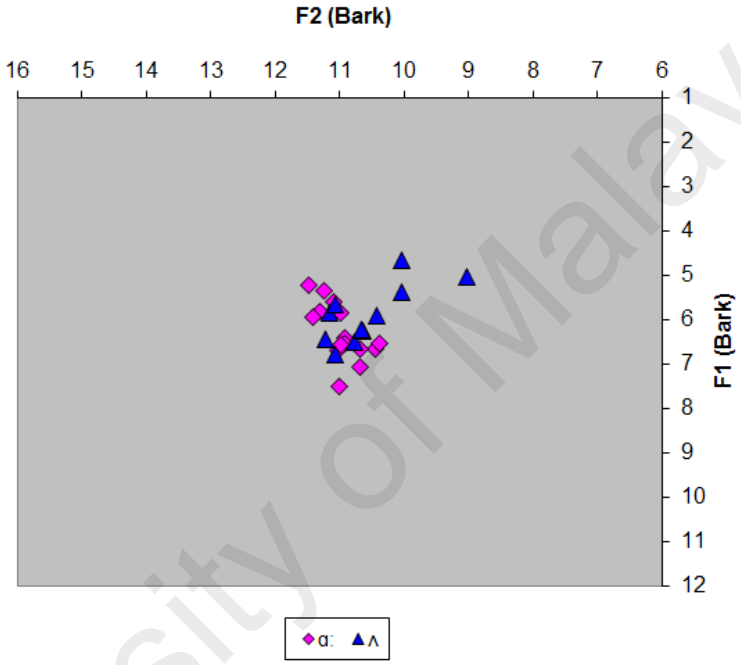

Figure 4.37: Scatter plot of NigE male speakers /ʌ/ and /ɑː/ vowels in *hVd* context

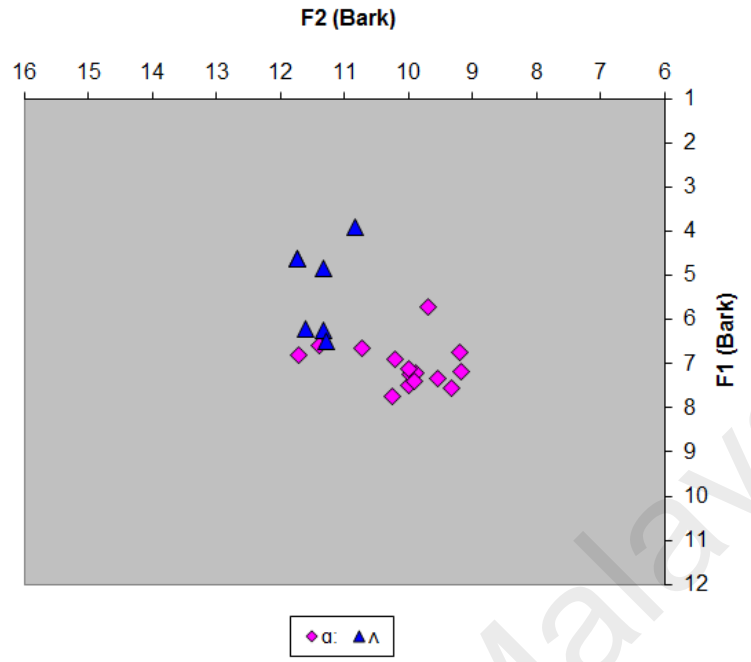

Figure 4.38: Scatter plot of MalE male speakers /ʌ/ and /ɑː/ vowels in *hVd* context

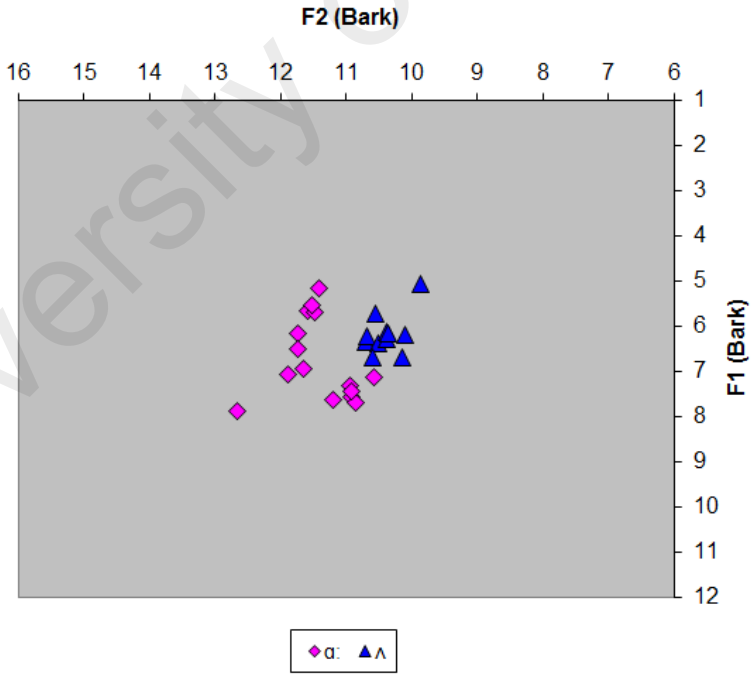

Figure 4.39: Scatter plot of NigE female speakers /ʌ/ and /ɑː/ vowels in *hVd* context

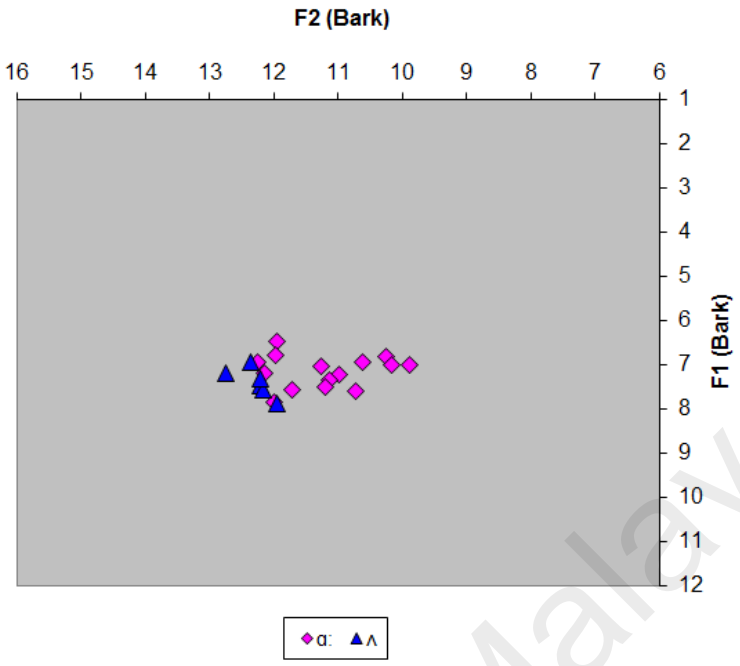

Figure 4.40: Scatter plot of MalE female speakers /ʌ/ and /ɑː/ vowels in *hVd* context

For /ɒ/ and /ɔː/ vowels in *hVd* context, Figures 4.49 to 4.52 show females and males NigE and MalE vowel's distribution. It indicates that the speakers realize the vowel pair in a similar way as an overlapped is seen between the vowels. Table 4.13 summarizes the *t-test* results and concludes that no differences were found in the average F1 and F2 values for male's NigE and MalE speakers and female NigE speakers. The *t-test* results for males' NigE is ($t(14) = 0.64$, $p < 0.05$; $t(14) = 1.99$, $p < 0.05$), and females' NigE ($t(14) = -0.41$, $p < 0.05$; $t(14) = 0.56$, $p < 0.05$, while for male MalE speaker's F1 and F2 $t(12) = 0.96$, $p < 0.05$; $t(12) = 1.\ 02$ $p < 0.05$). However, except for females MalE *t-test* result in which a significant difference was found in F1 values ($t(14) = -2.31$, $p < 0.01$), but not in F2 ($t(14) = 1.87$, $p < 0.05$). The NigE female speakers realize the vowels slightly lower compared to their males counterparts. In Tan and Low's (2010) findings, no distinction between the vowels for female speakers was observed, while some differences in terms of vowel height

by males were conspicuous. The finding in this research contradicts Tan and Low's findings for both females and males.

Table 4.13: t-test results of F1 and F2 values for /ɒ - ɔː/ vowels in *hVd* context

	Male NigE F1	Male NigE F2	Male MalE F1	Male MalE F2	Females NigE F1	Females NigE F2	Females MalE F1	Females MalE F2
df=	14	14	14	14	12	12	14	14
t=	.639***	1.991***	-.409***	.563***	.957***	1.018***	-2.315**	1.872***

(*: p < 0.001; **: p < 0.01; ***: p < 0.05…) df = 14, Two sample assuming equal variance, two tailed.

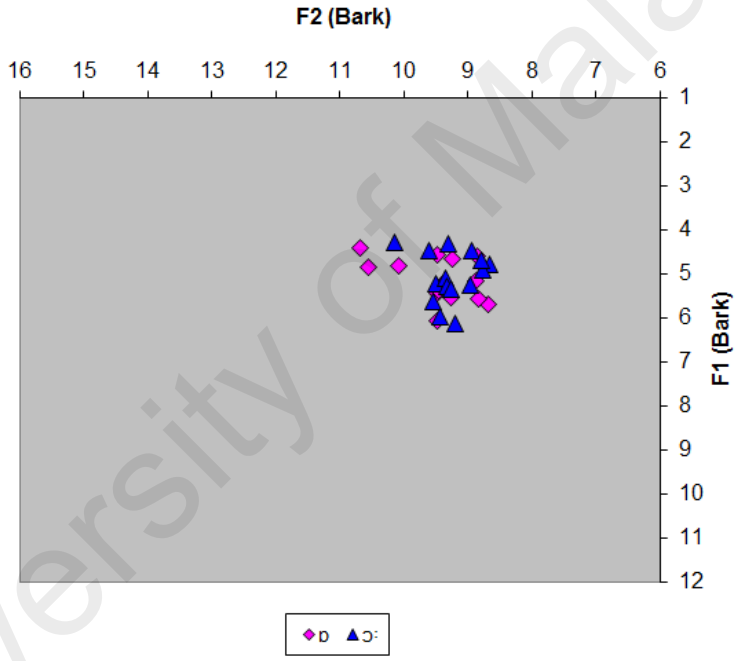

Figure 4.41: Scatter plot of NigE male speakers' /ɒ/ and /ɔː/ vowels in *hVd* context

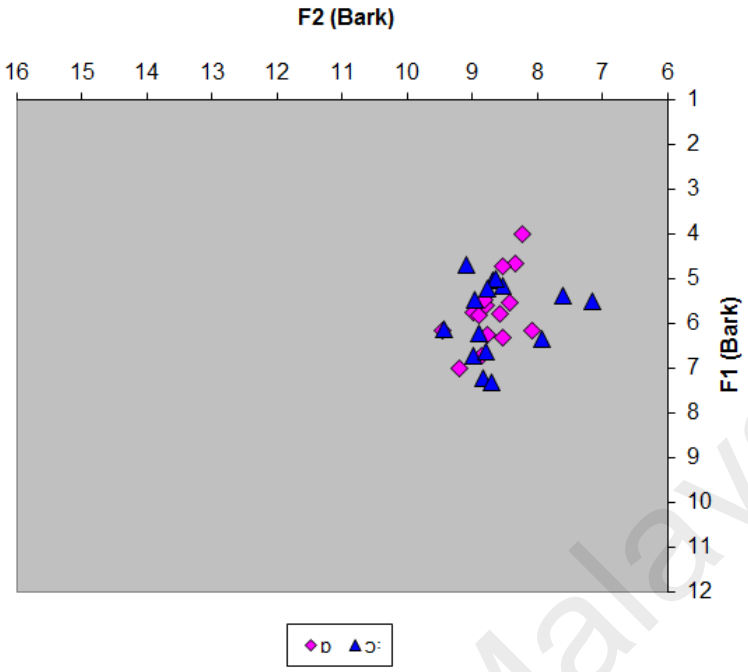

Figure 4.42: Scatter plot of MalE male speakers' /ɒ/ and /ɔː/ vowels in *hVd* context

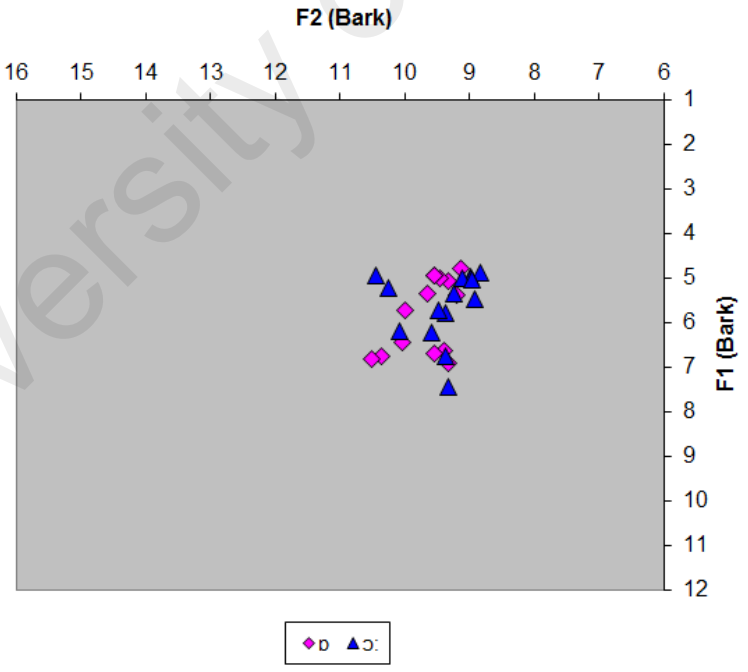

Figure 4.43: Scatter plot of NigE female speakers' /ɒ/ and /ɔː/ vowels in *hVd* context

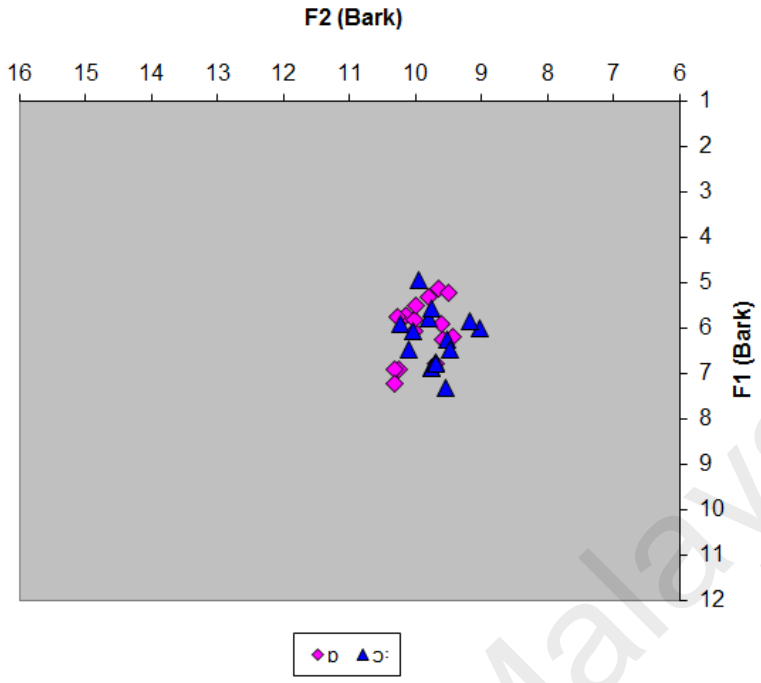

Figure 4.44: Scatter plot of MalE female speakers' /ɒ/ and /ɔː/ vowels in *hVd* context

However, the /ʊ/ and /uː/ vowel pairs in Figures 4.53 to 4.56 of NigE display some degree of overlap in the realization of these vowel pairs for both NigE and MalE. Table 4.14 gives a summary of t-test results of /ʊ/ and /uː/ vowel pair that was done. No significant differences were seen in males NigE and male and female MalE speakers' realization of /ʊ/ and /uː/ vowels ($t(13) = 0.48$ $p < 0.05$; $t(13) = 0.22$, $p < 0.05$), $t(12) = -1.14$, $p < 0.05$; $t(12) = 2.14$ $p < 0.05$). While females NigE /ʊ/ and /uː/ realization has significant differences in their F2 average values ($t(14) = 2.23$, $p < 0.01$), not for F1 values ($t(14) = -1.91$, $p < 0.05$).

Table 4.14: t-test results of F1 and F2 values for /ʊ - uː/ vowels in *hVd* context

	Male NigE F1	Male NigE F2	Male MalE F1	Male MalE F2	Females NigE F1	Females NigE F2	Females MalE F1	Females MalE F2
df=	13	13	12	12	14	14	14	14
t=	-.484***	.224***	-1.145***	2.140***	-1.913***	2.235**	1.989***	.476***

(*: p < 0.001; **: p < 0.01; ***: p < 0.05…) df = 14, Two sample assuming equal variance, two tailed.

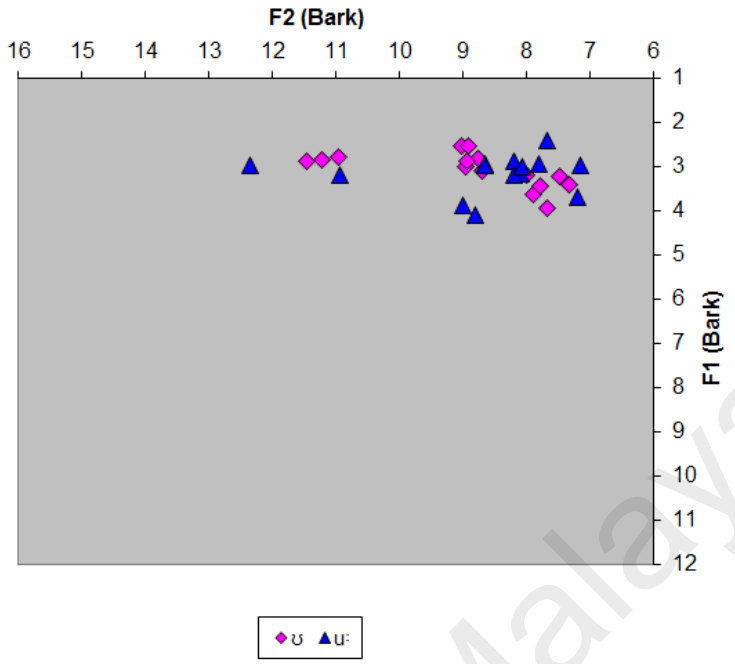

Figure 4.45: Scatter plot of NigE male speakers' /ʊ/ and /uː/ vowels in *hVd* context

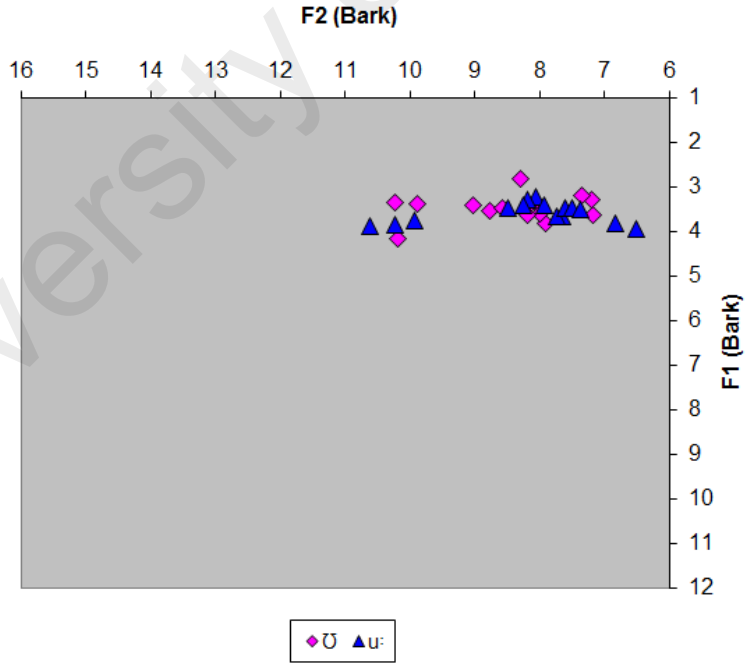

Figure 4.46: Scatter plot of MalE male speakers /ʊ/ and /uː/ vowels in *hVd* context

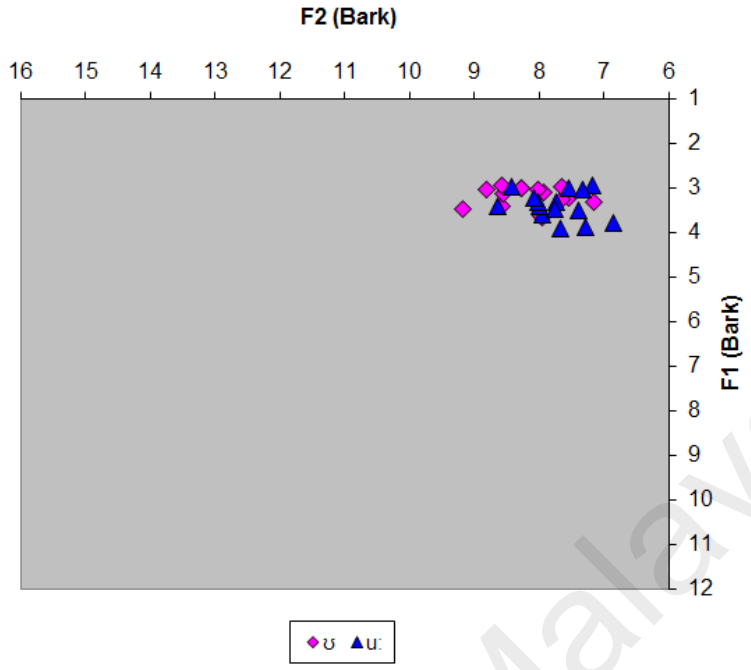

Figure 4.47: Scatter plot of NigE female speakers' /ʊ/ and /uː/ vowels in *hVd* context

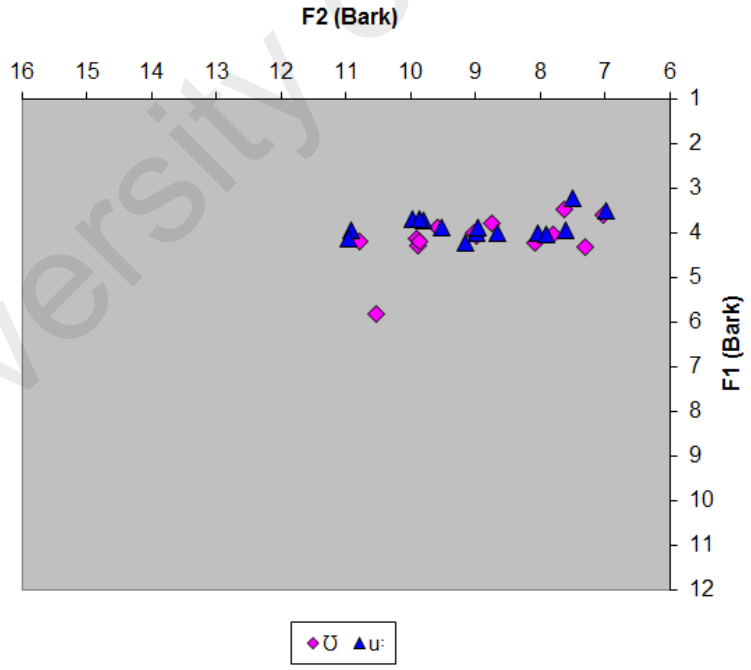

Figure 4.48: Scatter plot of MalE female speakers' /ʊ/ and /uː/ vowels in *hVd* context

However, separate post-hoc tests were conducted for the *t-tests* of vowels duration and quality to reduce the chance of type 1 error. The Least Significant Difference (LSD) post-hoc analyses showed the mean difference is significant. In relation to this finding, Table 4.15 listed the summary of the differences found between the vowel quality in NigE and MalE for the two contexts *bVd* and *hVd*.

Table 4.15: Summary of difference in NigE and MalE vowel contrast

	Sounds	NigE	MalE
bVd context		Vowels produced by male occupy less vowel space.	Vowel occupied less vowel space in the vowel plots.
	/ɪ, iː/	F1 not differentiated, but differentiated in F2.	F2 not differentiated by both speakers, F1 differentiated by males.
	/e, æ/	Differentiated all by speakers	Not differentiated in F1 and F2.
	/ʌ, ɑː/	F1 and F2 differentiated only by female speakers.	Differentiation in F2 by both speakers, not in F1.
	/ɒ, ɔː/	Difference in F1 for females only not for F2.	Not differentiated by female speakers' inF1 and F2.
	/ʊ, uː/	Differentiated by both speakers**.**	Not differentiated only by female speakers for F1 and F2
hVd context		Males vowel plots seem to be more marginal	Vowel space was more compact
	/ɪ, iː/	Differentiation by female speakers.	Not differentiated by both speakers in F1 and F2.
	/e, æ/	Clear differentiation by males and females.	No difference only for females.
	/ʌ, ɑː/	Differentiated in F1, for both speakers.	Differentiation in F1 for both speakers
	/ɒ, ɔː/	Difference in males F2 and females in F1 and F2.	No difference in F1 and F2 for both speakers.
	/ʊ, uː/	No difference for male speakers, not for females F1	No differentiation for both speakers in F1 and F2

Consequently, this table focuses on the major findings on the monophthongs in NigE and MalE. The NigE speakers differentiate between the duration for short and long vowels of each of the vowel pair in the two contexts *bVd* and *hVd*. Therefore, the paired samples *t-test* results in Tables 4.6 and 4.8 as previously seen confirm this, as significant differences were found for the vowel pairs. For *bVd* context, /ɪ, iː/ vowel pair at the 0.001 level significant difference, /e, æ/ at 05 significant level for males, while 0.01 level for the females. /ʌ, ɑː/ vowels the male speakers at 0.01 level and females at 0.001. For /ɒ, ɔː/ vowels at 0.001 significant level for males, while the females at 0.001 level. For /ʊ, uː/ vowels for both males and females were at 0.01 significant level. In *hVd* context, however, /ɪ, iː/ at 0.001 level, 05 level for /e, æ/, 0.01 for males and 0.01 level for females for /ʌ, ɑː/, for /ɒ, ɔː/ vowels at 0.01 level and at 05 level for male, while 0.01 for female for /ʊ, uː/.

On the other hand, the MalE speakers more disparity was realized between the speakers realization of length contrast compared to NigE speakers. Therefore, the MalE speakers, seem not to differentiate between all vowel pairs, but for /ʌ, ɑː/ at 0.01 level, and at 0.001 level for /ɒ, ɔː/ for both speakers, while /ʊ, uː/ at 0.01 level only for male speakers in *bVd* context. For *hVd* however, at 0.01 level for /ɪ, iː/ for both speakers, while at 0.01 for only females' for /ʌ, ɑː/, while at 0.01 for males for /ɒ, ɔː/ vowels.

Similarly, it is found that there were differences in the vowel space of speakers in NigE and MalE. However, the F1 and F2 values obtained and the formant plots generally indicate that the females NigE speakers seem to have less peripheral vowel space compared to females MalE speakers. For the male NigE speakers the vowel space appears to be more central compared to that of male MalE speakers.

The results for the measurements of the vowel quality in this study indicate that the short and long vowels in the vowel pairs were realized with differences and similarities in NigE and MalE. However, the degree of difference or similarity is distinct; they differ from one vowel pair to another. Therefore, while the /ɪ, iː/ vowels produced with difference in terms of backness for the NigE speakers, F1 is differentiated by males MalE in *bVd* context. In *hVd* context, the male speakers in NigE and MalE realized with conflation in terms of F1 and F2. Comparatively, females NigE differentiate the vowel pair in F1 and F2. /e, æ/ vowels were differentiated by the NigE speakers, but not by MalE speakers in both contexts. As regards to /ʌ, ɑː/ vowel pair, females NigE differentiated for both F1 and F2, whereas MalE speakers distinguish it only in F2 when males NigE did not differentiate the vowels in F1 in *bVd* context. However, they were not differentiated in terms of F2 for NigE and MalE speakers in *hVd* context. For /ɒ, ɔː/ vowel pair, females NigE differentiated in F1 only, whereas the male speakers did not differentiate either. The MalE females did not differentiate the vowels in terms of F1 and F2, while males MalE differentiated for F1 and F2 in *bVd* context. In the case of /ɒ, ɔː/ vowels were not differentiated by females NigE and MalE speakers in terms of F1 and F2 in *hVd* context, but they were differentiated by males NigE for F2 alone. The vowels /ʊ, uː/ were differentiated by females NigE and males MalE speakers in F1 and F2, but they were not differentiated by males NigE in *bVd*. However, in *hVd* context males NigE and females MalE in F1 and F2 differentiated the vowels.

4.2.1 Vowel Duration Contrast in NigE and MalE

To give the description of the vowel's contrast in length (duration), the results of the overall mean duration of the vowel pairs in (ms) measured in both contexts are listed in Table 4.16. The results of the *t-test* of each vowel pair for a comparison of the averaged paired vowels were presented. Table 4.17 and 4.19 lists the paired samples *t-test* results for each vowel pair in the two (2) contexts. In addition, a histogram was generated for both contexts to indicate if the contrast is maintained in the realization of the vowel pairs. However, the data for this present study was used to compare the differences and similarities between the two (2) varieties to ascertain the extent to which the vowels produced by these speakers are differentiated in terms of length.

In relations to length contrast, the average duration results between each of the vowel pair in (ms) were compared. Table 4.16 listed the average duration of the five (5) vowel pairs in *bVd* and *hVd* contexts. Each vowel pair was subjected to a sampled pair *t-test* between short and long vowels, in order to determine whether significant differences in duration between each of the five (5) vowel pairs were maintained. Table 4.17 present results of the *t-test*. In addition, a histogram was generated to see if the length contrast is maintained between these vowel pairs in NigE and MalE. Figures 4.49 to 4.52 showed the histograms for all vowel pair length in *bVd* context.

Based on Table 4.17 it indicates that the NigE speakers produced long and short vowels relatively longer compared to MalE speakers. The /ɪ/ and /iː/.vowels pair in NigE were produced with a difference that is length contrast is maintained. A paired *t-test* was conducted and significant difference were found between /ɪ/ and /iː/ vowels ($t(12) = -5.37$,

$p < 0.001$; $t(14) = -7.02$, $p < 0.001$). In MalE however, the males slightly did differentiate between the long and short /ɪ/ and /iː/ vowel pair where significant difference was found ($t(10) = -2.47$, $p < 0.01$). The female speakers realize the vowels similar to one another and therefore, in these vowels, length contrast is not maintained. The paired samples *t-test* result in Table 4.17 confirms that no significant difference was found ($t(14) = -1.58$, $p < 05$).

Going further to /e/ and /æ/ vowels, NigE and MalE did not differentiate the length between the short and long vowels. This indicates lack of contrast in these vowels concerning length as no significant differences were found between NigE and MalE speakers ($t(14) = 0.43$, $p >05$ $t(14\text{-}1.31$, $p >05$, $t(14) = 1.45$, $p >05$), except for the females NigE. Here, a significant difference was found between long and short /e/ and /æ/ vowel pair ($t(14) = -2.713$, $p < 0.01$). This is to be expected, as the vowel pair was not contrasted in English in relation to length.

Table 4.16: Mean durational values for NigE and MalE in bVd context

Vowels	Male NigE Duration (ms) *bVd*	Female NigE Duration (ms) *bVd*	Male MalE Duration (ms) *bVd*	Female MalE Duration (ms) *bVd*
ɪ	126	153	141	114
iː	217	220	167	121
e	173	180	195	141
æ	169	203	203	135
ʌ	134	170	152	139
ɑː	201	226	206	159
ɒ	150	153	178	132
ɔː	210	211	215	163
ʊ	107	107	141	111
uː	158	162	163	119
Average	165	179	176	133

SD = Standard Deviation

However, for /ʌ/ and /ɑː/ vowel pair in NigE and MalE length contrast is distinguished between male and female speakers. The statistical test that was carried out indicates a significant difference between /ʌ/ and /ɑː/ vowel ($t(11) = -4.04$, $p < 0.05$, $t(14) = -6.30$, $p < 0.001$, $t(12) = -6.28$, $p > 001$, $t(11) = -2.28$, $p < 0.05$). Similarly, all speakers realized the durational contrast between the /ɒ - ɔː/ vowels. The *t-test* results in Table 4.17 for NigE and MalE speakers indicate a significant difference between the duration of this vowel pair ($t(14) = 5.91$, $p > 001$, $t(14) = -7.05$, $p > 001$, $t(14) = -5.95$, $p > 001$, $t(14) = -4.68$, $p > 001$).

For /ʊ - uː/ vowel pair, the length discrimination is maintained between all speakers in NigE, (*t*(14) = -6.59, *p* >001, *t*(14) = -6.11, *p* >001). For MalE male speakers however, length contrast is maintained as reported in the *t-test* result (*t*(14) = -2.62, *p* >0.01). It is observed that females MalE did not realize the /ʊ/ and /uː/ vowel pair with contrast based on vowel length (*t*(14) = -1.37, *p* < 05).

Table 4.17: t-test results of the duration of paired vowels *bVd* context

Vowels Vowel pairs t-test results	t-values /ɪ iː/	t-values /e æ/	t-values /ʌ ɑː/	t-values /ɒ ɔː/	t-values /ʊ uː/
NigEM	-5.375*	.432***	-4.037**	-5.906*	-6.588*
NigE F	-7.020*	-2.713**	-6.299*	-7.053*	-6.111*
MalE M	-2.466**	-1.311***	-6.277*	-5.954*	-2.625**
MalE F	-1.582***	1.451***	-2.276**	-4.684*	-1.372***

(*: p < 0.001; **: p < 0.01; ***: p < 0.05…). df = 14, paired sample, two tailed.

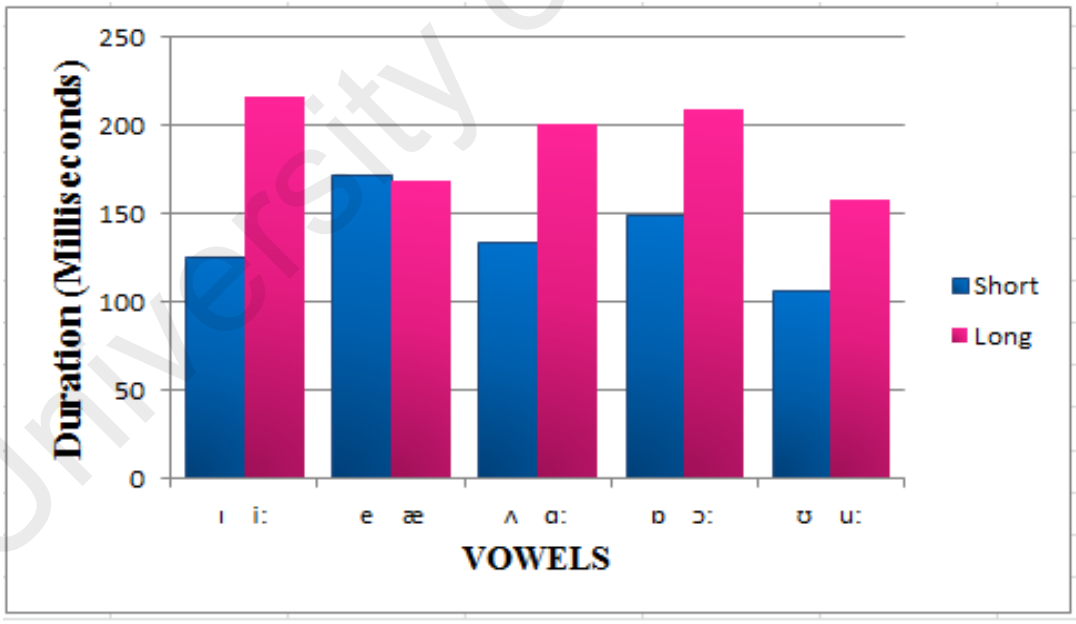

Figure 4.49: Vowel length discrimination in NigE males' bVd context

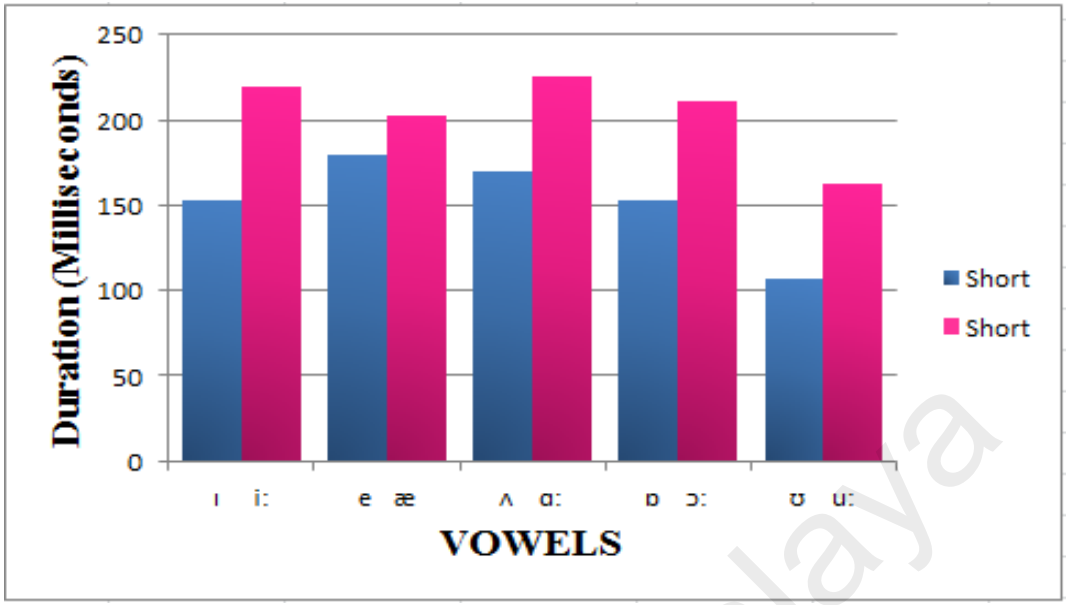

Figure 4.50: Vowels Length discrimination NigE females *bVd* context

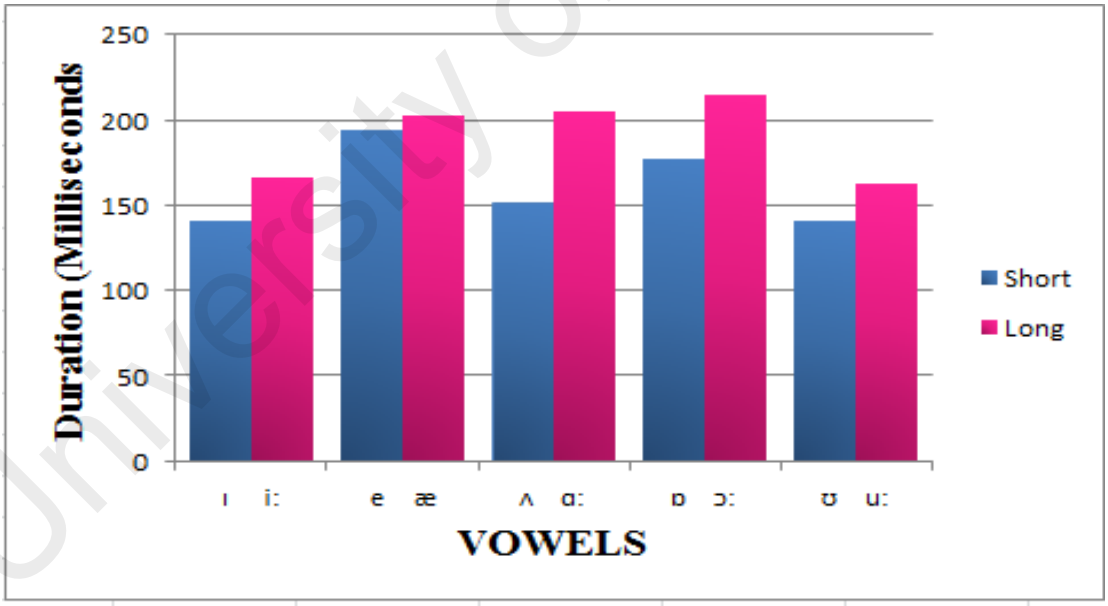

Figure 4.51: Vowels length discrimination MalE males' *bVd* context

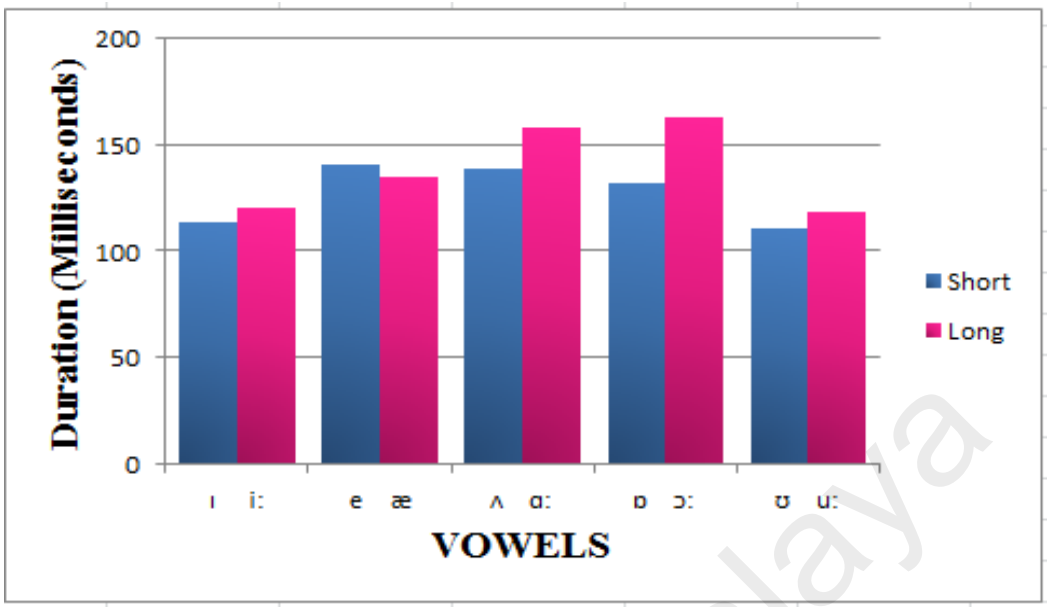

Figure 4.52: Vowels length discrimination MalE females' bVd context

In *hVd* context, table 4.18 displays the average measurements for the length duration in *hVd* context of the paired vowels. Table 4.19 listed the paired *t-test* results for all vowel pairs in *hVd* context, while Figures 4.53 to 4.56 showed the histograms. Going by Table 4.18 and 4.19 it is clear that the NigE speaker's length contrast was significant. The results determine the durational differences between short and long vowel pairs as an indicator for the vowel differences. Subsequently, *t-test* results showed that all average vowel pairs duration differed significantly from one another. It is interesting to note that the vowel pair /e - æ/ were not discriminated based on the *t-test* result and from the results in Figures 4.53 and 4.55. Equally, no significant difference was found in the /ʊ/ and /uː/ vowels for males NigE. However, Figure 4.53 deficits a difference.

For MalE speaker, vowel length was contrasted for the /ɪ, iː/ however, /ʊ, uː/ and /e, æ/ vowel pairs length was not distinguished based on the *t-test* results. For male speakers, /ʌ/ and /ɑː/ were not differentiated while /ɒ/ and /ɔː/ vowels were differentiated based on the *t-*

test result. The female speakers, however, did differentiate the /ʌ/ and /ɑː/ vowels, while /ɒ/ and /ɔː/ vowels were not differentiated. In the Figures 4.54 and 4.56 of male and female MalE, the vowel pairs were contrasted, except for /e, æ/ vowels for males, while /e, æ/ and /ʊ, uː/ for females.

Table 4.18: Mean durational values for NigE and MalE in *hVd* context

Vowels	**Male NigE Duration (ms) *hVd***	**Female NigE Duration (ms) *hVd***	**Male MalE Duration (ms) *hVd***	**Female MalE Duration (ms) *hVd***
ɪ	114	159	112	105
iː	168	203	147	113
e	149	156	136	123
æ	133	158	142	116
ʌ	108	154	129	107
ɑː	153	201	153	141
ɒ	125	151	133	125
ɔː	149	188	163	133
ʊ	145	172	158	118
uː	163	197	152	115
Average	141	174	143	120

SD = Standard Deviation

Table 4.19: *t-test* results of the duration of paired vowels *hVd* context.

Vowels Vowel pairs t-test results	t- values /ɪ iː/	t- values /e æ/	t- values /ʌ ɑː/	t- values /ɒ ɔː/	t-values /ʊ uː/
NigEM	-5.766*	1.399***	-3.079**	-2.751**	1.505***
NigE F	-7.918*	-350***	-5.888*	-3.619**	2.243**
MalE M	-3.826**	-1.446***	-1.346***	-3.183**	.467***
MalE F	-2.651**	1.022***	-6.618**	-1.263***	.535***

(*: p < 0.001; **: p < 0.01; ***: p < 0.05…). df = 14, paired sample, two tailed.

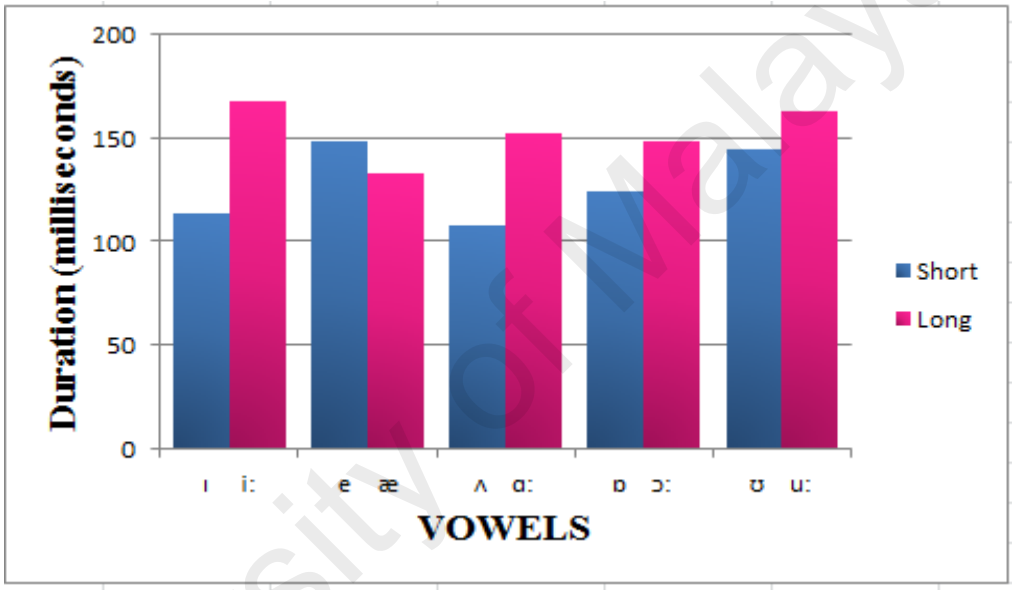

Figure 4.53: Vowels length discrimination NigE males' *hVd* context

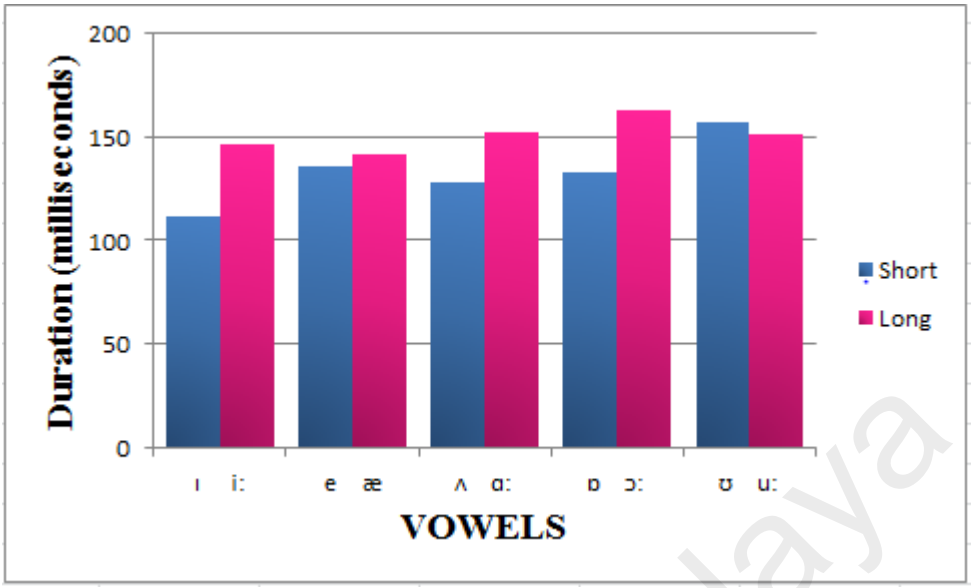

Figure 4.54: Vowels length discrimination MalE males' *hVd* context

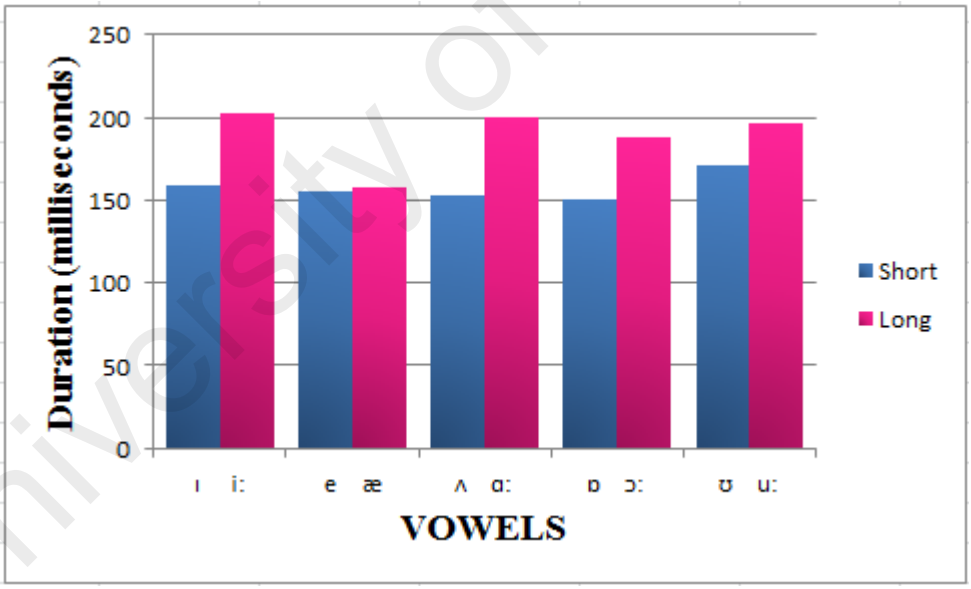

Figure 4.55: Vowels length discrimination NigE females' *hVd* context

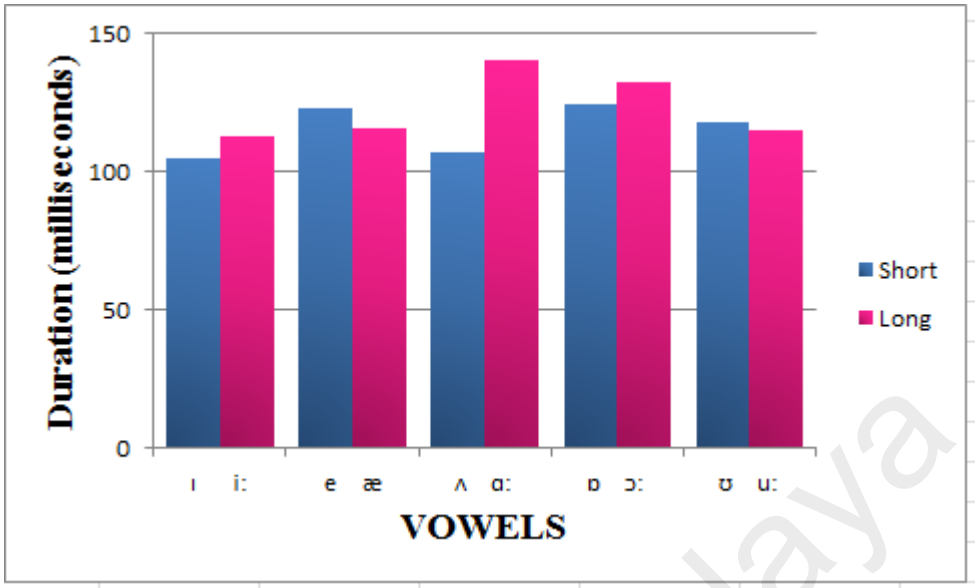

Figure 4.56: Vowels length discrimination MalE females' *hVd* context

Based on the average durational values of the monophthong sounds, it is realized that male and female NigE speakers differentiate between short and long vowel pairs, except for /e/ and /æ/ vowels, in which both speakers for the two contexts realized the vowels with the same length. This follows pattern in many inner circle varieties where /e, æ/ are not differentiated in terms of length. However, without exception, previous studies by Udofot (2004) and Gut (2008) indicated that Hausa speakers have the ability of realizing vowel length contrast. While the current study agrees with the above assertion, it is pertinent to note that this study is at par with the previous studies on the basis of its exceptional front vowels /e/ and /æ/. Notwithstanding the lack of differentiating the vowel length of the above pairs by L1 native speakers, (Deterding, 1997) finding's justified the test of vowel pairs on L2 natives as even in L1 natives, the mix-up nature of vowel contrast (Cruttenden 1994: 92) have compensatory factor for quality and length. This ability and inability to contrast may however be attributed to the norm orientation of Hausa speakers where the

influence of L1 is seen to exert its impact on pronunciation of /e/ as well as /æ/ with the same length. Looking at the vowel inventory of Hausa language, one finds that they have /e/ sound, but they do not have /æ/ sound. This is where the norm orientation presents itself.

For MalE speakers, however, the males and females have variations in realizing the vowel length in the two (2) contexts. Therefore, males and females realized the vowels differently in some instances, the *bVd* context /ʌ, ɑː/ and /ɒ, ɔː/ vowel pairs were realized with differences by both speakers, while, /ɪ, iː/ and /ʊ, uː/ vowel pairs were realized with no difference by females while, differentiated by males. In *hVd* context however, /ɪ, iː/ vowels were differentiated by both speakers, while /ʊ, uː/ as well as /e, æ/vowels were not differentiated by both speakers. /ʌ, ɑː/ vowels for males' were not differentiated, while differentiated by females, for /ɒ, ɔː / vowel pair females differentiate, while the males do not. Moreover, it is pertinent to note that based on previous impressionist study on MalE pronunciation, speakers do not differentiate between the lengths. Wan Aslynn (2005) finds no difference in the length of /i: ɪ/ and /uː/ and /ʊ/ vowel pairs. However, Tan and Low (2010) indicated that the speakers differentiate between /ɪ, i: /, /ʌ, ɑ: / /ʊ, u: / and not for /ɒ, ɔ: / vowel pairs.

The reading contexts in this present study as Hung (1992) point out are very formal. The fact that no difference was found between some of the vowel length such as /ɪ, iː/, /ʊ, uː/ /ɒ, ɔː/ in the two (2) different contexts "*bVd* and *hVd*" suggests that, the speakers realized these vowels with conflation in MalE. Therefore, due to the influence of L1 on L2, the speakers produced and realized some vowels without length contrast; the norm orientation of Malaysian is hereby manifested.

On the other hand, the vowel duration in *bVd* context is observed to be longer than the vowel duration measured in *hVd* context. The *t-test* paired two sample results showed marginal significant differences between the two contexts for females ($t(21) = 2.16$, $p < 0.01$), but not males, ($t(21) = 5.21$, $p < 0.05$). In addition, the observed differences may be traced to voice and voiceless initial consonant sound in the two contexts. The voice sound of [b] is known to be produced with vocal cord vibration while the voiceless [h] sound is produced without vocal cord vibration. The present finding echoes with the finding of Jacewicz et al. (2007), in which the duration of preceding voiced consonant measured were long before the voiceless consonants. The *bVd* and *hVd* durational measurements as in Fourakis (1991) findings showed the vowels produced in *bVd* were longer in terms of durational measurements than in the *hVd* context, but the durational differences do not reach significance. While the analysis revealed no significant difference between the two contexts '*hVd and bVd*" as in L1, it may be related to the same speech style and speech rate and the place of the vowels in utterances as well as the consonants surrounding the vowels in the two contexts.

4.3 To What Extent is there a Difference in Vowel Realization between Males and Females speech and between NigE and MalE speakers?

All the three repetitions of each vowel sound by every participant were averaged. The NigE and MalE data is comprised of 20 participants with 11 vowels for each speaker. Having one thousand two hundred and seventy-two (1272) vowel tokens estimated. Tables 4.3 and 4.4 indicate average formant values for the NigE and MalE speakers' realization.

The percentage differences between the males and females F1, F2, and duration were calculated to identify patterns of gender variance in both vowel quality and duration.

However, the female speakers produce longer vowels compared with male speakers. It is reported that females produce longer vowels than males in Cox (2006) and Hillenbrand et al. (1995). In this finding, it echoes with the previous study, in which the females produced longer vowels than males' speakers do. There were significant differences in the vowel duration between the gender groups. The *t-test* paired two sample analyses showed significantly longer duration for females as compared to males in *bVd* context ($t(21) = 1.93$ $p < 0.01$), but not in *hVd* context ($t(21) = -0.53$ $p < 0.05$). Hillenbrand et al. (1995) stated that the differences between males and females longer duration were not anticipated, likewise in this present findings. This finding is similar with Cox (2005) and Hillenbrand et al (1995) where the female speakers are using longer vowels overall, however the difference between the long and short vowels remains proportional across the groups.

As explained in Chapter 3, vowel quality is the main acoustic feature that can be related to the formant frequencies, that is F1-F3. Conversely, great difference in formant frequencies values is shown in such vowel sounds produced by different speakers. The male's vocal tract tends to be longer than female's; hence female's formants tend to be higher in frequency. Thus, the difference between male and female's vowel realization:

The female speakers occupy more vowel space compared to the male speakers.

In terms of vowels realization, based on the vowel quadrilateral the females produce the /ɪ, iː/ vowels higher and more fronted compared to male speakers although, the vowels were produced by all speakers with almost similar height direction.

The NigE /æ/ vowel is more central and slightly lower than /e/ compared to MalE speakers, although the female /e/ is more fronted. The MalE females produced /e/ and /æ/.vowels higher and more fronted than males.

The vowel quadrilateral /ʌ, ɑː/ of males MalE were realized with difference, while for the females MalE a slight difference is realized between the vowels, although /ʌ/ is produced little higher for male speakers. For NigE males realized little higher compared to female speakers.

/ɒ, ɔː/ were not differentiated by males NigE, while differentiated by the females, but were realized much higher for male speakers. For MalE males they were produced differently, while the females were not differentiated and are produced very similar to one another.

/ʊ, uː/ vowels were differentiated by NigE speakers, whereas not differentiated by MalE. However, it appears to be realized higher in males speakers compared to females.

4.4 Conclusion

Conclusively, it can be deduced from the finding that the exhibited features of NigE and that of MalE as extracted from the respondents portrays a typical L2 learner English, each with a peculiar influence traced back to L1 structure. This, as observed by Schneider (2008) is inferred to be as such because of its statutory application as a second language in the two countries- Malaysia and Nigeria. It is pertinent to indicate that the frequency of usage of a language in a given society dictates its status and strength of accuracy as observed in the case of the United States of America, Canada and New Zealand. In these countries, the English Language as L2 overshadows the native languages as it is widely used not only in

its capacity of official or second language, but also as a general language of communication across and within tribal identities. Hence, with the passage of time, it assumes the status of L1. In such cases, phonetics variations are seldom observed between the native English speakers and non-native English speakers of the region.

Sequel to the above, the finding in this research is in concordance with Gut's (2007) Norm Orientation Hypothesis wherein it is implied that, the L1 sociolinguistic setting of the respondents influences the L2 (English) phonological pattern. This is indicated in the finding whereby, depending on the structural texture of their L1, both respondents intersect on certain phonetic features and differ in others. This is clearly indicated in the observed duration of pronouncing long and short vowels in the context between MalE and NigE speakers. Whereas the NigE speakers distinguish between the long and short vowels in their pronunciation, the MalE speakers did not. This is however traced back to their L1 structural context wherein Nigerian respondents (Hausa) already have it within their L1 and Malaysian respondents (Central Malaysia) do not have it in their L1. Consequently, it is hereby submitted that, the application of norm orientation hypothesis in this research yields a positive result as the finding fits into the hypothesis supporting its validity.

CHAPTER 5

CONCLUSION

This study investigates the production of English monophthong vowels produced by Hausa speakers of NigE, with the aims of describing the quality of these vowels and the extent to which the typical vowel pairs are contrasted in terms of quality and length. The data derived from this study were used to compare the differences and similarities between males and females realization. This section revisits the research questions presented in Chapter 1 by providing a summary for the findings, which addresses the research questions.

5.1 Research Question 1: What are the Acoustic Features of English Monophthong Vowels as Produced by Hausa Speakers?

The English vowels produced by Hausa speakers occupy less vowel space in the vowel plots based on Euclidean distance test as compared to MalE speakers .Therefore, the results of the paired samples t-test confirm that the vowel space of males NigE is more central than that of males MalE. While the vowel space for female speakers in NigE and MaIE appears to be peripheral, but the t-test result indicated that this could not be claimed, as the vowel space for the females were different. On the other hand, more contrast was realized between the front vowels /e, æ/ and back vowels /ʊ, uː/ in NigE, whereas for MalE speakers these vowels were not contrasted. Though the observations revealed that /ɒ, ɔː/ vowels appear to be quite close for the male MalE speakers, they tend to be a little further apart for the female speakers. Unlike in NigE whereas the vowel /ɜː/ is shifted towards /ʌ æ ɑː/ with almost the same position, the vowel /ɜː/ appeared to be more central for MalE speakers. The

vowel space in *hVd* context for NigE males was more compact compared to males MalE, while vowel space for females NigE vowels plot seem to be more marginal compared to females MalE where the vowel space was more peripheral. There is lack of contrast between the vowels /ɪ, iː/, /ʌ, ɑː/, /ɒ, ɔː/ as well as /ʊ, uː/ vowels for all speakers. It was also observed that /e, æ/ vowels were contrasted in NigE, but not in MalE. Ultimately, /ɪ, iː/, /ʌ, ɑː/ and /e, æ/ vowels have similar findings to *bVd* context results. In the two (2) contexts- *bVd* and *hVd* - the vowels occupy relatively quite similar position; however, *bVd* context has more spread out vowel based on the calculation of the average Euclidean distance results.

5.2 Research Question 2: To What Extent is there a Vowel Contrast in terms of Vowel Quality and Length?

NigE speakers discriminate between all long and short vowel pairs in relation to length contrast. Based on the averaged durational values of the monophthong sounds and the *t-test* results, it is realized that NigE 'males and females' differentiate between long and short vowels except for /e/ and /æ/ vowels, in which the speakers realized the vowels with same length in both contexts "*bVd* and *hVd*", as this is similar pattern found in inner circle varieties. However, notwithstanding the lack of differentiating the vowel length of the above pair by English native speakers (L1) as observed by Deterding (1997). His finding's justifies the test of this vowel pair on L2 native as even in L1 native, the mix-up nature of vowel contrast (Cruttenden, 1994: 92) have compensatory factor of quality or quantity contrast. In consistent with previous findings, length is contrasted in NigE as produced by Hausa speakers.

In contrast to NigE, MalE speakers in some instances exhibit no uniformity between males and females realization in the two (2) contexts. For instance in *bVd* context, /ʌ, ɑː/ and /ɒ, ɔː/ were differentiated by the speakers whereas, /ɪ, iː/ and /ʊ, uː/ vowel pairs were not discriminated by the females but differentiated by male speakers. In *hVd* context, the speakers differentiated /ɪ, iː/vowels, but /ʊ, uː/ and /e, æ/vowels were not differentiated. As /e and æ/ vowels were not contrasted in English, which is to be expected in this study. However, females differentiated /ʌ, ɑː/ vowels while, males did not whereas for /ɒ, ɔː/ vowel pair, the reverse is the case. On the other hand, the vowel duration in *bVd* context is observed to be longer than the vowel duration measured in *hVd* context. However, *t-test* results shown the difference is significant for females ($t(21) = 2.16$, $p < 0.01$), but not males, ($t(21) = 5.21$, $p < 0.05$), a finding, which supports previous findings as, revealed by Fourakis, (1991).

For the vowel pairs in terms of vowel quality, paired samples *t-test* was done to ascertain if there were categorical separations or overlaps between the vowel qualities. Therefore, based on the *t-test* result shown, it is suggested that NigE speakers do produce the /ɪ/ and /iː/ vowels slightly different from one another, particularly the female speakers differences were realized in their F1 and F2. However, /ɪ, iː/ were differentiated by MalE males (F1), but not for the females in F1 and F2. In contrast, /e, æ/ vowels were clearly differentiated by the NigE speakers (F1 and F2) but not for the MalE speakers. This finding is similar to Pillai's (2010, 2014) and with Tan's (2011) findings. More so, /ʌ, ɑː/ in NigE were not differentiated by males, whereas differentiated by females for F1 and F2. Comparatively, males and females MalE differentiated the vowels in F2 but not in F1. /ɒ and ɔː/ were differentiated by females NigE in F1 but not in F2, while both F1 and F2 were not

differentiated by male speakers. In contrast to NigE, the MalE females do not discriminate the vowels in F1 and F2 but the males differentiate the vowels in F1 and F2. Finally, /ʊ, uː/ were differentiated by males and females NigE as well as MalE males in F1 and F2, but not differentiated by MalE females in F1 and F2

For *hVd*, /ɪ, iː/ were realized by NigE male speakers with no difference, but differentiated by female speakers. The MalE speakers did not differentiate F1 and F2 for /ɪ, iː/ by both males and females. There was an observed clear differentiation of /e, æ/ vowels in NigE by all speakers. Whereas, in MalE speakers, only males differentiated the vowels in F1 and F2. More so, /ʌ, ɑː/ in NigE speakers were differentiated in F2 and not in F1. In contrast, MalE speakers differentiated the vowels in F1, not in F2. /ɒ, ɔː/ were contrasted by NigE female's in F1 and F2, with males differentiating only in F2 exhibiting no contrast for MalE speakers in F1 and F2. Finally, /ʊ, uː/ vowels analysis showed a skewered presentation in NigE as the difference is only shown in F1 for female speakers, leaving NigE males as well as all MalE speakers without discrimination of the vowels. These findings confirm some of impressionist studies on NigE as in Jibril (1986), Udofot (2004) that there were discrimination between the short and long vowels in terms of length. Therefore, there is no conflation between the vowel lengths of short and long monophthongs. Bobda (2000a) claims that /ʌ, æ, ɑ: / were not distinguished in GhE, this present study demonstrates the same phenomenon for NigE.

5.3 Research Question 3: To What Extent is there a Difference in Vowel Realization in Males and Females Speech and between NigE and MalE Speakers?

The female speakers produce longer vowels compared to male speakers. It is reported that females produce longer vowels than males (Cox, 2006) and (Hillenbrand et al., 1995). Therefore, the *t-test* paired two sample results reveals there were significant differences in the vowel duration between the gender groups. The *t-test* paired two sample for means analyses showed significantly longer duration for females as compared to the males in *bVd* context ($t(21) = 1.93$ $p < 0.01$), but not the *hVd* context ($t(21) = -0.53$ $p < 0.05$).

The female speakers occupy more vowel space compared to male speakers with regards to Euclidean distance and based on the vowel quadrilateral, the females produce the /ɪ, iː/ vowels higher and more fronted than male speakers even though, the vowels were produced by all speakers with almost similar height direction. The NigE /æ/ vowel is more central and slightly lower than /e/ compared to MalE speakers, although the females NigE /e/ is more fronted. The MalE females produced /e/ and /æ/.vowels higher and more fronted than males. /ʌ/ is produced little higher for male speakers in NigE and MalE compared to females

5.4 Implication

The acoustic investigations in this study confirmed that, NigE speakers on this variety are prone to norm orientation hypothesis, suggesting that their L1 is influential on the acoustic texture of their L2 (English). Considering the Nigerian vast population in diaspora, multilingual composition of the country vis-a-vis implication on interpersonal

communication, it is suggested that in-depth analysis on acoustic structure be carried out to assess the extent of variation within the ethnic identities and with the SBE. Moreover, it is recommended that a close analysis of intelligibility studies should be conducted on the gap of variation to identify the missing link that may present difficulty in perception.

5.5 Further Research

This study was limited to only ten speakers of NigE five (5) males and five (5) females and therefore set up a preliminary look at the production of English vowels by Hausa speakers of NigE. In order to obtain a more detailed description of the production of English vowels by Hausa speakers, future research should comprise of a larger number of participants including male and female speakers. The sample data should include different sub-varieties of NigE and the data collection should be expanded to include different reading context, such as spontaneous speech and informal conversations to have a more natural speech flow-out. Therefore, to enable a richer data set from which to extract the vowel quality. The phonetic environment in which the target vowels were placed has to be extended to counter for coarticulatory effects and to include diphthongs of NigE as well. Moreover, the need to compare the Hausa vowel with NigE by attempting acoustic study to determine the substrate influences on NigE is vital.

5.6 Concluding Remarks

In accordance with this research findings, the acoustic features of English monophthong vowels as produced by Hausa speakers were measured on the vowel quality and quantity (length) scale. The features were observed to be produced and realized in accordance with

their L1 structure. While the qualities of some of the vowels were uniformly produced between sexes, some were differently produced. The vowel length is however, differentiated and produced uniformly except for /e/ and /æ/ vowels, in which the speakers realize the vowels with same length in both contexts "*bVd* and *hVd*".

As for the difference of vowel realization between sexes, this study reveals in concordance with previous studies that, females produce longer vowels than males. In the bid to validate the research's observation, a parallel research on MalE (another L2 learner English) was conducted and the result showed striking similarities in L1 dependency.

Conclusively, it can be deduced from the findings that the exhibited features of NigE and that of MalE as extracted from the respondents, portrays a typical L2 learner English, each with a peculiar influence traced back to L1 structure. This, as mentioned in section *2.1.3* is inferred to be as such because of its statutory application as a second language in the two countries- Malaysia and Nigeria. The transfer of phoneme from the phonology of the indigenous languages that categorizes NigE in Endonormative stabilization phase is hereby upheld.

Sequel to the above, the findings in this research are in concordance with Gut's Norm Orientation Hypothesis (2007) wherein it is implied that, the L1 sociolinguistic setting of the respondents influences the L2 (English) phonological pattern. Consequently, it is hereby submitted that, the application of norm orientation hypothesis in this research yields a positive result as the finding fits into the hypothesis supporting its validity.

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