

2020

Exploring the Career Experiences of Immigrant Nigerian Women Engineers

Ijeoma Lilian Ozoude
Walden University

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Walden University

College of Social and Behavioral Sciences

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Ijeoma Lilian Ozoude

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2020

Abstract

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by

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MPhil, Walden University, 2020

MBA, University of Maryland University College (UMUC), 2006

MsTMAN, UMUC, 2004

BS, University of Maryland College Park (UMCP), 1999

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Policy and Administration

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Abstract

The contribution of immigrant Science, Technology, Engineering and Mathematics (STEM) workers in addressing the projected shortage of U.S. STEM workforce cannot be overemphasized. Despite efforts by U.S. policy makers to provide opportunities for a positive STEM experience and diversify the STEM field by increasing the number of underrepresented minorities and women via The Women and Minorities in STEM Booster Act, changes to the U.S. immigration policy towards Nigeria, including bans on immigrant visas and Diversity visas could impact recruitment of immigrant Nigerian workers in STEM. Using Kingdon's multiple streams framework and Crenshaw's intersectionality theory, this study explored the career experiences of immigrant Nigerian women engineers in the Washington Metropolitan area with regard to what impacts opportunities outlined in the STEM Booster Act may have had on their career success. The study also explored what impact changes in U.S. immigration policy may have had on the recruitment of immigrant Nigerian women in STEM. Using a descriptive phenomenological design, interview data were collected from 11 immigrant Nigerian women engineers. Findings from this study revealed that immigrant Nigerian women engineers experienced discrimination due to their gender, race, ethnicity and immigrant status. Findings also showed a more positive STEM experience for underrepresented minorities if the STEM Booster Act is enacted into law and an underrepresentation of immigrant Nigerians in STEM due to changes in immigration policy towards Nigeria. Positive social change may occur by introducing Diversity and Inclusion programs that could boost the number of underrepresented minorities and women in STEM.

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Dedication

I dedicate this research study to my parents, my biggest fans, my anchor, my sources of inspiration, and the instigators of this work. The kind words, the support, and the persistent reminder from my dad of the need to complete this journey are immeasurable. With all my life endeavors, my dad's insatiable quest for academic pursuit and success, encouragement and motivation guided me to this accomplishment. For that, I say thank you!

To my seven siblings and my four beautiful children, thank you for your patience and understanding, and for cheering me on throughout this journey. I appreciate each of you immensely!

C'est fini!

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Chapter 1: Introduction to the Study

Immigrant Nigerian women who have an interest in pursuing science, technology, engineering and mathematics (STEM) education and careers in the United States do so with a level of excitement and eagerness to succeed in an environment where there are numerous STEM opportunities. These Nigerian immigrants enter the United States, mostly via family-based immigration, employment-based immigration, and Diversity Visa Lottery programs (Capps, McCabe & Fix, 2012), with hope for achieving a successful education and career. However, once they start their STEM journey, they may realize they face similar or even more difficult challenges than other women of color and other underrepresented minorities in STEM. The experience of an immigrant Nigerian woman in STEM may be better understood by reviewing findings from Johnson's (2012) study, which showed a negative relationship between being a woman of color and being in STEM, with race and ethnicity playing a significant role in the STEM experience. Johnson also discussed the impact of not feeling a sense of belonging in an environment where there is a perception of negative racial climate.

For immigrant Nigerian women in STEM, the primary challenges are being a woman in a male-dominated field, being a woman of color (Black), and having a distinct ethnic identity. Another challenge is adapting to an environment where their immigration status, in addition to changes in immigration policy, could potentially impact their STEM experience. Most African immigrants in the United States are from Nigeria, and as of 2016, 60% of them have a bachelor's degree or higher, a percentage about double that of the general American population (Gramlich, 2020). The immigrant visa options grant

immigrants Lawful Permanent Resident (LPR) status on arrival and allows them access to opportunities for education and work. In recent times, there have been immigration politics targeted towards Africans, whom President Trump have addressed as coming from “shithole” countries and has questioned why they should be admitted into the U.S. (Meckler & Hughes, 2018). For Nigerians who are facing the temporary immigrant visa ban via Presidential Proclamation 9983, in addition to the elimination of Diversity Visa lottery programs (U.S. Dept. of State, 2020), the chances of obtaining immigrant visas to pursue STEM education and careers in the U.S. is non-existent. Consequently, this has an impact on the recruitment of this demographic in STEM.

For United States policy makers, the underrepresentation of women and minorities in the STEM field continues to be an area of interest, mainly as women make up 50% of the U.S. workforce, but only 26% of the STEM workforce (American Community Survey Report, 2013). Consistently, in 2015 women held 47% of all U.S. jobs, but only 24% of STEM jobs (Noonan, 2017). Specifically, the United States is facing the problem of a shortage of local workers, and the need for skilled workers in the area of STEM is growing. Also, there is a notable change in the ethnic diversity of workers in the STEM field (Litzler, Samuelson & Lorah, 2014). It is estimated that by 2050, there will be an increase in the number of underrepresented minorities from a quarter to almost half of the workforce (Litzler et al., 2014). Of the approximately 12 million immigrant women, which accounted for 7.3% of the U.S. labor force in 2015, the labor-force participation rate for African immigrant women was 65.6% (American Immigration Council, 2017).

Data from the Pew Research Center shows African immigrants as having the fastest growth rate (137%) from 2000 to 2013 (Anderson, 2017), with Nigeria being the leading country for immigrants. Nigerians in the United States are highly educated and are likely to stay active in the workforce, and those in STEM fields are no exception (Rodriguez, 2014). Data from the American Immigration Council shows that in 2015, foreign-born STEM workers made up 26.8%, 26.3%, and 22.9% of the STEM workforce in District of Columbia, Maryland and Virginia respectively (American Immigration Council, 2017). Also, the Maryland and Washington DC metropolitan areas have been cited amongst the metro areas having the largest number of Nigerian immigrants (Migration Policy Institute, 2014; Echeverria-Estrada, & Batalova, 2019). Data from the U.S. Department of Homeland Security (2020) showed that in 2010, ~70% and in 2017, ~79% of immigrant visas issued to Nigerians are of the broad category of family immigration. Also, in 2010, ~22% of immigrant visas issued to Nigerians are of the Diversity Visa category. With most of the African immigrants entering the U.S. via family-based, employment-based, or Diversity Visa Lottery programs, changes in U.S. immigration policy could have an impact on the recruitment of immigrant Nigerian women in the U.S. STEM workforce.

For the purposes of data collection and reporting in the United States, race and ethnicity data can either be collected in a combined format or separately (OMB, 1997). In the case of the latter, the terms race and ethnicity can be used interchangeably, and a Nigerian immigrant will be categorized as being of Black race/ethnicity. In the case of the former, where data on race and ethnicity are collected separately, and for the purposes

of this study, a Nigerian immigrant will be categorized as being of a *Black* race, and of a *non-Hispanic or Latino* background, hence of ‘African Nigerian’ ethnicity. This ethnic social identity of an immigrant Nigerian woman engineer distinguishes her from other Black immigrants due to her distinct culture, language, and national origin. An immigrant Nigerian woman engineer therefore faces a deeper level of discrimination due to her ethnicity, beyond her gender or race.

The continuous disregard of the diverse ethnic background of immigrants of African descent is frustrating, ignorant, and incorrect, and has the potential to leave important issues facing this diverse group of Black immigrants un-addressed (Agyemang, Bhopal & Bruijnzeels, 2005). There is heterogeneity within the Black population, and simply using the term Black brushes over the diverse ethnic and cultural identities of the African immigrants. Also, merely pushing Nigerians or other African immigrants into a homogenous category provides for misleading data for policy making (Agyemang et al., 2005). Hence the approach for this study to delve into the intersection of the social identities of gender, race, ethnicity and immigrant status of the immigrant Nigerian women engineers

Consequently, the choice of the term immigrant Nigerian women for this study is to be clear about the immigration status of these Nigerian women engineers as either naturalized U.S. citizens or LPRs, who were not born in the United States, and may have come into the United States via various categories of non-immigrant or immigrant visas. Additionally, the immigrant status of these Nigerian women engineers is equally important because the study participants migrated to the United States via different

immigration programs, such as family-based immigration, employment-based immigration, Diversity Visa lottery program, and student visa. With the different immigrant status of the study participants, some of them with LPR status faced discrimination when applying for certain Federal Government jobs, and others with non-immigrant (student) status did not have access to as many job opportunities as those with LPR status, and had a change in their status when their employers filed for their H1B visas. That notwithstanding, these social identities of ethnicity and immigrant status cumulatively add layers of disadvantages when it comes to access to opportunities and experience in STEM for immigrant Nigerian women engineers.

As an amendment to the existing Immigration and Naturalization Act of 1965, the Immigration Act of 1990 was needed to increase the number of legal immigrants to the United States (GovTrack.us, 2020). The Diversity Visa (DV) Lottery program was introduced as one of the immigrant visa categories via the Immigration Act of 1990, in addition to the family-based immigration and employer-based immigration categories (Wasen, 2011). The DV lottery program allowed for random selection of immigrants from countries with low rate of immigration to the U.S in the last five years of enacting the law (Wasen, 2011). Enacting this law increased opportunities for entry for immigrants from Nigeria, as Nigerians participated in the DV Lottery program until 2013, when they were banned from participating in the lottery program. In January 2020, President Trump issued Presidential Proclamation 9983, which placed visa restriction for immigrant visas including Diversity visas for Nigeria, amongst a handful of other countries (U.S. Dept. of State, 2020). This proclamation added Nigeria to the list of countries that are banned

from entering the United States via the family based immigration (Gramlich, 2020). As a result, until this policy change is reversed, Nigerians are no longer able to migrate to the United States to live permanently via immigrant visa categories outlined in the Immigration Act of 1990: Diversity Visa Lottery, family based or employer-based immigration. In addition, even upon reversal of Presidential Proclamation 9983, there needs to be a deeper conversation on the equity of immigration policy as Africa is underrepresented based on yearly immigration statistics as reported by the U.S Department of Homeland Security (2020). This change to the Immigration Act towards Nigerians poses a lot of challenges for entry into the U.S for Nigerians, particularly as Nigeria has one of the highest denial rates for non-immigrant visas in addition to high visa application fees (Thurston, 2020). This is important because unlike the non-immigrant visa, an immigrant visa gives an immigrant a Permanent Resident Status upon arrival to the U.S. (U.S. Embassy in Japan, 2020). In addition, most Nigerians come into the U.S. via family-based immigration and employment based immigration, which allow them to become LPRs (VisaPlace, 2020). Consequently, the impact of the recent changes to the immigration Act is a reduction to the number of Nigerian immigrants allowed entry into the U.S. to live permanently and pursue their education or careers, and add value to STEM and other fields. The non-immigrant student visa category could be considered an option for entry, however this visa option poses a challenge for success, with limited access to opportunities, and lots of uncertainties for the immigrants. Data from the U.S. Department of Homeland Security (2020) showed that ~6% of all non-immigrant visas issued to Nigerians in 2015 and 2017 are in the Student and Exchange visitor admission

category. Likewise changes to non-immigrant visa (student visa) eliminates opportunity for entry to study for Nigerians.

To address the shortage of skilled workers in STEM and boost the number of historically underrepresented minorities and women in STEM, the United States House of Representatives and Senate introduced The Women and Minorities in STEM Booster Act of 2019, also known as STEM Booster Act, (H.R. 4528 and S.2578) geared towards providing women and underrepresented minority groups opportunities to succeed in their STEM education and careers. This bipartisan effort has implications for gender equality, gender equity, and under representation of women and minorities in STEM. Immigrant Nigerian women engineers in the U.S. are an underrepresented minority in STEM. As defined in the STEM Booster Act of 2019, an underrepresented minority group has a significantly lower number of scientists and engineers per 10,000 population when compared to scientists and engineers that are White and/or Hispanic (Congress.gov, 2017). Many studies exist on the career experience of African American, White, and Hispanic women in STEM; however, those studies do not necessarily take into account the impact of the added social identities of ethnicity and immigrant status. As a result, this study explored the STEM career experience of a group of Black immigrant women from Africa, immigrant Nigerian women engineers for whom no research study exists. Accordingly, seeking out these women to recruit and retain in the field of engineering can be a challenge. Giving the various efforts to recruit and retain women and underrepresented minority groups in STEM, these immigrant Nigerian women can take

advantage of STEM programs targeting minorities in addition to STEM policies such as the STEM Booster Act to grow, develop, and succeed in their engineering careers.

Chapter 1 includes the background of the study, the problem statement, the purpose of the study, research questions, and theoretical foundation, which will be discussed in more detail in Chapter 2. Also included in this chapter are the nature of the study, definition of terms, assumptions, scope and delimitations, the significance of the study, and a summary of Chapter 1.

Background of Study

There has been an increase in the number of male and female foreign-born STEM workers in the U.S. workforce (American Immigration Council, 2017). Immigrant STEM workers have made a significant impact in the U.S. economy through their innovations which have increased productivity, income stream, and recruitment for STEM companies (American Immigration Council, 2017). Immigrant Nigerian women in STEM belong to a group of highly sought-after STEM workers who have made a significant impact in addressing the shortage of STEM workers in the United States. While there are several efforts to increase the recruitment and retention of women and under-represented minorities in STEM fields, there will be a need for immigrant workers to help address the growing demand of STEM workers in the U.S. There is data to support the shortage of STEM workers in the United States. In 2010, the ratio of STEM jobs posted online to unemployed STEM worker is 5.4 to 1, and that ratio increased by 17 to 1 in 2015 (New American Economy, 2017). This ratio increased to between 45 and 88 to 1 for states such

as North Dakota, South Dakota, Iowa, and Nebraska, and by more than 20 to 1 in 14 states including Virginia (New American Economy, 2017).

There has been extensive research on the under-representation of African American women, women of color, and minorities in STEM (Butler, 2015; Miller, 2013; Johnson, 2012; Jenkins, 2012). Researchers attribute the underrepresentation of women of color in STEM to factors such as gender, ethnicity, race, discrimination, stereotypes (Martin & Barnard, 2013), barriers to access, and lack of women role models (Butler, 2015; Miller, 2013; Johnson, 2012; Jenkins, 2012). Other factors that negatively affect women's ability to succeed in STEM include the low number of female faculty or role models in a predominantly male field, a gender equality issue, and the chilly learning or work environment coupled with the lack of racial and ethnic diversity in the school or workplace (Johnson, 2012). Research studies (Butler, 2015; Miller, 2013; Johnson, 2012; Jenkins, 2012) have shown that due to the barriers faced by women of color and minorities, the availability of STEM programs does not always translate to access to these programs and opportunities, even as the U.S. continues efforts to improve the number of women and underrepresented minorities in STEM.

Women with strong interests and high self-efficacy choose to go into the STEM field with the understanding that it may not be as welcoming as other fields that are not typically see as male dominated. However, the women face challenges, as the STEM fields are challenging academically, and some people do not see women as fit to handle such academic challenges as well as men. This stereotypical assessment of women also dates to traditional gender roles in the family and society, where men are seen as the

heads of household and women as the homemakers. These stereotypes have spilled into colleges and organizations (Martin & Barnard, 2013), resulting in additional factors that could have a more negative impact on a woman's ability to succeed in STEM. Immigrant Nigerian women seek opportunities in the United States where they believe they can make significant impact in STEM.

In many studies, researchers have focused on the experiences and underrepresentation of women of color, particularly African American women in STEM (Butler, 2015; Johnson, 2012; Jenkins, 2012) and Afro-Caribbean women in STEM (Miller, 2013). The researchers have discussed the recruitment and retention of women of color in STEM, identified barriers to success, and developed models of success for women in STEM (Butler, 2015; Johnson, 2012; Jenkins, 2012). Some of the studies have identified the intersection of gender, race, and ethnicity as negatively affecting experiences in STEM. However, the researchers of these studies have neglected the impact of these social identities on the career success of women who belong to an immigrant population, an underrepresented group, such as immigrant Nigerian women engineers, whose experiences differ from African American women in that they face disadvantages based on their immigration status and ethnicity in addition to discrimination due to gender and race. These immigrant Nigerian women engineers in the U.S. are part of the nearly 12 million immigrant women workers that make up just over 7% of the workforce (American Immigration Council, March, 2017).

To understand the experiences of Panamanian Afro-Caribbean women of African phenotype and how to use their experiences to improve the retention of this group of

immigrant women in STEM, Miller (2013) presented strategies that would help support all females of African phenotype to pursue and succeed in STEM careers. Miller's study population includes Panamanian Afro-Caribbean women of African Phenotype, who are categorized as African American due to their physical characteristics of being Black despite having a different culture and values. The study identified gender and phenotype as factors that contribute to the reduction of women of African phenotype in STEM (Miller, 2013). This theme also appears in Martin and Barnard's (2013) study on the experiences of women in male-dominated occupations. The findings showed that the retention of women in male-dominated fields required a breakdown of formal and company practices that encouraged gender discrimination and bias (Martin & Barnard, 2013), in addition to an understanding of the work identity and work-life balance issues that women face. Women in male-dominated fields have adopted survival mechanisms that include the use of their femininity, adopting male characteristics, seeking mentorship opportunities, and other intrinsic motivational factors.

The benefits of a social support system and of mentoring and research opportunities have been shown as resiliency or persistence indicators for African American women in STEM (Jenkins, 2012). Jenkins's (2012) study results indicated that while researchers should examine the intersection of gender and ethnicity regarding their impact on the success of African American women in STEM, the university department climate may play a big role in understanding the experiences of the STEM students. Jenkins also noted that while students are in their undergraduate years, schools should

have active roles in equipping African American female students with the tools they need to succeed, even after graduating in STEM fields.

Johnson's (2012) study was similar to Jenkins's (2012) study and included a focus on the impact of campus racial climate on perceptions and overall sense of belonging among racially diverse women in STEM majors. According to Johnson, race and ethnicity negatively impact a woman of color's overall sense of belonging in STEM. Both Jenkins and Johnson acknowledged the double negatives faced by African American women that have both a race and ethnic identity. The findings from Johnson's study showed a negative academic stereotype that sees women in STEM as inferior to their male counterparts, resulting in low academic self-confidence in addition to a negative racial environment and negative effect on the sense of belonging for women of color in the STEM field.

Schools and colleges can address the isolation that women feel in STEM at the institutional level, where the STEM faculty can begin to understand the experiences of students, identify ways to be more inclusive, and provide more positive interactions for women of color. The disadvantages that various identities, in addition to other structural deficiencies, create for women of color in STEM resulted in President Obama's Educate to Innovate Campaign, which focused on providing opportunities to improve the participation of underrepresented groups, including women in STEM education and STEM career opportunities (White House, 2015). This policy decision is also critical in recruiting and retaining underrepresented minorities in STEM, which includes immigrant Nigerian women engineers.

The intersection of these various contributing factors to the underrepresentation of women and minorities in STEM as identified above, makes for a challenging STEM career success in the lives of immigrant Nigerian women engineers, and to their experiences in accessing the opportunities similar to that outlined in the STEM Booster Act. This concern is at the heart of The Women and Minorities in STEM Booster Act. The full impact of this bill will be meaningful when underrepresented minority women groups can share their experiences and benefit from the bill. To that extent, there is a gap in research in exploring the career experiences of immigrant Nigerian women engineers on how their gender, race, ethnicity, and immigrant status intersect to impact their STEM career success. The immigrant Nigerian women engineers will help improve the need for STEM workers in the U.S. As a result, understanding how their career experiences will be beneficial in their recruitment and retention in STEM, as is the goal of the Women and Minorities in STEM Booster Act becomes increasingly important. Also, these immigrant women migrate to the United States to take advantage of the better opportunities and succeed, not just for themselves but for their families (Hollifield, Martin & Orrenius, 2014). However, in migrating they are faced with the challenges of settling and adapting in a new country, and navigating the opportunities accessible to them due to their immigration status. Also, they begin to learn and understand what it means to be a Black woman in a male-dominated field of engineering. This descriptive phenomenological research study will increase the depth of knowledge on career experiences of immigrant Nigerian women engineers in the Washington Metro area with regard to the intersection of gender, race, ethnicity, and immigrant status, the impact of the opportunities outlined

in the STEM Booster Act on their career success in STEM, and the impact of changes to the U.S. immigration policy on the recruitment of immigrant Nigerian women in STEM. This will be accomplished through the lenses of multiple streams framework (MSF) and Crenshaw's intersectionality theory.

Problem Statement

Several studies have explored the experiences and underrepresentation of African American women and other women of African phenotype in STEM (Butler, 2015; Jenkins, 2012; Johnson, 2012). Immigrant Nigerian women face a myriad of challenges as women in a male-dominated field and as women of African phenotype (Miller, 2013), in addition to being immigrant women in a new country, where changes in the immigration policy could have an impact on the number of immigrant Nigerian women in STEM. The problem addressed in this study is that the intersection of the social identities of gender, race, ethnicity, and immigrant status impacts access to STEM opportunities and career success for immigrant Nigerian women engineers. And despite efforts by U.S. policy makers to diversify the STEM field by providing opportunities and increasing the number of underrepresented minorities and women in STEM via the STEM Booster Act, changes to the U.S. immigration policy could impact the recruitment of immigrant Nigerian women engineers in STEM. Perhaps, policy makers could be mindful of the impact of changes in immigration policy, particularly on African (Nigerian) immigrants, and the impact of addressing the issue of recruitment and retention of women and underrepresented minorities in STEM. This qualitative study was necessary to explore the career experiences of immigrant Nigerian women engineers in the Washington

Metropolitan area with regard to what impacts opportunities outlined in the Women and Minorities in STEM Booster Act may have had on their career success in STEM, in addition to what impact changes in the U.S. immigration policy may have had on the recruitment of immigrant Nigerian women in STEM.

Purpose of Study

The purpose of this descriptive phenomenological study was to explore the career experiences of immigrant Nigerian women engineers in the Washington Metropolitan area with regard to what impacts opportunities outlined in the Women and Minorities in STEM Booster Act may have had on their career success in STEM, in addition to what impact changes in U.S. immigration policy may have had on the recruitment of immigrant Nigerian women in STEM. The study participants were Nigerian women that immigrated to the United States mostly via family-based immigration, employer-sponsored immigration and Diversity Visa Lottery programs, to complete their engineering degrees, currently reside in the Washington metro area (encompassing District of Columbia, Maryland, and Virginia), and have a minimum of three years of experience in their engineering careers. Using a descriptive phenomenological approach provides an opportunity for the participants to share their views and personal experiences through interviews with open-ended questions to drive extended conversations (Rudestam & Newton, 2015). Understanding the experiences, challenges, and perspectives of these immigrant Nigerian women engineers may help drive immigration policies for an underrepresented minority group as well as address the needs identified in the Women and Minorities in STEM Booster Act.

Research Questions

This descriptive phenomenological study was guided by the following overarching research question: What are the career experiences of immigrant Nigerian women engineers in the Washington Metro Area with respect to the intersection of the social identities of gender, race and ethnicity? The sub-questions are as follows:

RQ1: What impact does the ban on family immigration and Diversity Visa Lottery program towards Nigeria have on the recruitment of immigrant Nigerian women engineers?

RQ2: What impact does the Women and Minorities in STEM Booster Act have on career experiences of immigrant Nigerian women engineers?

Theoretical Foundation

The theoretical foundation that guided this descriptive phenomenological study was a combination of Kingdon's (1984; 1985) MSF and Crenshaw's (1989) intersectionality theory. Kingdon's MSF focuses on the dynamic and irrational nature of policy making process owing to the real working environment (Chow, 2014). MSF analyses a policy-making process in the context of three areas: a problem, proposed policy solution, and surrounding political environment (Chow, 2014). MSF was applied in the context of this study in the area that there is a problem of underrepresentation of women and minorities in STEM, which is an important field of study and engine that drives innovation in the United States. The bipartisan Women and Minorities in STEM Booster Act is a policy solution that is geared towards improving the recruitment and retention of underrepresented minority groups in STEM, for which immigrant Nigerian

women engineers belong. Despite having a policy geared towards providing opportunities and increasing the number of women and underrepresented minorities in STEM, changes in the U.S. immigration policy could impact the recruitment of immigrant Nigerian women in STEM.

Crenshaw's (1989) intersectionality theory provides an understanding of how multiple social identities including race, gender, and sexual orientation intersect to reflect systems of advantages or disadvantages on an individual's experience (Bowleg, 2012). Intersectionality theory supports the notion that the intersection of the multiple social identities of gender, race and ethnicity presents a disadvantage that can help explain the specific experience of a particular group of people (Bastia, 2014). For immigrant Nigerian women engineers, their career experiences are shaped by the intersection of the social identities of race, gender, and ethnicity. The frameworks identified for this study served as the lens through which the study was conducted. More details on the theoretical framework will be provided in Chapter 2.

Nature of the Study

This qualitative study consisted of a descriptive phenomenological research design. The essence of a descriptive phenomenological study is to capture the experience of an individual and use stories, journals and other forms of documentation to collect data about a phenomenon experienced by a group of people (Rudestam & Newton, 2015). The descriptive phenomenological design provided an understanding of the career experiences of immigrant Nigerian women engineers in the Washington Metropolitan area with regard to what impacts opportunities outlined in the Women and Minorities in

STEM Booster Act may have had on their career success in STEM, in addition to what impact changes in U.S. immigration policy may have had on the recruitment of immigrant Nigerian women in STEM. Research findings will equip policy makers with information to be able to make changes to immigration policies to accommodate this minority group, who have the potential to increase the representation of women and minorities in STEM. There is limited research on the experience of immigrant Nigerian women engineers in the U.S. STEM workforce, who bring with them unique cultural and ethnic characteristics that will allow for a different experience than other minority women in engineering.

A sample size of 11 immigrant Nigerian women residing in the Washington Metro area with experience of the phenomenon being studied was contacted to participate in the study and share their varying experiences. Purposeful and snowball sampling were used to recruit the study participants. Immigrant Nigerian women engineers who met the criteria for the study were contacted to participate in the study, and they were asked to recommend others who may be willing and able to participate in the study. Data for this study were collected via online and telephone semi-structured interviews. The interviews were audio tape recorded and transcribed after collection, and the transcribed data were shared with each participant to ensure her experience was properly captured and reflected. The study also followed all the requirements and guidelines of Walden University's Institutional Review Board (IRB). The choice of descriptive phenomenological design allowed for more rigor in analyzing the career experiences of the participants to identify the basic elements of the experience common to immigrant

Nigerian women engineers.

Definition of Terms

The following terms and definitions may help with a better understanding of its application to this descriptive phenomenological research study.

African phenotype: The observable features of a person born in and having lived in Africa, which have exposed them to a different food, language, climate, environment, culture, and pattern of life.

Career success: Gender equitable opportunities for growth and professional development geared towards upward mobility in one's career.

Ethnicity: A concept that comprises one or more of the following: shared origins or social background; shared culture or tradition that are distinctive, maintained between generations, and lead to a sense of identity and group; and a common language or religious tradition (Agyemang et al., 2005).

Gender: the economic, social, and cultural attributes and opportunities associated with being male or female (United Nations Population Fund, 2005).

Gender equality: concept requiring that women and men enjoy the same opportunities, rights, and obligations in all spheres of life and that access to opportunities and life changes is neither dependent on, nor constrained by, their sex (United Nations Population Fund 2015).

Gender equity: refers to the process of being fair to women and men by ensuring that strategies and measures be available to compensate for historical and social

disadvantages that prevent women and men from otherwise operating on a level playing field (United Nations Population Fund, 2005).

Minority: Mexican Indian, Alaskan Native, Black, Hispanic, Asian, Native Hawaiian, Pacific Islander Origin Subgroup, or other ethnic group underrepresented in science and engineering (Civic Impulse, 2019).

Immigrant – A person who comes to live permanently in another country (IRS, 2015).

Immigrant Nigerian women engineers: Nigerian women that started an undergraduate degree in engineering in Nigeria and immigrated to the United States to complete their engineering program and pursue a career in engineering in the United States. This definition does not include temporary residents.

Phenotype: The physical and psychological characteristics of an organism from both genetics and environment, or a group of organisms having like traits (“Phenotype,” 2018).

Science, Engineering, Technology and Mathematics (STEM): A wide range of disciplines including mathematics, natural science, engineering/engineering technology, and computer/information sciences (Hinz, S.E, & Chen, X, 2017).

Underrepresented in science and engineering: minority group, whose number of scientists and engineers per 10,000 population is substantially below the comparable figure for scientists and engineers who are White and not of Hispanic origin, as determined by the Secretary of education under section 637.4(b) of title 34, Code of Federal Regulations (Civic Impulse, 2019).

Assumptions

The study made the following assumptions: The study participants met the criteria to participate in this study by having some experience with immigration to the U.S. and career experience in a male-dominated STEM career. The study participants, once identified, were willing to participate in the study. The interview questions were properly worded so that participants could understand what was being asked. The hour-long in-depth telephone or online interviews were appropriate to explore the career experiences of immigrant Nigerian women engineers in the Washington Metropolitan area with regard to what impacts opportunities outlined in the Women and Minorities in STEM Booster Act may have had on their career success, in addition to what impact changes in U.S. immigration policy may have had on the recruitment of immigrant Nigerian women in STEM.

The study participants were open and willing to share their stories honestly and truthfully without bias, and that they were available for follow-up interviews as necessary. The findings from this study will apply to other immigrant Nigerian women engineers residing in other parts of the U.S., and will help restructure immigration policy as well as develop additional STEM policies that will provide more opportunities for success for other underrepresented minorities or immigrant groups such that the results will lead to positive social change.

Scope and Delimitations

The study focused on 11 immigrant Nigerian women engineers that reside in the Washington metropolitan area (District of Columbia, Maryland and Virginia) in the

United States, who immigrated to complete their engineering degrees and have a minimum of three years' experience in their engineering careers. The minimum three years' experiences for study participants allows for the time it would take for the immigrant Nigerian women engineers to have gained some experience in their careers and some understanding of how immigration politics may have impacted recruitment of immigrant Nigerian women in STEM. Although other immigrant women of African descent, as well as other ethnic groups or other women of color, may share similar experiences, they are not within the scope of this study. The study did not include family members or close friends that are engineers to prevent any concerns that they may have been coerced due to my relationship with them. The study also excluded the use of other data collection instruments such as surveys, since surveys serve a similar purpose to the interview protocols with open-ended questions.

Limitations

There were several limitations to this study. The first limitation was about challenges in recruiting the participants because of the shortage of immigrant Nigerian women engineers. I used the snowball technique to recruit additional candidates once the first initial participants that met the study criteria were recruited. The second limitation could exist with a small sample size of 11 study participants, which may not reflect the entire population of Nigerian women engineers in the Washington Metro area. However, smaller sample size is acceptable for qualitative studies, particularly because there may reach a point of saturation with the responses received (Moustakas, 1994). Due to the small sample size, the findings from this study may not be transferable to other women of

color in STEM. The third limitation was the possible introduction of ethical issues and potential influence in the outcome of the study as a result of my biases, personal experiences, and values. There was a need to fully prepare for the interview, remove any distractions, be objective, and act without bias. Such steps were necessary to ensure the study was trustworthy.

Trustworthiness was established via peer debriefing with the participants and ensuring that participants provided as much information as possible when responding to the open-ended questions. The immigrant Nigerian women that participated in this study did so voluntarily, even though some of them were identified via the snowball technique. Another limitation was that the participants for this study were not native English speakers. The participants freely expressed themselves and shared their experiences during the interviews. The participants in the study were female, and have worked as engineers, and engineering does not necessarily represent the broad spectrum of STEM careers. However, giving that STEM is male-dominated, the participants' experience should represent similar experiences for other immigrant Nigerian women in STEM.

Significance of Study

The importance of immigrant STEM workers cannot be overemphasized in addressing the projected shortage of STEM workers in the United States, and helping boost innovation and productivity in the United States (American Immigration Council, June 2017). Furthermore, there is a notable effort to increase the recruitment and retention of women and underrepresented minorities in STEM, as is the intent of the bipartisan Women and Minorities in STEM Booster Act. To that effect, immigrant

Nigerian women engineers will help boost the representation of women and minorities in STEM since African immigrant women made up 65.6% of the labor-force participation rate in 2015 (American Immigration Council, 2017). Migration policy data (2014) showed Nigerian immigrants as being more likely than the general U.S. population to stay actively engaged in professional jobs. Therefore, it becomes necessary to explore the career experiences of these immigrant Nigerian women engineers on how the social identities of gender, race, and ethnicity intersect to impact their STEM career success. It is also necessary to understand the impact of the politics associated with changes to U.S. immigration policy on the recruitment of immigrant Nigerian women, as that may help restructure immigration policies and other STEM policy initiatives geared towards recruiting and retaining visible minorities.

The findings from this descriptive phenomenological research study will narrow the gap in understanding the career experiences of immigrant Nigerian women engineers and the impacts of the opportunities outlined in the policy (The Women and Minorities in STEM Booster Act of 2019) to address the problem (of underrepresentation of women and minorities in STEM), and the impact of politics around changes to U.S. immigration policy may have had on the recruitment of immigrant Nigerian women in STEM. The findings of this study will make an original contribution to public policy areas of STEM and Immigration. The findings will also provide valuable information that will be beneficial to policy makers as they seek solutions to address the underrepresented minorities and women in STEM, as is intended with The Women and Minorities in STEM Booster Act of 2019, H.R. 4528 and S.2578.

The findings revealed the experiences of immigrant Nigerian women engineers, in addition to the challenges they faced as a result of their gender, race, ethnicity, and immigrant status. The findings of the study identified possible ways the experience of immigrant Nigerian women engineers can be improved upon to ensure their adaptability and assimilation, as well as their success in their careers, thus providing an enabling gender-equitable environment in addition to the increased recruitment and retention in STEM. Similarly, the Nigerian community in the United States will benefit from the study findings, as the results identified ways to improve the engagement and interest in engineering for young Nigerian women. This will lead to positive social change in the immigrant Nigerian community, as women and men that are interested in pursuing careers in STEM will feel engaged and be willing to contribute fully to STEM innovation in the U.S. The findings may also be beneficial to leaders of educational institutions and corporate organizations that would like to improve their diversity and inclusion programs, as well as put in place career development initiatives, strategies to ensure gender equality and gender equity, to enable immigrant women to grow and develop despite the challenges of their multiple social identities.

Summary

Immigrant Nigerian women engineers in the United States seek better opportunities in a country where they believe they can succeed in their careers. However, challenges abound in the STEM field with an underrepresentation of minorities and women, coupled with the possible disadvantages faced by these immigrant women due to the intersection of their race, gender, ethnicity, and immigrant status. This descriptive

phenomenological research study explored the career experiences of immigrant Nigerian women engineers in the Washington Metropolitan area with regard to what impacts opportunities outlined in the Women and Minorities in STEM Booster Act may have had on their career success in STEM, in addition to what impact changes in U.S. immigration policy may have had on the recruitment of immigrant Nigerian women in STEM. Though several studies exist on the experiences of women of color, particularly African American women in STEM, there is limited research done on immigrant Nigerian women in STEM. Chapter 1 discussed the study's background, problem statement, and purpose, in addition to ways to eliminate any biases that could negatively affect this study. The background section included information on some literature and studies on the challenges faced by women of color in STEM.

Chapter 2 includes a more comprehensive review of current literature and relevant studies, followed by a discussion on the study's research design and rationale, methodology, and data collection strategy in Chapter 3. Chapter 4 focuses on the findings of the study, and Chapter 5 includes the interpretations of the findings, conclusions, implications for social change, and recommendations for future study.

Chapter 2: Literature Review

Introduction

The purpose of this descriptive phenomenological research study was to explore, from the perspective of a sample of 11 immigrant Nigerian women engineers residing in the Washington metro area with a minimum of three years' experience, their career experiences with regard to what impacts opportunities outlined in the Women and Minorities in STEM Booster Act may have had on their success in STEM, in addition to what impact changes in U.S. immigration policy may have had on the recruitment of immigrant Nigerian women in STEM. Despite being a sizeable immigrant population dealing with the United States immigration politics, there is a problem with the underrepresentation of women and minority groups in the STEM field. The challenges with changes in immigration policy would have an impact on the recruitment and retention of this underrepresented minority group in STEM. Consequently, the effort to address the underrepresentation of women and minorities in STEM has led to the introduction of the S.2578 or H.R. 4528: Women and Minorities in STEM Booster Act of 2019, which focuses on increasing the participation of women and historically underrepresented groups in STEM (Civil Impulse, 2019). By not having the right, diverse representation of the minority groups in STEM, there is a problem of isolation or exclusion with not having African role models or mentors for these immigrant Nigerian women.

The focus of this chapter is to provide a comprehensive introduction to scholarly literature that relates to the purpose of the study. There is limited literature on immigrant

Nigerian women engineers' career experiences. Chapter 2 starts with an introduction of Kingdon's (1984; 1995) MSF and Crenshaw's (1989) intersectionality theory, both of which comprised the study's theoretical framework, including an examination of scholarly literature on these theories. Owing to the problem that there is no study on how the social identities of gender, race, and ethnicity intersect to impact the career success of immigrant Nigerian women engineers, on the impact of changes to the U.S. immigration policy on recruitment of African immigrants in STEM, and on the impacts of the opportunities outlined in the Women and Minorities in STEM Booster Act on their career success, the literature review shows how researchers use the intersectionality theory to understand the disadvantages immigrant Nigerian women engineers may face based on the intersection of these multiple social identities. In addition, there is research on how the MSF uses the three areas of problem analysis, policy, and politics to drive a change in policy for the benefit of the study population.

According to Hazari, Sadler, and Sonnert (2013), the experiences of a woman of color are unique, and such an experience is not the same as the experiences of being a woman and being a person of color. The unique experience of this group of minority Black women is essential, as it will help understand the underlying issues in the career success as it relates to issues of gender equity well as recruitment and retention rates for immigrant Nigerian women engineers. The literature review shows that most researchers focused on the experiences of minority women or women of color (including African American women, Latinas, Asians), and the closest group to Nigerian women that researchers have focused on are African American women in STEM. However,

experiences of Nigerian women engineers differ from the experiences of African American women in that they face disadvantages based on the immigration status and ethnicity, in addition to those experienced by African American women.

The next sections in this chapter include discussions on the roles that the social identities of gender, race, and ethnicity play in the career experiences of minority women in STEM, extrapolating that experience to immigrant Nigerian women engineers. These sections include findings from different scholarly studies on how minority female students have navigated their gender, race, and/or ethnicity to persist in undergraduate or graduate studies or in their STEM careers mainly because STEM is a White-male-dominated field and all other groups (i.e., African American men, White women, Asians, Latinas, African American women, and African women) are typically considered unequally competent owing to the disadvantages resulting from their race, gender, and ethnicity. For African American women in STEM, the intersection of race and gender presents a case of double discrimination. According to Kolo (2016), the effort to increase recruitment of African American women in STEM requires identifying and addressing issues related to race and gender discrimination. For Nigerian women engineers who immigrated to the United States to complete their engineering degrees and pursue their careers, theirs is a case of triple discrimination. For these Nigerian women engineers, the intersection of gender, race, and ethnicity plays a significant role in understanding any impact to their career success. By so doing, this study provided some understanding of how to address the recruitment and retention of such minority women groups in STEM.

With Black women making up only 2% of practicing engineers and scientists (McGee & Bentley, 2017), the shortage of women and minorities, particularly Nigerian women, in STEM is an issue that researchers have not adequately addressed. This study attempted to address the gap in the literature by exploring the career experiences of immigrant Nigerian women engineers in the Washington Metropolitan area with regard to what impacts opportunities outlined in the Women and Minorities in STEM Booster Act may have had on their career success in STEM, in addition to what impact changes in U.S. immigration policy may have had on the recruitment of immigrant Nigerian women in STEM. The next section includes a review of other qualitative, quantitative, and mixed-method studies that show the challenges to increasing the number of minorities, especially women, in STEM fields is ongoing.

Literature Search Strategy

Research findings used for this study are from current, peer-reviewed articles retrieved from multiple databases from the Walden University Library, including SAGE, ProQuest, Google Scholar, Academic Dissertations and Theses, ERIC, and EBSCOhost. The research search years were limited to 2010–2017 to stay within the Walden University guidelines. Keywords and search phrases used include *Nigerian women in STEM*, *Nigerian women engineers*, *women in engineering*, *African Women in engineering*, *African women in STEM*, *African American Women in STEM*, *race and gender in STEM*, *underrepresentation of women in STEM*, *gender equality*, *gender equity*, *African immigration*, *Nigerian immigrants*, *U.S. immigration policy on Africans*, *STEM policy*, *intersectionality theory and multiple streams framework*, as well as a

number of combinations of these phrases. The focus of most of the literature identified for this study was on Black or African American women or women of color, U.S. immigration for Africans, with no literature found that directly referenced immigrant Nigerian women engineers. As a result, the literature review is limited to the experiences of or studies conducted on Black women, African American women, or other minority women in STEM.

Theoretical Foundation

Kingdon's (1984; 1995) MSF and Crenshaw's (1989) intersectionality theory comprised the theoretical foundation for this descriptive phenomenological study. This section will have the following subsections: intersectionality theory and MSF.

Intersectionality Theory

Attributed to Crenshaw, the theory of intersectionality allows researchers to understand how discrimination due to multiple social identities intersect to form a system of oppression and injustice on a group of people (as cited in Butler, 2015). Crenshaw's intersectionality lens was borne out of her realization that the negative issues and experiences of Black women did not matter in feminist and antiracist discussions (Shin et al., 2017). The intersection of gender, race, and ethnicity amplifies the challenges of self-confidence, persistence, and career success for minority women of color in STEM.

Although women have made significant strides in the field of STEM, and there have been notable efforts to improve the number of minorities in STEM. Such effort includes The Women and Minorities in STEM Booster Act of 2019, H.R. 4528 and S.2578, a bipartisan bill introduced by the United States House of Representatives and Senate to

boost the number of historically underrepresented minorities and women in STEM (Civil Impulse, 2019). The journey is still an uphill battle for women of color, particularly immigrant Nigerian women of African phenotype. These immigrant Nigerian women engineers face disadvantages based on their immigration status and ethnicity, in addition to discrimination due to gender and race as experienced by African American women in STEM.

According to Bastia (2014), the aim of intersectionality is to review and understand how various social identities intersect to create disadvantages based on gender, race, and class. Through the theory of intersectionality, this study has added to the knowledge base on the career experiences of immigrant Nigerian women engineers, how their gender, race, and ethnicity may have impacted their success, and what impacts the opportunities outlined in the Women and Minorities in STEM Booster Act may have had on their success. I used intersectionality to frame the issues faced by immigrant Nigerian women engineers in terms of the simultaneous impact of gender, race, ethnicity, and immigrant status. It is important to look at the intersection of these social identities together and not as distinct from one another. Researchers typically study these social identities separately but with an additive impact (Juan, Syed & Azmitia, 2016) instead of a multiplicative or cumulative effect. Juan et al. (2016) noted that an individual's identity is made up their stories and experiences of challenges they have faced. As such, intersectionality does not align with the notion that homogeneity exists within racial/ethnic and gender groups.

Although the intent behind intersectionality theory was to understand how the multiple social identities intersect to impact social systems, the scope can be increased to capture the lived experiences of individuals that belong to a marginalized group (Juan et al., 2016). Therefore, while White women may face gender issues and African American men may face race issues when it comes to their numbers and abilities in progressing in STEM, African American women would face a double intersection of race and gender in a way that produces a challenging narrative for their success rate when compared to African American men or White women in STEM. When extending that same argument to a case where the triple intersection is the frame for looking at immigrant Nigerian women engineers, the challenge is a narrative that has not had a platform when looking at ways to improve the experiences of these minority Nigerian women in STEM.

Several researchers have examined how race and gender interact to influence the success of women of color in STEM, but very few, if any, have looked at how gender, race and ethnicity may affect success in STEM fields and careers for immigrant Nigerian women. To capture the full experience of these immigrant Nigerian women engineers, it is critical to address the cumulative effect of the intersection of gender, race, and ethnicity (Juan et al., 2016) on their career success. It is also critical to understand and address the cumulative effect of the intersection of the social identities on students, who are facing additional challenges related to pursuing STEM education (McGee & Bentley, 2017). The odds of failure are high, for even after attaining academic, financial, and professional success, it is easy for immigrant Nigerian women engineers to doubt themselves and doubt their ability and competency (McGee & Bentley, 2017) because of

the disadvantages they face as a result of the intersection of the social identities of gender, race, and ethnicity. Researchers have conducted several studies to show that individuals with a minority identity (e.g., African American men or White women) face far fewer issues or disadvantages than the cumulative disadvantages suffered by those with multiple social identities (Juan et al., 2016).

The disadvantages presented by the three social identities, coupled with being in a different environment, are a challenge for immigrant Nigerian women engineers. When there are negative experiences or comments about their gender, race, or ethnicity, these women tend to focus on trying to analyze their situation as a way to understand how these social identities affect their life and their careers, especially in a field where others do not consider them competent. In their mixed-methods study, Juan et al. (2016) found that women of color have a different type of experience due to the intersection of race/ethnicity and gender than White women. Juan et al. also discussed a point that would apply to immigrant Nigerian women engineers, which is that their phenotype and their roles as women in their racial/ethnic groups strongly influence these women.

Nigerian women identify closely with traditional family-oriented roles in addition to upholding the traditional values of their racial and ethnic groups. However, having gone through and survived the challenges of attaining career goals as women in STEM, Nigerian women also see the need to assert themselves and seek independence in the workplace. However, the challenges these women face due to their multiple social identities can affect their career success. Nigerian women must balance multiple identity conflicts, and they cope with the discrimination and other social injustices they face in

their careers as women in STEM. These multiple identities, in addition to a lack of role models, mentors, faculty, and support networks, affect the participation, persistence, and career success of immigrant Nigerian women engineers.

Researchers have used intersectionality to capture the need to understand and address the disadvantages faced by women of color in STEM fields. These social identities are preventing women in STEM from achieving long term success (P R, N., 2018). Without an understanding of the impact of the cumulative effect of these social identities, efforts geared at recruiting and retaining women of color in STEM may continue to be a topic of discussion, as the focus seems misdirected. The Women and Minorities in STEM Booster Act of 2019, H.R. 4528 and S.2578 geared towards boosting the number of historically underrepresented minorities and women in STEM brings this concern to light (Civil Impulse, 2018). The next sections focus on the roles that the different social identities of gender, race, and ethnicity play in the success of women of color in STEM.

Gender. A social identity that is central to any discussion on intersectionality is gender. Gender plays a key role in understanding the shortage of women in STEM. With women accounting for nearly 50% of the U.S. workforce, they hold only about 25% of STEM jobs (Schiavelli, 2012). This is a concern that is also evident on college campuses. Despite the number of women who graduate with a STEM degree, only about 26% work in STEM jobs, and the others work in other fields. This trend is different for men, as four out of 10 men who graduate with a STEM degree work in the field (Schiavelli, 2012). This trend had continued, since women did not have equal access to education before

Title IX (Kolo, 2016). However, since Title IX, women have gained increased access into courses and careers previously dominated by men. Despite these gains, there are still fewer women in STEM degree programs and careers than men, and women of color in STEM programs face far more challenges due to the issue of race (Conrad, Dixon, & Green, 2014).

The underrepresentation of women in STEM continues to be an issue of concern for leaders of companies looking for a diverse and inclusive workforce. This issue could affect the ability of U.S. workers to compete in the global innovation marketplace. The Women and Minorities in STEM Booster Act of 2019 will help address the issue of gender equality in STEM since it will provide more opportunities and programs to retain more women and underrepresented minorities in STEM. The benefits of increasing the number of women in STEM include improving the diversity of scientific advancement and innovation to help keep the U.S. competitive, as well as improving social justice by addressing the issue of gender and race differences in the STEM field (Smedley, 2014). Although researchers have attributed several factors to the decline of women in STEM, including the small number of female faculty and female role models, availability of female role models and female faculty, as well access to mentoring opportunities will positively impact the rate of persistence for women and minorities in STEM (Jackson, 2013; Griffith, 2010). Also, female students who interact more with their mentors or faculty feel more comfortable and confident in their ability to persevere in STEM.

A higher level of engagement is necessary to help women survive the negative stereotypes and biases about their ability to succeed in STEM. According to Smeding

(2012), the reason some people view women as not capable of succeeding in STEM is the perception that women have a lower level of reasoning skills in the STEM field. In addition, Griffith (2010) highlighted the lack of female faculty in STEM departments as a reason that STEM is not the appropriate field for women. Gayles and Ampaw's (2014) study linked the decrease in the number of women in STEM to women's inability to adapt to the rigorous STEM climate. Barker-Williams (2017) noted that women leave from the STEM field due to poor academia, life-changing decision, or slow career advancement.

According to Griffith (2010) most students who intend to stay with a STEM major in college typically make that decision by the end of the sophomore year, although there is still a chance of losing a few of those committed to STEM majors between the sophomore and the final year. Despite having lower persistence rates, Griffith noted that the number of Advanced Placement (A.P.) classes taken, good grades, a more welcoming college environment, and the availability of female faculty role models can affect a student's persistence in STEM. Several researchers have cited the academic environment, the availability of mentoring opportunities, and social and academic engagement as factors that could affect student success in STEM (Barker-Williams, 2017). The results of Griffith's (2010) study showed that race does not have an effect on minority student's decision to stay in STEM.

In a National Science Foundation study, Williams, Phillips, and Hall (2014) noted that gender bias does exist in STEM, especially for women of color, as reported by 100% of the 60 women of color scientists interviewed for their study. Williams et al. (2014)

identified four distinct patterns of gender bias. *Prove-it-again* refers to a situation where people discount women's success and attribute it to luck, thus requiring women to prove their competence by providing more evidence to substantiate their work in comparison to their male counterparts. *The tightrope* refers to a situation where a woman has to balance the tightrope of being perceived as too feminine (likeable but not respected) to be intellectually capable or being seen as too masculine (accepted but not liked). *The maternal wall*, which is the most damaging form of gender bias, is a situation where motherhood makes women appear less competent. Finally, the *tug-of-war* bias refers to a situation where a woman puts on her survival garb to distinguish herself from other women.

In Williams et al.'s (2014) study, different women of color viewed their experiences differently. For the most part, Black women attributed most of the bias experienced on the job to race rather than gender, whereas Asian, Latina, and White women attributed the bias they experienced to gender. Therefore, a difference in experience existed based on the levels of social identity involved. Although gender is fundamental to assessing the abilities of STEM students or employees, this minority identity contributes significantly to the challenges all women must overcome to stay in a meritocratic STEM field. However, the challenges begin to compound as other identities come into play.

Race. Race relations have been and continue to be a dominant topic in U.S. history, since the U.S. Supreme Court ruling in *Plessy v Ferguson* (1896) when facilities were marked for Blacks and Whites (Toldson, 2014). The race issues created inequalities

in access to education as well as facilities for White and Black students. Subsequent rulings by the Supreme Court on the issues of race resulted in differences in quality of student education due to their race (Toldson, 2014). The field of STEM is no different, White males have been the historically dominant parties. Researchers have discussed the notion of Black failure and inferiority in STEM (McGee & Bentley, 2017), which created a hierarchy that places Whites and Asians above Blacks and other races. This race-based narrative creates a challenging environment for male and female Black students, who face perceived academic inferiority. This challenge leads to doubts in the capabilities, aptitude, and competency of Black students (McGee & Bentley, 2017).

Immigrant Nigerian women engineers in the United States come from Nigeria, where race is not an issue. For these women, their challenges in the field of engineering could be due to gender and ethnicity, because of the different ethnic groups or tribes in Nigeria. In the United States, they find themselves faced with a new challenge of racial inequity. When collecting data for analysis or policy decisions on minorities in STEM, Nigerian women engineers fall under the category of Blacks or African Americans. However, they have different backgrounds and experiences and have never experienced race issues or discussions. As such, they must adapt to this category and cope with the race issues and challenges faced by African American women in engineering.

African American women are born in the United States and understand the issues of race and race relations in the United States. In contrast, Nigerian women do not have the same privilege of understanding race relations in the United States. They, therefore, walk into an environment where they must accept their position on the issue of race

relations. Citizenship and immigration status challenges could also potentially introduce more challenges for immigrant Nigerian women engineers, which may be yet another multiplier for the challenges faced by immigrant Nigerian women engineers. Sorting through these race issues will affect the career experiences of Black immigrant (Nigerian) women engineers, which are different from the career experiences of African American or Black women, and these experiences are still different from the career experiences of White women or Black men. Other minority women in STEM, such as Latinas, also have different career experiences giving their racial backgrounds. Although White, Asian, and Latina women have a single identity issue of gender, the multiplier effect begins to compound with gender and race for Black or African American women. That multiplier effect increases even further for Black immigrant (Nigerian) women engineers, who have to face challenges due to their ethnicity.

Ethnicity Some researchers typically use race and ethnicity interchangeably as one social identity. Ethnicity refers to things that are common to a particular group and include common ancestry, language, society, culture, or nation (Diogo Da Rosa, 2013). For the purposes of data collection and reporting in the United States, race and ethnicity data can either be collected in a combined format or separately (OMB, 1997). In the case of the latter, the terms race and ethnicity can be used interchangeably and a Nigerian immigrant will be categorized as being of Black race/ethnicity. In the case of the former and for the purposes of this study, the Nigerian immigrant will be categorized as being of a *Black* race, and of a *not-Hispanic or Latino*, hence of ‘African Nigerian’ ethnicity. This ethnic social identity of an immigrant Nigerian woman engineer denotes her distinct

culture, language and national origin. For this ethnic identity, the immigrant Nigerian woman engineer faces a deeper level of discrimination, different from being female (gender) or Black (race), similar to an African American woman engineer.

The continuous disregard of the diverse ethnic background of immigrants of African descent is frustrating, ignorant and incorrect, and has the potential to leave important issues facing this diverse group of Black immigrants un-addressed (Agyemang, Bhopal & Bruijnzeels, 2005). There is a heterogeneity within the Black population, and simply using the term Black brushes over the diverse ethnic and cultural identities of the African immigrants. Also, merely pushing Nigerians or other African immigrants into a homogenous category provides for misleading data for policy making (Agyemang et al., 2005). Hence the approach for this study to delve into the intersection of the social identities of gender, race, ethnicity and immigrant status of the immigrant Nigerian women engineers

Consequently, the immigrant Nigerian women engineers that participated in this study are either naturalized U.S. citizens or lawful permanent residents, though they may have come into the United States using diverse categories of non-immigrant or immigrant visas. Immigrant Nigerian women engineers have a distinct ethnic background. They come from a rich culture, and each woman has a language and dialect with unique experiences that define her. In Nigeria, there are set cultural expectations for women, who are mostly seen as homemakers. Stepping out of their traditional areas of comfort to pursue undergraduate studies in the STEM field is not typical for women in Nigeria. Hence, Nigerians do not readily accept women's dreams and aspirations to go into STEM

as readily as people do in the United States. So, when Nigerian women immigrate to the United States and continue to pursue their STEM degrees and careers, they have the added concern that their ethnicity, much like their race and gender, could lead to an uphill task and may affect their success in the STEM fields. Given their minimal number in STEM, the immigrant Nigerian women engineers will feel that they do not fit in, as they do not see peers that speak like them or share their ethnicity and culture (Litzler et al., 2014). These concerns could impact the confidence in their ability to succeed in STEM, and will therefore affect their success in STEM studies and careers. Ethnicity is a distinct social identity that, when combined with gender and race, increases the multiplier effect of the net disadvantages to success in STEM.

In addition, the number of role models or teachers who share the same or similar cultural background or ethnicity as Nigerian women can affect the women's morale and ability to succeed. Immigrant Nigerian women engineers speak with an African accent, which could pose a challenge to their ability to communicate fluently and naturally with peers, professors, or employers. The women's accent has a unique impact after graduation, when they begin searching for a STEM job. Immigrant Nigerian women engineers can easily be overlooked or discriminated against based on their accent, which can lead to feelings of isolation and to an assumption that no one wants to listen to them (William et al., 2014).

Williams et al. (2014) noted a sense of isolation existed that Black women felt more than other groups of women. Isolation translates to exclusion and forces Black women to stay away and alienate themselves from activities from which they may

otherwise benefit. Immigrant Nigerian women engineers can identify with isolation bias in their engineering journey and careers. Coming from a culture where women are not assertive and do not easily open up or mingle, feelings of isolation would push them further away and result in having little interest in making any effort to feel accepted or to perform at their best, which would diminish opportunities for networking or professional growth.

Williams et al. (2014) found information that is central to understanding the differences between immigrant Nigerian women engineers and African American women. The one Native American scientist who participated in their study noted that despite experiencing some forms of gender bias, her challenges were mainly due to cultural differences between her and the dominant group. In a situation where she saw herself as a lone voice, she expressed her concern regarding the lack of a support group that forced her to speak up and fend for herself. She felt a great difference between her roles and that of women in the dominant culture. This finding highlighted the unspoken differences between immigrant Nigerian women engineers and African American women, both of whom are typically grouped as Black women and their concerns are addressed together without an accurate and clear understanding of the distinct cultural/ethnic differences between these groups of Black women.

The introduction of diversity and inclusion programs in various colleges and workplaces allows for a better understanding and possibly an appreciation of the cultural differences between various groups. This platform will make it easier for women of color, including immigrant Nigerian women engineers to begin to integrate and feel a

sense of belonging in the STEM field. Therefore, it is important not to overlook the intersection of these social identities, as they inform the experiences of these women of color and will help identify the appropriate programs and policies to address the issue of the underrepresentation of women and minorities in STEM. To succeed in the field of STEM, immigrant Nigerian women engineers require resiliency and perseverance.

Multiple Streams Framework

Kingdon's MSF provides an opportunity to understand the situation faced by immigrant Nigerian women engineers in the United States as they strive towards success in their careers. MSF uses a three streams approach by identifying the problem, the policy solutions and the political forces at play (Chow, 2014). The problem stream has garnered much attention from both public and private institutions and the federal government, and it is the underrepresentation of women and underrepresented minorities in STEM and what actions can be taken to recruit and retain women and underrepresented minority groups in STEM. This is important, mainly as women make up 50% of the U.S. workforce, but only 26% of the STEM workforce (American Community Survey Report, 2013). It is estimated that by 2050, there will be an increase in the number of underrepresented minorities from a quarter to almost half of the workforce (Litzler et al., 2014). Data from Pew Research Center shows African immigrants as having the fastest growth rate of 137% from 2000 to 2013 (Anderson, 2017), with Nigeria being the leading country for immigrants. Of the approximately 12 million immigrant women who account for 7.3% of the U.S. labor force in 2015, the labor-force participation rate for African

immigrant women was the highest at 65.6% in contrast to those from Latin America, Asia and Europe (American Immigration Council, 2017).

For this study the policy stream is the bipartisan United States House of Representatives and Senate bill, The Women and Minorities in STEM Booster Act of 2019, H.R. 4528 and S.2578, geared towards boosting the number of historically underrepresented minorities and women in STEM. The STEM Booster Act provides opportunities for women and underrepresented minority groups to succeed in their STEM education and careers (Civil Impulse, 2018). This bipartisan effort has implications for gender equality, gender equity and under representation of women and minorities in STEM. As defined in the Women and Minorities in STEM Booster Act of 2019, the immigrant Nigerian women engineers in the United States are considered an underrepresented minority in STEM, since they have a significantly lower number of scientists and engineers per 10,000 population when compared to scientists and engineers that are White and of Hispanic (Congress.gov, 2017).

The politics stream is centered on the political discourse on changes in U.S. immigration policy, where the U.S. government is leading the charge to reduce immigration, particularly for Africans by urging immigration bans, stricter visa restrictions, visa fees and visa processing (Kazeem, 2019). The ongoing effect of changes in U.S. immigration policies that target immigrants of color impacts individuals who wish to immigrate to the United States and live lawfully (McKanders, 2019). Changing immigration policy, including disqualifying Nigerians from participating in the DV lottery program, temporary ban on family-based immigration for Nigerians could

potentially have a negative effect on the effort to boost the number of underrepresented minorities and women in STEM as is the purpose of the Women and Minorities in STEM Booster Act.

Career Success in STEM

Immigrant Nigerian women engineers would consider themselves successful after they have navigated the challenges posed by the intersection of gender, race, and ethnicity to earn their undergraduate or graduate degree and to obtain a job in their field of study. Attaining career success for these minority women would mean having access to gender-equitable opportunities for growth and professional development geared towards upward mobility in their careers. The college experience somewhat prepares them for life in a STEM career. However, barriers still exist in the workplace, and further success will depend on the career development opportunities the companies they work for are providing to motivate, inspire and develop them as leaders in their STEM fields. STEM companies should put in place programs to address gender, racial, and ethnic biases women of color face in the workplace. These negative experiences affect women's career experiences with women feeling a lack of belonging, causing them to stay away from company-sponsored events that are typically forums for networking and professional development (Burke, 2017).

Several researchers identify workplace barriers as the reason women decide not to stay in the STEM field. Company leaders can create an enabling environment for women of color to succeed by having mentoring programs for new employees, and programs to assess and address discriminatory practices. (Gupta, 2015). As a member of a thrice

stigmatized group due to gender, race, and ethnicity, immigrant Nigerian women in STEM experience the burden of these identities such that their ascension to career success may be quite steep and sluggish compared to other women or other women of color. Also, since immigrant Nigerian women engineers are in the United States for better educational and career opportunities, it is easy to see racial battle fatigue set in, as they resort to accepting these challenges instead of quitting. Also, due to their persistence, resilience and drive, they are likely to tough it out despite the lack of support systems to help address their concerns. To that effect, immigrant Nigerian women engineers need support to stay in STEM. With a forecast of about 8.6 million STEM jobs in 2018, if the trend of the underrepresentation of women in STEM continues, an estimated 3 million of those jobs will remain open and unfilled (Pocock, 2013).

Gender Equity in STEM

Despite the progress or efforts being made to recruit and retain women and underrepresented minorities in STEM, gender equity in STEM continues to be a challenging area of interest. As noted in Chapter 4 of Rosser's (2012) *Breaking into the Lab: Engineering Progress for Women in Science*, the gender equity issues for women in STEM include differences in salaries, the way they are treated, fewer career development opportunities (Sax, 2013). According to Rosser, gender equity involves providing women opportunities for advancement into influential positions where they can add meaningful value. Gender equity requires putting in place strategies and programs to compensate for the historical and social disadvantages that prevent both men and women from operating on a level playing field (United Nations Population Fund, 2005).

Providing gender-equitable career opportunities is a task that would require active engagement from stakeholders at all levels including women in STEM, male and female mentors and at campuses (Sax, 2013). In her research study at Iowa State University (ISU), Torres (2012) showed consistent hiring of white men 63% and 78% of the time, in their science departments from 1993 to 2003. ISU wanted to change that narrative and improve its effort to recruit and retain women and underrepresented groups in their STEM programs. To address its gender equity issue, the National Science Foundation (NSF) granted ISU funding for their ADVANCE program (Torres, 2012). The ADVANCE program requires ISU to identify changes in its policies and practices so as to improve the recruitment and retention of women in ISU's science department. (Torres, 2012).

Providing gender-equitable opportunities which are only accessible to the dominant White women group in STEM while neglecting the needs of the traditionally underrepresented minority women of color groups, does not count towards advancing equity for all women in STEM (Torres, 2012). Torres (2012) cited this as the concern with the data collection and reporting for NSF ADVANCE program since it aggregates all women together, while ignoring the differences in the ethnicity and experiences of the minority women group. In addressing a gender-equity issue by grouping all women together, the ISU ADVANCE and NSF programs promote the dominant White women group without consideration to the minority women groups. As a result, the gender-equitable career advancement programs offer opportunities to white women ISU's science faculty to feed the narrative of gender equity via gender representation.

Unfortunately, the goal of gender equity in STEM can be diminished by such oppressive gender equity programs as ADVANCE. Consequently, gender-equitable programs are only truly effective when advanced for all women in STEM, particularly the underrepresented minority women. Such programs must be inclusive to meet the needs of the underrepresented minority women groups. It is only through such effective gender equity programs can the goal of The Women and Minorities in STEM Booster Act of 2019 be realized.

Immigration & Challenges for Nigerian Immigrants

Data from the Pew Research Center shows African immigrants as having the fastest growth rate (137%) from 2000 to 2013 (Anderson, 2017), with Nigeria being the leading country for immigrants. Nigerians in the United States are highly educated and are likely to stay active in the workforce, and those in STEM fields are no exception (Rodriguez, 2014). This goes to show that Nigerian immigrants have the potential to participate in the work force and contribute meaningfully to the growth of the U.S. economy. Despite having foreign-born STEM workers make up about one-quarter of the STEM workforce in District of Columbia, Maryland and Virginia (American Immigration Council, 2017), it is difficult to comprehend the politically charged inflammatory comments attributed to the United States President about Africans and other immigrants.

The President reportedly remarked that African immigrants come from shithole countries and that Nigerian immigrants should go back to their huts (Svajlenka, 2018). Immigrant Nigerian women engineers have to deal with a myriad of challenges including

adapting to a new country, navigating a male-dominated STEM field, and dealing with the disadvantages due to the intersection of their race, gender, and ethnicity. The inflammatory remarks by the U.S. President will no doubt add to the challenges and impact their experiences of immigrants who are pursuing careers in STEM. Changes to immigration policy therefore can impact recruitment for a particular demographic in STEM. The participants of this study migrated to the United States via immigration policies at the time of their arrival including family-based immigration, employment-based immigration, student visas, and Diversity Visa Lottery programs.

The problem of underrepresentation of women and minorities in STEM is an issue of concern in the private and public sectors, and policies such as the Women and Minorities in STEM Booster Act must be in place, as law, to examine the problem and propose solutions to improve the recruitment and retention of women and minority groups in STEM. Despite the politics surrounding changes in U.S. immigration policy, there has to come a time when the immigration policy will need to be restructured to align with the goals of the STEM Booster Act to address the problem of underrepresentation of minority groups in STEM. According to Kingdon, such a change will typically occur when policy makers actively take advantage of political opportunities to ensure that policy problems are linked to policy solutions (Beland & Howlett, 2016).

Review of Other Studies and Literature

The following literature review provides some insight into the impact of gender, race, and ethnicity on the career success of minority women or women of color in STEM. In a phenomenological study on the experiences of 11 African American young women

in STEM, Kolo (2016) found out that participating in STEM extracurricular activities and having good mentors that believed in their skills and abilities were critical to the success of young African American women in STEM. Kolo (2016) used the theory of multicontextuality to show how the differences between people in high-context cultures and low-context cultures can affect their success in STEM. A key takeaway from Kolo's (2016) study was the importance of diversity in STEM, which might lead to more diverse ideas and more value in the STEM field from recruiting and retaining African American young women. These women would need an effective learning or working environment and support from their parents and their professors so they can put their best effort toward succeeding in STEM.

Litzler et al. (2014) used data from the Project to Access Climate in Engineering (PACE) to examine how the undergraduate experiences of women and underrepresented minority groups (i.e., African Americans, Latinos, Native Americans, and Pacific Islanders) in engineering influenced their confidence in STEM fields. Using social cognitive theory as the framework, Litzler et al. examined the differences by racial/ethnic group and gender in STEM confidence levels, and how personal, environmental and behavioral factors affect STEM confidence. The focus of Bandura's social cognitive theory is how an individual's attributes, environmental factors, and behavior intersect to determine the individual's level of motivation and action (Litzler et al., 2014). Personal attributes include such items as beliefs and attitudes, and behavior refers to an individual's response to a given situation and environment, including external factors such as roles others play in the given situation. An individual's self-concept, in addition

to his or her self-efficacy, also influence self-confidence. The results of the study showed that when consideration is given to personal, environmental and behavioral factors, African American and Hispanic men had higher average STEM confidence than White men. Also, White women emerged as being less STEM confident than White men and the other minority groups. In addition, race and ethnicity influence gender STEM confidence.

Women who see themselves in a male-dominated field may perceive a cultural bias and external environmental pressure (i.e., lack of role models, lack of inclusion, and little encouragement), in addition to a self-inflicted burden of feeling less capable than men in the same field. Such experiences can lower women's confidence and feelings of self-efficacy in engineering. For underrepresented minority women in engineering, this concern multiplies further based on the fact that their numbers are small and they are not part of the dominant group (Litzler et al., 2014). Litzler et al. (2014) indicated that the key to improving the retention of underrepresented groups in STEM lies in understanding the differences in students' STEM confidence, which is defined by student perception of their ability to succeed, their interest and choice of major.

Miller (2013) focused on the experiences of an underrepresented group of women, Panamanian Afro-Caribbean women of African phenotype in STEM. The Panamanian Afro-Caribbean women, like participants in this phenomenological study, were categorized as Black women, despite having distinct experiences. Miller identified challenges due to gender and phenotype as the barriers to retention for Women of African phenotype in STEM. The findings from Miller's (2013) study will help provide strategies to educators, school and teacher training institutions to support all females of African

phenotype who are interested in participating in STEM careers. Miller suggested conducting similar research with other African women of African phenotype to obtain additional strategies that might help them achieve success in engineering.

Parker (2013) conducted a phenomenological study through the lens of critical race feminism. Parker showed that African American families and science identity formation influenced the STEM experiences of 10 African American female undergraduate students. The findings showed that having a strong family support system is a positive influence for success for African American females in STEM. Also, students in STEM at historically black colleges and universities (HBCU) tend to be in the right environment for academic success. The HBCUs provide a welcoming, supportive and nurturing social, cultural and racial environment for success in STEM (Parker, 2013).

Somerville-Midgette's (2014) phenomenological study with cognitive interview techniques examined the lived academic and occupational experiences of six African American female engineers' persistence in STEM. The results of the study showed early positive academic influence and achievement, in addition to environmental factors and strong support systems, motivated participants' persistence in STEM. Participants had a minimum of four and half years of experience in the engineering profession, which served as a test for their persistence and success in STEM.

McGee and Bentley (2017) conducted a qualitative phenomenological study to understand how high-achieving Black female students and Black women in STEM deal with the structural issues of racism, sexism, and race-gender bias in STEM. The findings from the study showed that the Black women demonstrated resilience as their key to

surviving the negative experiences in STEM. McGee and Bentley called attention to the fact that resilience is not endless and that having the right institutional structures could help the Black women to succeed. McGee and Bentley also noted that the Black women could suffer racial battle fatigue by dismissing racial concerns and any attendant effects on their health. As is the case with similar existing research, the Black women in STEM worked hard to demonstrate they have the intellectual capability and conduct needed to succeed in the STEM field (McGee & Bentley, 2017). McGee and Bentley noted institutional changes, support systems, mentoring, and counseling resources are necessary for addressing the needs of Black women and other minority students in STEM.

Johnson (2012) and Jenkins (2012) shared some similarities as they focused on the experience of women of color in STEM. Jenkins (2012) discussed the role of science or math self-efficacy, department climate, and campus climate at the intersection of race and gender. At the same time, Johnson (2012) focused on the impact of campus racial climate on perceptions and overall sense of belonging among racially diverse women in STEM majors. Unlike the studies presented earlier, both Johnson and Jenkins conducted quantitative studies to understand how factors such as self-efficacy, campus climate, race, gender, and ethnicity interact to help African American women succeed in engineering. Both studies acknowledge the double negatives faced by African American women, who have both a race and an ethnic identity dimension.

Galloway (2012) provided a diverse analysis of the relationship between race, gender, and class in a qualitative study on eight African American women conducting research in STEM. Galloway discussed the African American women's strategies for

success, their ability to understand and navigate their diverse identities with regard to their race, gender, and class as they sought to use their successes to promote other minority women in higher education. The findings of the study will be beneficial to African American women, who would be pursuing careers or further studies in STEM, as well as policy makers that might gain some understanding of how to help this group of women succeed. Galloway used Black feminist theory to explain the challenges experienced by the women as they faced racial and gender issues while they pursued their education in STEM, and while conducting research in mostly White-dominated institutions. Galloway identified mentoring and race, gender, activism, early academic preparation, and construction of a scientific identity as the five themes that influenced the experiences that led to the success of the participants in STEM research and teaching. Galloway also showed that African American women would see race, more than gender, as influencing their success in STEM.

Gap in Literature

This literature review revealed consistency in research about the challenges that minority women face in STEM, particularly with biases due to gender, race, or ethnicity, and how these social identities intersect to cumulatively affect their experiences and career success in STEM. The research studies used in the literature review showed various models for success and retention for women, particularly Black and other minority women and African American men in STEM (Parker, 2013; Miller, 2013; Jackson, 2013; Jenkins, 2012). However, there is a gap in the literature on the experiences of immigrant Nigerian women engineers, who in addition to facing

challenges due to their race, gender and ethnicity, also have their immigrant status as a disadvantage while pursuing studies and advancing in their careers in STEM. Consequently, the effort to understand and address the unique experiences of immigrant Nigerian women engineers would be beneficial in increasing and retaining underrepresented minorities in STEM, in line with the goal of the Women and Minorities in STEM Booster Act of 2019.

This study explored the career experiences of immigrant Nigerian women engineers in the Washington Metropolitan area with regard to what impacts opportunities outlined in the Women and Minorities in STEM Booster Act may have had on their career success in STEM, in addition to what impact changes in U.S. immigration policy may have had on the recruitment of immigrant Nigerian women in STEM. The study findings provided some understanding on how to address issues including the recruitment and retention of underrepresented minority groups in STEM as well as the value in restructuring U.S. immigration policy for this immigrant population.

Summary

The theoretical foundations of this study included Kingdon's (1984; 1995) MSF and Crenshaw's (1989) intersectionality theory. Chapter 2 included a review of the literature and theories on the three streams of the problem, policy and politics for exploring the career experiences of immigrant Nigerian women engineers, the impact of the intersection of the social identities of gender, race, and ethnicity on their career success, and what impact changes in U.S. immigration policy has had on recruitment, as well as what impacts opportunities outlined in the Women and Minorities in STEM

Booster Act may have had on their career success in STEM. Also presented was an analysis of relevant studies by discussing the purpose, the research methods used, and the results of the studies. As seen from the research studies presented, there are literature and research studies on African American women, white women and other women of color and their experiences in STEM (e.g. (Butler, 2015; Miller, 2013; Johnson, 2012; Jenkins, 2012). However, a gap exists in the scholarly literature, as none of the studies included immigrant Nigerian women engineers as a focus.

By focusing on immigrant Nigerian women engineers, I addressed the issues of underrepresentation of women and minorities, including immigrant Nigerian women in STEM, the impact of changes to U.S. immigration policy and impacts of the opportunities outlined in the Women and Minorities in STEM Booster Act of 2019 on the recruitment of underrepresented minorities and women in STEM. And it is by exploring the career experience of this minority group of immigrant Nigerian women engineers that this gap in the recruitment and retention of minority women in STEM can be addressed. Additionally, the focus of President Obama's Educate to Innovate Campaign was on providing opportunities to improve the participation of underrepresented groups, including women in STEM education and STEM career opportunities (White House, 2015). This policy decision ties into the effort to ensure a boost in minority women in STEM and highlights the problem that this study addressed. Chapter 3 includes the research design and rationale, the role of the researcher, study methodology, issues of trustworthiness and data collection strategy.

Chapter 3: Research Method

Introduction

The purpose of this descriptive phenomenological study was to explore the career experiences of immigrant Nigerian women engineers in the Washington Metropolitan area with regard to what impacts opportunities outlined in the Women and Minorities in STEM Booster Act may have had on their career success in STEM, in addition to what impact changes in U.S. immigration policy may have had on the recruitment of immigrant Nigerian women in STEM.

Career success is defined as access to gender-equitable opportunities for growth and professional development geared towards upward mobility in the engineering careers of these immigrant Nigerian women. By using the lens of intersectionality theory and MSF, this study explored the multiplicity effect of the intersection of gender, race, ethnicity, and immigrant status on immigrant Nigerian women engineers, the impact of changes to the U.S. immigration policy on recruitment of immigrant Nigerian women engineers, and the impacts of the opportunities outlined in the Women and Minorities in STEM Booster Act on their career success.

The study included a descriptive phenomenological design to capture the differences in experience for immigrant Nigerian women engineers, who identify as Black women because of their race, but have more isolating experiences and face more disadvantages than African American women do because their ethnicity and immigrant status come into play. All these disadvantages add up to the reason they are almost invisible in STEM. Researchers have not documented or captured the experiences of

immigrant Nigerian women engineers, and this study captured and brought to light their experiences and the effect that addressing those experiences could have on improving the number of Black immigrant women in STEM.

Chapter 3 includes a description of the role of the researcher, including any researcher bias and ethical strategies used to reduce bias in the study, the population sample for the study, the criteria and process to recruit the participants, and the process to select participants for the study. It also includes the data collection instrument, data analysis processes, issues of trustworthiness with the study, and ethical considerations in recruiting and protecting the participants and the data for the study. Chapter 3 concludes with a summary and transition to Chapter 4.

Research Design and Rationale

Research Design

A descriptive phenomenological design serves as one potential design and possibly the best fit for this study. In a descriptive phenomenological study, the researcher collects data through interviews and observations from a group of participants who have experienced the same phenomenon and describe the common meaning and essence of the participants' experiences (Creswell, 2013). The researcher in a descriptive phenomenological study brackets their own experience to look at the data as presented without any bias. Phenomenological researchers capture more than the experience of an individual and use stories, journals, and other forms of documentation to collect data about a phenomenon experienced by a group of people (Rudestam & Newton, 2015). The overarching research question is: What are the career experiences of immigrant Nigerian

women engineers in the Washington Metro Area with respect to the intersection of the social identities of gender, race and ethnicity? The sub-questions are as follows:

RQ1: What impact does the ban on family immigration and Diversity Visa Lottery program towards Nigeria have on the recruitment of immigrant Nigerian women engineers?

RQ2: What impact does the Women and Minorities in STEM Booster Act have on career experiences of immigrant Nigerian women engineers?

In-depth online and telephone semi-structured interviews were conducted to collect data on the career experiences of immigrant Nigerian women engineers. A sample participant size of 11 immigrant Nigerian women engineers residing in the Washington Metro area (Maryland, Washington, DC, and Virginia) was contacted and interviewed for this study. This location was ideal for this study because of the large number of engineering companies including the federal government, publicly owned and private engineering firms, coupled with the high and growing number of Nigerian immigrants in an area that is the political seat of the United States. Also, data from American Immigration Council (2017) show that in 2015, foreign-born STEM workers made up 26.8%, 26.3% and 22.9% of the STEM workforce in District of Columbia, Maryland and Virginia, respectively.

Research Rationale

For this study, the choice of a descriptive phenomenological research design was most effective for exploring the career experiences of immigrant Nigerian women

engineers. Through the use of the descriptive phenomenological research design, the meaning and essence of the lived experiences of the immigrant Nigerian women engineers with regard to the intersection of gender, race, ethnicity, and immigrant status, the impacts of the opportunities outlined in the Women and Minorities in STEM Booster Act on their career experience, and the impact of changes to U.S. immigration policy on recruitment of immigrant Nigerian women engineers were examined. Husserl's descriptive phenomenology focuses on using evidence of people's lived experiences presented in the first person by those experiencing it to provide descriptions of what was being experienced in the way it occurred and on its own merits (Reiners, 2012). In addition, the choice of descriptive phenomenological research allowed me the ability to explore, analyze, and describe the phenomenon being experienced by this group of immigrant Nigerian women engineers on a first-person account basis (Matua & Van, 2015). By so doing, the depth of their experience was captured without any form of dilution or bias from me. For this study, I bracketed any knowledge and personal experience of this phenomenon to get first-hand and rich accounts of the phenomenon through the lived experience of the 11 study participants (Matua & Van, 2015). Although other qualitative approaches such as narrative, grounded theory, ethnography, or case study may have been suitable for my study, they may not have been as effective as a phenomenological approach. In addition, the descriptive phenomenological design was effective in providing meaning and essence of phenomenon being studied.

A narrative study may not fully capture the career experiences of a group of immigrant Nigerian women engineers, as a narrative study involves exceptional stories

that may have some twists or turns in the experiences of one or a few individuals, set within the individuals' personal, social, and historical context (Patton, 2015). Grounded theory research involves studying the processes that lead to theory development. Researchers generate a theory or ground a theory on data from participants who have experienced a process (Creswell, 2013). In using the grounded theory approach, a researcher focuses on a process that has defined stages that would occur within a certain time frame. The researcher collects data mostly via interviews and compares the data with main ideas of the grounded theory. Intersectionality theory and MSF provided the theoretical lens to explore the career experiences of immigrant Nigerian women engineers. Had such theories been lacking, a grounded theory approach may have been more effective.

The focus of an ethnographic study is on a group of people who share a cultural experience. The ethnographer obtains data by living with, interviewing, and observing a culture-sharing group. An ethnographic study was not appropriate even though the participants in this study shared some cultural similarities, as the issue of interest is their career experience as immigrant Nigerian women engineers in the United States. Lastly, the case study approach was also not ideal. The focus of a case study is on a case bounded or reviewed under certain guidelines in terms of time and place. The case study could be suitable for an intrinsic case (unique with unusual interest) or an instrumental case (pertaining to a particular issue or problem; Creswell, 2013). The guidelines of studying an issue occurring over time and place will not apply to this research study; as such, the case study approach is not appropriate.

Role of the Researcher

In conducting this study, I observed and captured the experiences of the study participants, and thereby played the role of a key instrument in the qualitative data collection. I conducted in-depth semi-structured telephone or online interviews of the study participants, analyzed interview data, and summarized the results of the interviews to capture the career experiences of immigrant Nigerian women engineers in the Washington Metropolitan area with regard to what impacts opportunities outlined in the Women and Minorities in STEM Booster Act may have had on their career success in STEM, in addition to what impact changes in U.S. immigration policy may have had on the recruitment of immigrant Nigerian women in STEM. The study was conducted per the requirements and guidelines of Walden University's IRB. As the key research instrument in this descriptive phenomenological study, I identified my opinions and experiences and bracketed them from affecting the outcome of the study (Reiners, 2012).

As a Nigerian woman of African phenotype that immigrated to the United States, completed undergraduate education at the School of Engineering at the University of Maryland College Park, and have worked as an engineer for over 15 years, this phenomenon is a familiar experience. The phenomenon has shaped my experiences, leading to an appreciation of the challenges and differences of these women. Working to remain objective and self-aware while conducting this study, I did not introduce biases to this research study as a result of my experiences. My experience has shaped my understanding that while immigrant Nigerian women work hard to excel in their studies and careers as engineers, the triple identities of gender, race, and ethnicity can have an

impact on their career success. In addition, political discussion on changes in immigration policy can have an impact on one's ability to consider migration to the United States, and ultimately on the recruitment of underrepresented minorities and immigrants in STEM. By using a descriptive phenomenological research design for this study, my experience was bracketed so as not to introduce any preconceptions or bias of my existing knowledge on the phenomenon. Doing so allowed me to tap directly into the lived experiences of the participants to drive the findings of the study (Matua & Van, 2015). I had no close friend or family member that participated in the study to eliminate any feeling of coercion or conflicts. Participants for the study included female engineers who met the criteria for the study. Giving that I do not supervise or work closely with any of the women who participated in the study, there were no issues with power or authority over the participants. My years of experience on the job did not impact the study or the participants, as each participant had stories based on her experience in the areas she has worked. My cordial working relationship with some of the women engineers did not interfere with the research or the outcome of the study.

Methodology

This study was qualitative. In a qualitative research study, a researcher typically sets out to obtain information about an issue or phenomenon or to develop a theory to help understand a situation. A group of individuals who participate in a study with a qualitative research method may feel empowered to tell their stories and lend their voices to issues that need exploring. Qualitative research is consistent with exploring the career experiences of immigrant Nigerian women engineers in the Washington Metropolitan

area with regard to what impacts opportunities outlined in the Women and Minorities in STEM Booster Act may have had on their career success in STEM, in addition to what impact changes in U.S. immigration policy may have had on the recruitment of immigrant Nigerian women in STEM. This section includes the following subsections: participant selection logic, instrumentation, researcher-developed instruments, procedures for recruitment participation, data collection instruments, and data analysis plan.

Participant Selection Logic

The study used a subset of purposeful sampling known as snowball sampling approach, with defined criteria to select the participants. This type of sampling strategy is useful in this situation when recruiting participants that have experienced the phenomenon. The criteria for selecting the sample participants for this study were a Nigerian woman who immigrated to the United States and completed a degree in engineering. In addition, the woman had a minimum of three years' experience in their engineering career and resided in the Washington metropolitan area that encompasses Maryland, Washington, DC, and Virginia. The study participants were randomly selected from a list of individuals who met the criteria for the study. The snowball sampling technique was used to identify and contact a few other Nigerian women engineers who met the criteria for the study to participate in the study and they were asked to recommend others who may be willing and able to participate in the study. This process was repeated as necessary to meet the desired sample size for the study. This approach did not present any disadvantage, as the study result did not show any bias or coercion due to snowball sampling.

A sample size of 30 to 60 could be appropriate for a study that involves small amounts of data collected using semi-structured interviews, six to 10 participants could be appropriate for a phenomenological study that involves multiple interviews, and 20 to 30 participants could be appropriate for a grounded theory research study that involves two to three interviews per participant (Patton, 2015). According to Patton (2015), determining the sample size will depend on the type of information sought, the impact of the study, in addition to the purpose for which the data is being used.

Data collection was via semi-structured interviews conducted for the 11 participants. Giving that the approach was to seek information-rich data from each participant, the choice of 11 participants was appropriate for this descriptive phenomenological study, as it is possible to reach saturation with six or fewer participants (Moustakas, 1994). At the point of saturation, where participants will present no new information, it will be a sign that the study can move forward with the information received thus far (Moustakas, 1994).

Instrumentation

According to Patton (2015), the personal accounts of lived experience for each participant will be collected via interviews to describe a phenomenon. I completed the NIH Human Research Protections training and had requisite knowledge of what was required for conducting a research study and protecting study participants. Interviewing participants commenced after the Walden University IRB approval was received. Due to the COVID-19 pandemic, data collection for the study was via a combination of semi-structured telephone and online interviews, with researcher-developed interview protocol

(Appendix B). Before the interview, I ensured content validity for my researcher developed interview protocol by sending my interview questions to six Walden Faculty in the School of Public Policy and Administration for expert review and validation. I received feedback, which helped me improve the quality of my interview questions.

Telephone interviews lasted approximately 45 minutes and captured information on the experiences of 10 immigrant Nigerian women engineers residing in the Washington Metro area, who completed their engineering studies in the U.S., and have a minimum of three years' experience in their career. The interviews were audio taped using appropriate recording devices and processes and then transcribed. The one participant that completed the interview online sent back her responses for analysis and storage.

Before the semi-structured telephone and online interviews, the consent forms were presented to the study participants via e-mail. After I received participants' consent, I sent them details on the two policies on which the interview questions were based: the U.S. immigration policy and the overview of Women and Minorities in STEM Booster Act of 2019. I then emailed the participants the Interview Information Sheet (Appendix A) and the Interview Protocol (Appendix B) so they would be familiar with the questions that would be asked. I also asked the participants to reply with the days and times they were available so that I could schedule the interviews. Based on the participants' availability, the interviews were conducted within two weeks. The interviews were audio-tape recorded, transcribed after collection, and analyzed using hand-coding via Microsoft excel. The transcribed data was shared with each participant to ensure their answers and

experience were adequately captured. All data collected for the study will remain locked away for a period of five years. The interview also allowed for additional information that the participants wished to share related to the issue being discussed. No follow-up interview was conducted.

Procedures for Recruitment, Participation, and Data Collection

To identify potential study participants, I reached out to potential study participants in my contact list. Via snowball sampling, participants that met the criteria were asked for referrals to other participants who met the criteria for the study. A recruitment e-mail was created and sent to all potential participants to inform them of the voluntary nature of the study and to obtain their consent to participate in the study. The processes selected to collect interview data were semi-structured telephone, and online interviews. For telephone and online interviews, the consent form was emailed before the interview. After I received participants' consent, I sent them details on the two policies from which the interview questions were based: U.S. immigration policy (focus on Immigration Act of 1990) and the overview of Women and Minorities in STEM Booster Act of 2019. I then emailed the participants the demographic questions and the interview questions so they would be familiar with the questions that would be asked. I also asked the participants to reply with the days and times they were available so I could schedule the interviews. Once a participant's consent was received, the participant was contacted to set up appointment for the interview based on their availability.

Data Collection

I was the primary instrument for data collection, transcription and analysis. Interview data was collected via phone and online. I commenced the phone interview session with an introduction and an overview of U.S. immigration policy and an overview of the STEM Booster Act. The interview lasted for approximately 45 minutes. The interviews were recorded to document participants' responses. After the interview was completed, participants were allowed time for questions and any responses clarified. Participants were provided information on how to contact the interviewer if they had any additional questions or comments. After all the questions were answered, the participants were thanked for their participation and interview was concluded. After the interviews were transcribed, the transcribed data was shared with each participant to ensure their answers and experience were properly captured. In addition, once the study is completed, a summary report of the findings will be emailed to the participants. All data collected for the study will remain locked away for a period of five years.

Data Analysis

Creswell (2014) noted researchers should carry out data analysis closely with data collection and the organization of findings. After interviewing each participant, the interview data was promptly transcribed and analyzed. For the telephone interviews, a recording device was used to audio tape and record the interviews to ensure accuracy of the information shared. The data collected were transcribed, analyzed and hand coded in Microsoft excel, and stored on my password protected personal computers.

The interview responses were reviewed for key words and phrases which were used to identify possible themes. I entered these data into an excel spreadsheet for easy analysis, and applied Moustakas (1994) recommended analysis using a modified Van Kaam method to analyze the data and identify possible themes. The process involved various stages of data analysis, which followed after I transcribed the interview data. Using Microsoft excel allowed me to create tabs and enter each participant's transcribed data to the corresponding interview questions. After I reviewed the transcribed data to gain some familiarity with the experience shared by each participant, I identified themes in participant's responses to each question and was able to identify significant statements to code into themes. This process was followed by multiple iterations of reducing and combining similar experiences into themes that reflected the essence of the experiences of the participants. After analyzing the data, a textural description of what the participants experienced was created, as well as a structural description of how they lived the experience (Creswell, 2013).

Issues of Trustworthiness

Credibility, Transferability, Dependability, Confirmability

Since the interviewing technique was the only source for data collection, there was a need to ensure the credibility and quality of the study. Researchers can determine trustworthiness by checking the credibility (validity), transferability, dependability (reliability) and confirmability (objectivity) of the study (Kumar, 2014). To ensure the credibility of the study the interviews were objective and were conducted without any bias or distractions. The transcribed data had to be appropriately coded. These steps were

necessary to ensure the study was trustworthy. To ensure the validity of the study further, the transcribed responses from the study participants were sent to the participants for their review to ensure there were no changes to the information provided.

The validity strategies that were used for this research study included member checking (by sending participants transcript of their responses to provide them an opportunity to provide any feedback), clarification of biases that I bring to the study, use of peer debriefing by identifying faculty members who vetted the interview questions (Creswell, 2014). In addition, as Loh (2013) suggested, audience validation was used by reaching out to the audience for the study, immigrant Nigerian women engineers, and asking them to assess whether the data interpretation made sense and could be of value to them on their journey. These different validation strategies are forms of triangulation and helped provide validity to the research study.

Transferability refers to how easily researchers can transfer the results of a study to other studies or scenarios (Kumar, 2014). Although there could be issues with establishing transferability because of the specific group and size of the sample, detailed information on the research design and process was shared. Dependability, which parallels reliability, refers to the ability to replicate a study with the intent of obtaining similar results (Kumar, 2014). Data reliability was ensured by keeping a detailed record of the data collection tools and processes, checking the transcripts of the interviews to ensure there were no obvious mistakes, and comparing data with codes to ensure there was no change in the definition or meaning of the codes (Creswell, 2014). Confirmability refers to the extent to which others can confirm the outcome of the study (Kumar, 2014).

Confirmability defines how objective a study is. To stay objective, researcher biases were in check during the interviews. A detailed record of the data collection tools and processes used were kept, such that, if another researcher replicates the study or conducts the study with the same population sample, the outcome of the study will be similar.

Ethical Considerations

Confidentiality

There is need to abide by the ethical practices required of a research study in order to respect the rights and needs of the participants (Creswell, 2014). The study was conducted following approval and authorization from the Walden University IRB. The participants were adults and were informed of the nature of the study and that their participation in the study was voluntary, which meant their decision or rights to participate in the study or not will be respected. I obtained informed consent from the participants. The participants were informed of their right to stop their participation any time, that there was no risk to their safety or well-being by participating in the study, and that their rights and confidentiality will be protected. This information was included in the consent form that was emailed to the study participants. The participants' names did not appear in the study. Personal information, such as the participants' names and locations were protected, by assigning each participant a numerical designation to protect her confidentiality. The electronic data obtained from the interviews, including any forms completed by the study participants, will remain securely stored in on a password protected personal computer for five years.

Ethical Concerns

Ethical issues could arise during the data collection and management process, and it is important to address these issues. In collecting and managing the data for this study, there was open and honest communication with the participants by informing them about everything they needed to know concerning the study, including that the interview will be recorded, about the data they provide during the interviews, and how the study will be used, as well as by allowing them access to the transcribed data so they can review their responses and ensure that their responses are properly captured and presented. When the study is complete and published, copies of the study will be shared with the participants.

Summary

The focus of Chapter 3 was the research methodology for the qualitative research study, including details on the research design, the participants, and the participant selection process, data collection, analysis, and interpretation, and ethical issues regarding the protection of study participants. Despite the existence of other methods to conduct this study, the descriptive phenomenological approach was best suited to explore the career experiences of immigrant Nigerian women engineers in the Washington Metropolitan area with regard to what impacts opportunities outlined in the Women and Minorities in STEM Booster Act may have had on their career success in STEM, in addition to what impact changes in U.S. immigration policy may have had on the recruitment of immigrant Nigerian women in STEM. Chapter 4 includes the findings of the study.

Chapter 4: Results

Introduction

The purpose of this phenomenological study was to explore the career experiences of immigrant Nigerian women engineers in the Washington Metropolitan area with regard to what impacts opportunities outlined in the Women and Minorities in STEM Booster Act may have had on their success in STEM, in addition to what impact changes in U.S. immigration policy may have had on the recruitment of immigrant Nigerian women in STEM. Using a descriptive phenomenological approach provided an opportunity for the participants to share their views and personal experiences through interviews with open-ended questions to drive extended conversations (Rudestam & Newton, 2015). This study was guided by this overarching research question: What are the career experiences of immigrant Nigerian women engineers in the Washington Metro Area with respect to the intersection of the social identities of gender, race, and ethnicity? The sub-questions are:

RQ1: What impact does the ban on family immigration and Diversity Visa Lottery program towards Nigeria have on recruitment of immigrant Nigerian women engineers?

RQ2: What impact does the Women and Minorities in STEM Booster Act have on career experiences of immigrant Nigerian women engineers?

In this chapter, I will discuss the setting of the study, demographics of the study participants, the data collection method, data analysis, evidence of trustworthiness (including credibility and dependability), and results of the data collection and analysis.

Setting

I planned to conduct face to face and phone interviews; however, due to the COVID-19 pandemic and in keeping with the CDC guidelines of maintaining social distancing, I could not proceed with face to face interviews. However, with Walden IRB approval to use alternative data collection formats, I opted to interview via email or phone. I used purposeful sampling to identify participants and used in-depth semi structured interviews which lasted for about an hour. I had intended to interview six to 10 immigrant Nigerian women engineers and had initially reached out to six participants from my contact list, who via snowball sampling introduced me to 12 other potential participants. In screening the participants to find out if they meet the criteria for the study, I ended up with a total of 15 participants who met the criteria for the study. However, due to schedule conflicts, only 11 participants were available and consented to participate in the study, which was one more than I had expected. The participants were Nigerian women who immigrated to the United States to complete their engineering program, currently reside in the Washington metro area (encompassing District of Columbia, Maryland, and Virginia), and have a minimum of three years of experience in their engineering careers.

Demographics

The criteria for selecting 11 participants for this study were a Nigerian woman that immigrated to the United States to complete her engineering program, currently reside in the Washington metro area (encompassing District of Columbia, Maryland, and Virginia), and has a minimum of three years of experience in her engineering career. The

study participants migrated to the U.S. via family-based immigration, employer-based immigration, and Diversity Visa Lottery program, which are the three categories of immigrant visas under the Immigration Act of 1990. A few participants came in as non-immigrants with student visas, which were later changed to H1B visas by their employers. All the study participants reside in the state of Maryland, but work in Maryland, DC, and Virginia. To protect the identity of each study participant, I designated them as Participant1 (P1) to Participant11 (P11). See Table 1 below for Participant Demographics.

Table 1

Participant Demographics

| Participants | Age Range | Marital Status | State of Origin (Nigeria) | # of Years in the Engr profession | Year of immigration to U.S. | Highest Level of Education Attained | Engineering focus Area | Colleges attended in the U.S. | State of Residence |
|---------------------|------------------|-----------------------|----------------------------------|--|------------------------------------|--|-------------------------------|---|---------------------------|
| P1 | >50+ (>60) | Single | Ogun | 40+ | 1980s | Doctoral | Electrical & Computer | None, Not U.S. Trained | MD |
| P2 | 35 to 39 | Married | Enugu | 10+ | 2012 | Master's | Civil | Morgan State | MD |
| P3 | 25 to 29 | Married | Edo | 6-10 | 2007 | Master's | Electrical | Morgan State, Virginia Tech | MD |
| P4 | 35 to 39 | Single | Abia | 6-10 | 2006 | Doctoral | Industrial & Systems | Morgan State | MD |
| P5 | 35 to 39 | Married | Anambra | 10+ | 2003 | Bachelor's | Chemical | Howard | MD |
| P6 | 30 to 34 | Single | Imo | 6-10 | 2007 | Master's | Electrical /Computer - Minor | University of District of Columbia, Johns Hopkins Community College | MD |
| P7 | 35 to 39 | Single | Ondo | 10+ | 2003 | Master's | Civil | Baltimore County, University of Maryland College Park (UMCP) | MD |
| P8 | 30 to 34 | Single | Abia | 6-10 | 2007 | Master's | Civil | Morgan State, UMCP | MD |
| P9 | 45 to 49 | Married | Osun | 10+ | 1996 | Doctoral | Electrical | UMCP, UMUC, University of Phoenix | MD |
| P10 | 30 to 40 | Married | Imo | 6-10 | 2010 | Master's | Civil | Morgan State | MD |
| P11 | 35 to 39 | Married | Edo | 10+ | 2009 | Master's, Doctoral in progress | Civil | Johns Hopkins, Morgan State | MD |

Data Collection

For this study, I was the instrument for data collection, transcription and interpretation. I was courteous and professional during the phone interviews. I made the participants feel at ease by helping them understand that the richness of their experience and openness was needed to meet the purpose of the study. Before the interview, I conducted an expert panel review of the interview questions by sending my interview questions to six Walden faculty in the School of Public Policy and Administration for content validation and I got feedback that helped me improve the quality of my interviews.

After I received approval for my study, I made initial contact with the study participants, after which I sent each of them a consent form via email. The consent form included the details of the study and the participants' rights. After I received participants' consent, I proceeded to send them details on the two policies which the interview questions were based: U.S. immigration policy (with a focus of the Immigration Act of 1990) and the overview of Women and Minorities in STEM Booster Act of 2019. I then emailed the participants the demographic questions and the interview questions so they would be familiar with what would be asked. I also asked the participants to reply with the days and times they were available so that I could schedule the interviews. The interviews were scheduled and completed via phone, except for one of the participants that opted to provide her answers via email after I experienced some technical difficulty with my recording device and lost her recorded answers. I recorded the interviews using

an audio recorder which I purchased from Amazon. The interviews lasted between 37 minutes and 45 minutes.

I had downloaded the free version of the *Otter Transcription App* from the Google Play Store to use for transcribing the interviews. However, after I played back some of the audio recorded interviews, the transcribed notes did not make a lot of sense. I attributed this to the participants' accent and the challenge with the software being able to understand what was being communicated. This resulted in my manual transcription of each participant interview. I sent the transcribed notes to each participant to validate the accuracy of their responses. The transcribed interview data were stored on my password-protected desktop computer. My data collection plan was in line with what was described in Chapter 3, except for the COVID-19 pandemic situation, which resulted in phone and email versus face to face interviews.

Data Analysis

The intent of data analysis in a phenomenological research study is to identify themes and patterns in data collected. This is helpful during data analysis to ensure that textural and structural description of participant's experience are identified (Moustakas, 1994). For this study, I reviewed data collected from the interviews to identify common themes. After transcribing the interview data, I used Microsoft excel to create sheets for each research question, and on each sheet, I provided a row for each participant and their responses to the question. For each sheet, which corresponded to each question, I reviewed participants' responses carefully for themes and added a column to list common themes identified across each interview responses. With each transcript review came

additional themes, resulting in a lot of themes initially. After much analysis, I had ten emergent themes, one for each research question. Each of the themes will be discussed in the results section.

Tables 2, 3 and 4 show each Research Questions and the Corresponding Interview Questions.

Table 2

Main Research Question (MRQ) and the Corresponding Interview Questions

| Research Question code | Question |
|------------------------------|--|
| Main Research Question (MRQ) | What are the career experiences of immigrant Nigerian women engineers in the Washington Metro Area with respect to the intersection of the social identities of gender, race and ethnicity |
| MRQ1a | Prior to immigrating to the U.S., how did your race, gender and ethnicity impact your experience in STEM? |
| MRQ1b | Upon immigrating to the U.S., how has your race, gender and ethnicity impacted your career experience in STEM? |
| MRQ1c | Could you speak of an experience in your career about how you were treated based on your race, gender, ethnicity or immigrant status? |

Table 3

Research Question 1 (RQ1) and the Corresponding Interview Questions

| Research Question code | Question |
|---------------------------|--|
| Research Question 1 (RQ1) | What impact does the ban on family immigration and Diversity Visa Lottery program towards Nigeria have on the recruitment of immigrant Nigerian women engineers? |
| RQ1a | How, if at all has the U.S. immigration policy impacted your engineering career? |
| RQ1b | What, if any are the implications of changes in U.S. immigration policy on recruitment of potential or new immigrant Nigerian women engineers? |

Table 4

Research Question 2 (RQ2) and the Corresponding Interview Questions

| Research Question code | Question |
|---------------------------|--|
| Research Question 2 (RQ2) | What impact does the Women and Minorities in STEM Booster Act have on career experiences of immigrant Nigerian women engineers? |
| RQ2a | In what ways, if any has U.S. STEM policies been promoted amongst immigrants or minorities in STEM? |
| RQ2b | In what ways, if any has the Women and Minorities in STEM Booster Act impacted you in your engineering career? |
| RQ2c | Are there ways in which the Women and Minorities in STEM Booster Act could be beneficial to boost the number of underrepresented minorities in STEM? If so, can you describe them? |
| RQ2d | What would you suggest to U.S. policy makers that could help improve STEM policies for immigrant Nigerian women in STEM or underrepresented minority groups in STEM? |

Evidence of Trustworthiness

I established trustworthiness through credibility, confirmability, dependability, and transferability. I established credibility by triangulation, which was done by interviewing study participants who met the study criteria, providing them the same interview questions and identifying the themes in their responses. I also used member checking by sending the transcribed interview responses to the participants to verify that their answers were free of errors of interpretation. I conducted an expert review and content validity of the interview protocol with Walden faculty members who provided feedback which was incorporated into the study interview questions. The triangulation and member checking ensured the validity of the study.

I established confirmability by ensuring self-awareness during the interview process. I introduced myself to the participants and made them aware of my background

as an immigrant Nigerian female engineer. I used the same open-ended interviews for all participants to ensure a focus and reduce any inconsistencies.

I established dependability by ensuring the audio recordings of the interviews and the transcribed interview data are safely stored in password-protected computer folders.

I established transferability by ensuring that I correlated the study theories to the research questions. In addition, the problem statement and research questions and study design are aligned. Participants were recruited via purposeful sampling and snowball sampling.

Results

The study results depict a thorough review of the detailed transcription, coding and analysis of the interview data. Through the analysis of the interview data, I identified emerging themes based on the participants' rich descriptions of their experience as they responded to the interview questions. I captured and analyzed the transcribed data using a Microsoft excel spreadsheet. I reviewed the data initially to identify a lot of themes, which, after several reviews, I was able to develop emergent themes based on the research/interview questions. Table 5 below shows the themes as identified after a review of the transcripts of each participant's interviews, and the number and percentage of the participants sharing those themes.

Table 5

Themes

| Theme# | Code | Description | n=11 | % |
|--------|-------|---|------|-----|
| 1 | MRQ1a | No negative experience due to race, gender, or ethnicity in Nigeria | 7 | 64 |
| 2 | MRQ1b | Negative impact due to race, gender & ethnicity in the U.S. | 9 | 82 |
| 3 | MRQ1c | Negative experience due to race, gender, ethnicity and immigrant status | 10 | 91 |
| 4 | RQ1a | No impact on career due to U.S. immigration policy | 9 | 82 |
| 5 | RQ1b | Significant reduction in immigrant Nigerian women engineers in STEM due to changes in U.S. immigration policy (Immigration Act of 1990) | 10 | 90 |
| 6 | RQ2a | Various STEM programs for minorities and at HBCUs | 11 | 100 |
| 7 | RQ2b | Beneficiaries and Benefactors of STEM Booster Act | 10 | 91 |
| 8 | RQ2c | STEM Outreach to Middle and High Schools, and to immigrant communities | 9 | 82 |
| 9 | RQ2d | Financial Incentive/Scholarship | 5 | 45 |

Main Research Question, MRQ Emergent Themes

MRQ was the basis for the underlying questions that showed the experiences of the study participants as it relates to their race, gender and ethnicity. The participants showed they were interested, competent and intellectually capable of studying engineering and pursuing their engineering careers regardless of what challenges they may encounter. While race, gender and ethnicity did not impact their experience in Nigeria, some had cultural and family restrictions, but chose to continue anyway. They believed in their knowledge and ability and were confident they would be successful in their careers. Upon immigrating to the United States, seven out of the 11 participants proceeded to obtain the Master's degree, and three pursued Doctoral degrees, showing

their commitment to the engineering career despite the negative experiences they faced due to their race, gender and ethnicity. Below are the three emergent themes and participant response shown as direct quotes.

Theme 1: MRQ1a: No negative experience due to race, gender or ethnicity in Nigeria. Seven of the 11 participants did not have negative experiences due to their gender, race or ethnicity while pursuing their engineering programs in Nigeria.

Participant 2: There was no negative experience, not minding there were just few ladies in my class being that STEM is a male dominated field. So, in a class of 35, we were just 4 ladies, and the guys in my class were not discriminating against us the ladies instead they were encouraging us. So my experience before migrating to the U.S., even for my race as a black lady, an African, a Nigerian, an Ibo, generally speaking I had a good experience before coming over to the United States.

Participant 5: The race was never an issue being that at that time, I was surrounded by people of the same race. And a lot of people with the same gender so it was never an issue. So, there was no negative impact or a negative stereotype associated with it.

Participant 8: Prior to immigrating to the U.S., coming a country like Nigeria, there were a lot of women in the STEM field so I was in classes with lots of girls/women that had same career interest that I did. Back then there was no issue of race because Nigeria is mostly a black nation.

Five of the participants stated that while they had no negative experience due to race or ethnicity, there was an impact due to cultural and family perceptions and stereotype of engineering being considered a field for men. As a result, they did not get the initial support to pursue their engineering programs though they forged ahead.

Participant 3: Prior to coming to the U.S., I don't believe my race or ethnicity impacted my ability to participate or be considered for STEM programs. In Nigeria, my gender may have put me at a disadvantage since engineering is considered more as a field for men.

Participant 4: I think the influences were twofold: one with respect to culture and the other with respect to what I will call family perception. Culturally, growing up, it wasn't very popular for women to be career minded or career oriented. My dad unfortunately just didn't think engineering particularly was well suited for me, because he doesn't want anything to be too strenuous or too stressful.

Theme 2: MRQ1b: Negative impact due to race, gender & ethnicity in the U.S. Nine out of the 11 participants stated that the experience was very different upon immigrating to the United States. Their race, gender and ethnicity have had some impact on their career experience in STEM. A good number of participants focused on their ethnicity and the impact of having an accent. Speaking with an accent meant no one was listening to them, and any ideas they made during meetings were either ignored or needed validation by a Caucasian male colleague. Five out of the nine participants that attended a Historically Black College and University, HBCU for their undergraduate or graduate

degrees, stated that their race was not an impact in a HBCU since most of the students are black.

Participant 2: Fortunate enough, I went to Morgan State which is more like a black school, black dominated. So even in our class at graduate school, we were not many ladies actually, but the treatment wasn't really the way it was back home because this is like a brand-new place.

Participant 3: Upon getting to the U.S., my race, gender and nationality (not necessarily ethnicity) have all impacted my career experience. I am female, considered Black and considered as someone with "an accent." These factors reduce how well I am listened to during meetings and how well my contributions are valued when compared to my male or Caucasian counterparts.

Participant 4: There were experiences that led me to believe that some prejudice existed, racial prejudices, and gender prejudice. I have to make a deliberate mental decision not to let perception based upon people's behavior and responses influence me. So far, while I did have some negative experience as an intern that were centered on some combination of gender and race, I would say those things have really shaped me. I think they have made me emotionally stronger and coupled with the decision I made coming on board full time.

Participant 5: Moving to the U.S., race and gender impacted my career, as far as my career ladder. When I came into the field, with engineering in general, it's a male dominated field and as a female, it's being made to feel like the males come first with every consideration than the females. My own particular experience

when I was in college, there were two Nigerians in my class. And the rest were Asians and Indians. It happened that when it comes to careers, internships and everything, it happened that they were picked first, not because they were the smartest, but they were picked first, with everything, they get everything.

Participant 6: Sometimes gender played a role, at some point it was race, and at some point, it was ethnicity, so at some different points like all three factors played a role in my career experience. It impacted the number of opportunities and the quality of opportunities that have definitely come my way. Having the accent, your ethnicity plays a bigger role than the knowledge, the technical knowledge that you bring to the job, to the job interview which shouldn't be so. Participant 1 however responded to this question differently by acknowledging that discrimination does exist but she has blinders on so she can stay focused on her journey.

Theme 3: MRQ1c: Negative experience due to race, gender, ethnicity and immigrant status. This interview question asked participants to speak of an experience in their career about how they were treated based on their race, gender, ethnicity or immigrant status. An overwhelming majority of them cited varying degrees of negative experience such as job discrimination due to their immigration status as Lawful Permanent Residents. The accent seemed to be a recurring theme with some of the participants stating that their ideas or suggestions in meetings were ignored except when validated by another colleague, typically a Caucasian male. Other candidates stated that

the onset of Diversity and Inclusion in most companies might have helped their situations.

Participant 5: I had a particular situation where I did majority of the work and someone took credit for the work. So, it has to go back to being female, being black or from Nigeria. So there are some things that happen automatically just because of being Nigerian they assume you are like everybody and never ask So it happened that someone took my work and made it appear like I was a lab rat, like some tech that was just helping out while it was my work. So, after the truth came out, who's been doing all the work, before I did any work, as far as research was concerned, I will make sure that my name is on that paper. My name has to be on each paper before it is published. But it was rough!

Participant 6: For one of my roles as an intern, I observed that the company wanted to maintain it as a team of male engineers all doing their field visits. It was hard to integrate the female engineers. And the supervisors making the decision and hiring more interns was very apprehensive in taking me and some of my colleagues and giving us the opportunity for that role. What changed it was another female engineer, a Caucasian female engineer came in and was insisting on the opportunities, she was direct in saying that maybe they should switch things up a little and have more female engineers come on board just to give us a different perspective. And what she did to was try to knock down some of the challenges that were presented

So, for race impact, I do remember interviewing for a job at one time in Iowa.

Don't ask me what I went to Iowa to do. But when you are so desperate for opportunities that would not come your way and you are done with school and see some of your white colleagues, fellow engineers getting jobs that you are struggling to get. I remember back then, some of my colleagues were immigrants like myself, but they are coming from places like Brazil, Europe, so although they had accent like me and they were immigrants, they were still further ahead of me in terms of opportunities. I remember getting on the phone interview and someone told me everything was going perfectly fine till I got on the phone. Resume looked right, my profile fitted what they needed, actually I was over-qualified for the role in my opinion because I met everything and I exceeded the preferred qualification requirements. Only for me to get on the phone interview that was being scheduled, and once the lady heard an accent, I think that took the whole conversation downhill. And at the end of the interview I knew that I didn't even want to put up or hold on in hope for something that I knew was never going to happen. She told me that I have the qualifications and everything, but I don't think you will be a culture fit to the team. Now, till today I don't know what that means.

But my biggest struggle as an immigrant and as a female engineer raised up in a country other than U.S. has been when you understand that you being a local, having the local attributes, having the accent, your ethnicity plays a bigger role than the knowledge, the technical knowledge that you bring to the job, and to the

job interview which shouldn't be so. For me that's how I see ethnicity playing into it.

Participant 7: In my first job, I felt like it was a little bit challenging over there. And that's because there weren't a lot of blacks at the job at that time. And my accent was an issue. I either spoke too fast or unclearly to them. I mean, not improper English but just the fact that I had to repeat myself a couple of times before they could actually pick up what I'm saying. Moving from that company to where I am right now, when I first started working, I had a manager female, and she's Caucasian. When it came to events like group events, I would either not get the invitation or maybe get it late. Like the job was more important than me networking with the rest of the new hires and meeting other people in the company. So that's one I would consider as race or ethnicity related, not gender because she is female.

Participant 8: I have had a lot of situations where I will come into a meeting prepared. And I will give an opinion and get the poker face like nobody understood what I am saying because of my accent or may be because of my race and a white male will take the same thing that I've said and re-phrase it, and get a lot of good idea, good idea, good job, nice input. Meanwhile I just said the same thing, and nobody responded.

Participant 10: I remember a project I was working on as an Assistant Project Manager. This project required a few trips to a neighborhood that was facing a lot of community clash, between blacks and whites in Baltimore that law

enforcement officers were involved. At the time I was not supposed to go out there. There was a white guy that was supposed to go out to the site during the chaos, but he didn't want to go. There were two immigrants, myself and another person. So they asked us the immigrants to go to their site. I felt like we were exposed, but it felt like we were the ones that were good to go out and die. I felt bad after completing this task and it got me thinking a lot of things and having to make a lot of decisions regarding improving myself and growing in my career so I would not be pushed into tasks that I do not want to do. If I were a white lady, I would not be assigned to that field meeting.

Figure 1 shows the number and percentage of participants' that shared their negative experiences in their career due to race, gender, ethnicity or immigrant status.

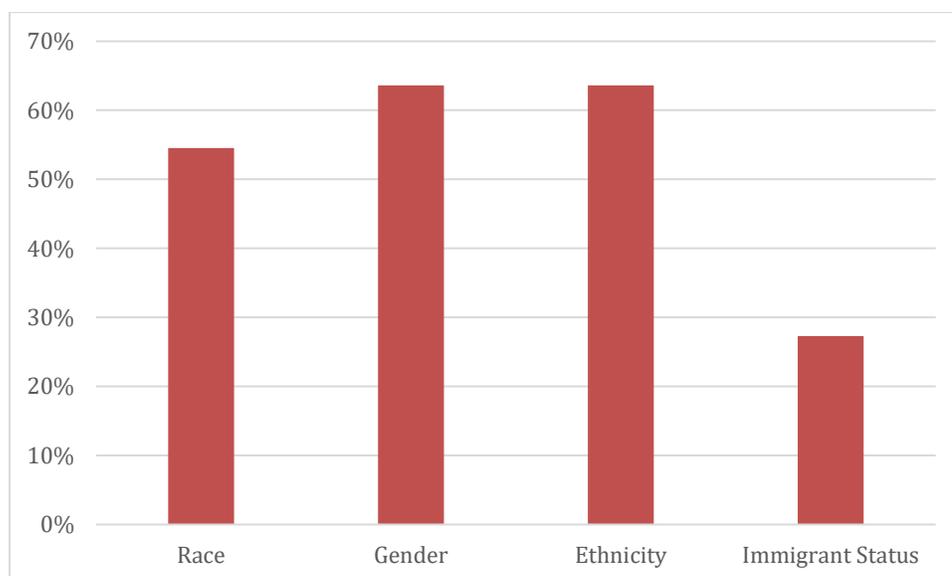


Figure 1. Participants' negative experience due to race, gender, ethnicity, and immigrant status

Research Question 1, RQ1 Emergent Themes

RQ1 focused on the impact of changes in U.S. immigration policy (Immigration Act of 1990) on the recruitment of immigrant Nigerian women engineers. Two themes emerged from the research question. The common thread amongst these themes was that changes in U.S. immigration policy may impact positively or negatively on the recruitment of immigrants, particularly immigrant Nigerian women engineers. Below are the two emergent themes and participant responses shown as direct quotes.

Theme 4: RQ1a: No impact on career due to U.S. immigration policy. Nine out of the 11 participants did not experience any impact on their career due to U.S. immigration policy. Based on the demographic information, one participant migrated to the United States over 30 years ago via the employer-based immigrant visa, while 10 of the 11 participants migrated to the United States between 1996 and 2012. During these years, the participants migrated via the different immigration programs as part of the Immigration and Naturalization Act (INA): family immigration, Diversity Visa (DV) Lottery program, and Student visa programs. The Diversity Visa Lottery program was added as one of the immigrant visa categories via the Immigration Act of 1990, and it allowed for random selection of immigrants from countries with low rate of immigration to the U.S in the last five years of enacting the law (Wasen, 2011). The Immigration Act of 1990 was a change or an amendment to the INA of 1965; and that change positively impacted Nigerian immigrants, since it resulted in increased opportunities for entry for immigrants from Nigeria. It was through the DV lottery program that two of the

participants immigrated to the U.S. to continue to pursue their engineering degrees and careers.

That being said, the participants did not experience any negative impact on their STEM education or careers due to immigration policy. If anything, a couple of them who came in as non-immigrants with student visas did benefit from their employers filing their H1B visas for them. Participants 3 and 4 were beneficiaries of employer-sponsored H1B visa. These participants faced challenges and had limited access to job opportunities, and one of them had to stay in school a lot longer, up to getting a Doctoral degree as she could not get a job with the student visa.

Participant 3: The U.S. immigration policy at the time made it possible for me to stay and practice engineering after I graduated college. My employer was able to sponsor my H1B visa.

Participant 4: I think it has benefited me, because with my current organization, I've been fortunate such that they filed the H1B and they were willing to progress my immigration through the pipelines that have been provided by the immigration policy.

The change in immigrant status from Student visa to H1B visa allowed the participants improved access to some job opportunities, though it also meant they were denied access to a lot more job opportunities that were for lawful permanent residents or U.S. citizens. The immigrant Nigerian women engineers faced discrimination due to their immigrant status, mostly due to limited access to job opportunities, as these opportunities would vary depending on the immigrant status. Over the years the politics surrounding

U.S. immigration continue to drive changes in policy that could have an impact for immigrants. For Nigerian immigrants, these changes include being banned from participating in the Diversity Visa Lottery program and in January, 2020 the ban on immigrant visas by President Trump, both of which have a huge impact on the recruitment of immigrant Nigerians in the U.S. STEM workforce.

Participant 5: I recall back in my college years; not necessarily that it was towards me but people I know that were Nigerians, and also in the same field as myself. Some people found it very hard to get a job just because of their immigration status, even though they were excellent engineers, they found it really really hard. For some people when it comes to access to scholarships and all, it was tough as an immigrant to qualify for engineering scholarships just because of your immigration status. Most scholarships were geared towards United States citizens or green card holders. So, while it doesn't not necessarily apply to me as I was one of the lucky ones, a lot of people I knew that were starting off in their career after engineering schools back then, the immigration policies affected them greatly.

Participant 9: I came in here via my spouse, and so, I had a soft landing. I was able to apply for a scholarship, which. I would not have been able to apply for if I didn't have a recognized immigration status.

Participant 11: For me, I came in with the DV lottery. So I didn't really have any issue. It was just almost like a straight flight.

Theme 5: RQ1b: Significant reduction in immigrant Nigerian women engineers in STEM due to changes in U.S. immigration policy. Ten of the 11 participants stated that the implication of changes to U.S. immigration policy on potential or new immigrant Nigerian women engineers is a significant reduction in recruitment for immigrant Nigerian women engineers being a part of the U.S. STEM workforce. The changes in U.S. immigration policy have resulted in Nigerians being banned from participating in the Diversity Visa Lottery program and just recently being banned from family-based immigration and immigrant visa under the Trump Administration. Six of the participants immigrated to the United States via family-based immigration and two participants migrated via the Diversity Visa Lottery program. The current *temporary* ban on family-based immigration, immigrant visas and the ban on Diversity Visa Lottery programs for Nigerians means that all potential immigrant Nigerian women that would have come in as Lawful Permanent Residents are not able to, thus impacting recruitment for the already small number of Nigerian women in STEM, till such a time when changes are made to the U.S. Immigration policy and the bans are lifted. Till then, the visa category available are the non-immigrant visa options, which are not encouraging since a lot of Nigerian immigrants are not granted entry into the U.S. via these visa categories.

Immigration data from the U.S. Department of Homeland Security (2020) showed that in 2010, ~70% and in 2017, ~79% of immigrant visas issued to Nigerians are of the broad category of family immigration. Also, in 2010, ~22% and 0% in 2017 of immigrant visas issued to Nigerians are of the Diversity Visa category. In January 2020, Presidential Proclamation 9983 placed visa restriction for immigrant visas (family immigration,

employer-based immigration and Diversity Visa lottery) for Nigeria (U.S. Dept. of State, 2020). These changes to U.S. immigration policy (including bans on Diversity Visa lottery program and immigrant visas) targeted towards Nigerians have an impact on the recruitment of immigrant Nigerian women in STEM. These changes reduce immigrant visas for Nigeria to ~0% for as long as the Presidential proclamation is in place. As a result, access to U.S. STEM opportunities provided to other immigrant groups is reduced for an entire immigrant demographics from Nigeria.

Participant 1: Until the immigration policy is relaxed, the potential immigrants cannot come in.

Participant 2: Yes, the implication is big, it will have a big impact on the potential ones, people that are thinking of coming; just like I cited an example about my former colleague, and new immigrants. If nothing is done, immigrant Nigerian women will not have the opportunity to be able to migrate to the United States.

Participant 3: Without the ability to obtain immigrant visas, there will be a significant reduction in the number of male and female immigrant Nigerian engineers in the U.S.

Participant 4: The administration keeps placing more and more constraints on the system such that regardless of gender or race, as long as you are an immigrant, it does get more and more difficult for you to secure a job.

Participant 5: With the current immigration policy bans, they will not come here, which in turn reduces the number of people which we have in STEM here.

Participant 7: The individual is impacted as well as the company. And the government is impacted because nobody knows who will bring in new ideas that would create something great.

Participant 11: In a way it is also going to impact the promotion of the STEM program within the society. For new immigrants, who may have just come into the U.S., they will not have 100% concentration that is required for the study, because a lot of them will be thinking of what will happen after the completion of their education here.

Research Question 2, RQ2 Emergent Themes

RQ2 focused on the impact of the Women and Minorities in STEM Booster Act on the career experiences of the study participants. Four themes emerged from this research question. Interestingly, all 11 participants were aware and had benefitted from opportunities available in STEM offered via various entities including the National Science Foundation, but did not know of a particular STEM policy such as the STEM Booster Act before this study. Giving that the intent of the STEM Booster Act is to increase and retain underrepresented minorities in STEM via programs such as workshops, mentoring, internships, and outreach programs that the participants are familiar with, they were able to relate to the STEM Booster Act. The common thread amongst these themes was that the STEM Booster Act should provide for more outreach particularly in the immigrant communities, in addition to increasing the focus of program benefits for immigrants, since immigrants are typically grouped under “major” minority groups like in the case of Nigerian immigrants being classified as African Americans.

According to the participants, the STEM programs serve African Americans more so than African immigrants, who are not aware and do not know the resources exist. With the majority of the participants attending HBCUs for their undergraduate degrees, they attested to the benefits and opportunities provided with the STEM Booster Act at HBCUs. The participants, however expressed concern that U.S. immigration policy/politics, particularly the current immigration ban on Nigerian immigrants could have an impact on the efforts being made to recruit and retain underrepresented minorities and women in STEM. Below are the four emergent themes and participant responses shown as direct quotes.

Theme 6: RQ2a: Various STEM programs for minorities and at HBCUs. All the participants stated that U.S. STEM policies had been promoted amongst minorities via grants, career fairs, internships, STEM Summer Camps, mentoring opportunities, outreach to middle and high schools, and via nonprofit organizations such as National Society of Black Engineers (NSBE), Society of Women Engineers (SWE) and Society of Hispanics in Engineering (SHPE). Participants stated that there are no STEM programs that are specifically for immigrants, however, immigrants as minorities do have access to the opportunities provided via the U.S. STEM policies. Giving that most of the participants attended HBCUs, they stated that HBCUs promote STEM programs and offer opportunities for minorities in STEM. Figure 2 shows the participants' responses to the different ways U.S. STEM policies have been promoted amongst minorities in STEM.

Participant 1: There are grants available. NSF gives a lot of grants to higher institutions to promote STEM recruitment amongst minorities. But when they say minorities there are referring to African Americans that live in the U.S., or females of any ethnic group with citizenship or permanent residence status.

Participant 3: In college, it was generally discussed amongst my peers that a wide range of companies attended our career fairs to fill their diversity quota. A number of engineering students including me got internship opportunities, and eventually full-time jobs, through career fairs at our Historically Black College.

Participant 4: I think something else that benefitted me was attending a historically black college and university because that type of college category has a lot of minorities and so, we get lots of information on job opportunities.

Participant 5: When you go to a historically black school, Howard University in particular, their alumni come back to give back, they come back to recruit, there is a year-round recruitment for interns, which was very, very helpful to the students. The black university, it made people feel like home.

Participant 7: The National Science Foundation does a lot of programs as well that showcase STEM workshops for minorities. They are putting more effort now to go into the black minority areas in the DMV to promote STEM programs to the black students. STEM summer camps and STEM summer programs that some schools are now promoting to their students is a good way to get the minorities to know more about STEM career.

Participant 8: Two different opportunities: the internship and mentoring programs that have been made available to the STEM professionals. Offering internship at different undergraduate level and engaging in different outreach programs from high schools, since the intent is to get them young, to increase the opportunity and to increase the awareness and exposure of women in STEM.

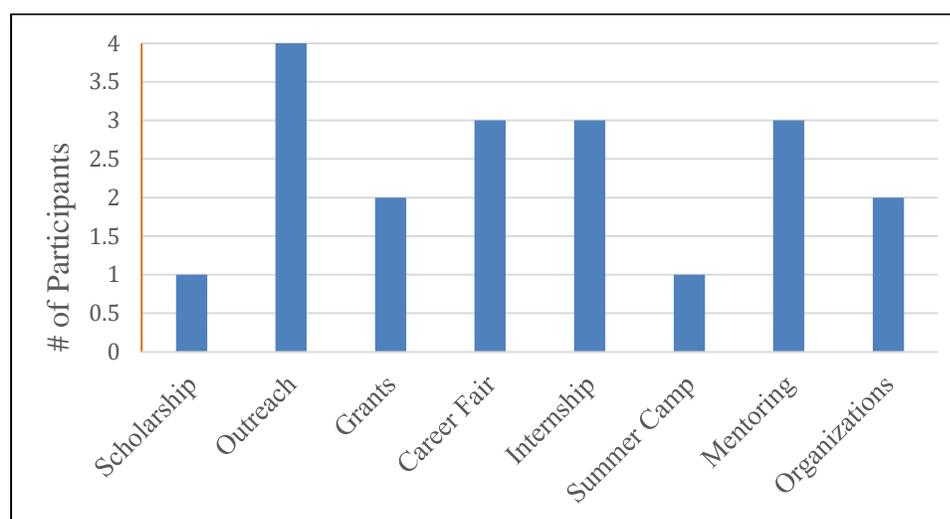


Figure 2. Participants' responses on ways U.S. STEM policies have been promoted amongst minorities in STEM

Theme 7: RQ2b: Beneficiaries and Benefactors of STEM Booster Act. 10 of the 11 participants stated they benefited from grants, internship opportunities from career fairs, scholarships and mentoring opportunities/female role models, despite their lack of knowledge of the Women and Minorities in STEM Booster Act. A good number of them are also giving back, acting as Benefactors to other young girls and boys in STEM. Table 6 shows participants' responses to how they benefited or were benefactors of the STEM Booster Act.

Table 6

Participants' Responses on the benefit of The STEM Booster Act

| Participants | Beneficiary/Benefactor of STEM Booster Act |
|---------------------|--|
| Participant 1 | Martin Luther King award. I was MLK fellow for four years. I secured National Science Foundation grant to run a workshop for STEM, for minorities |
| Participant 2 | I was once an intern. I was hired in the same place. where I work, now we have a career fair/ engineering fair where we meet with students from various schools, middle schools, high schools |
| Participant 3 | Through the provision of internship opportunities for me while I was in school |
| Participant 4 | I actually attended a career fair and that was how I was able to secure my internship at my current organization, and subsequently full-time position |
| Participant 5 | The truth is, these white females have had more impact in my career than anybody. As long as you are a woman, smart, she will fight for you. She also understands the minority challenges, which is also what fires her |
| Participant 7 | Engaging in mentorship programs with some of the females, black female engineers in STEM programs has been very impactful for me |
| Participant 8 | There were mentoring opportunities and I had women who had an impact in my STEM career |
| Participant 9 | When I joined this organization and they introduced us to conferences and seminars organized by SWE, you were not only able to get mentoring opportunities, but exposed us to the types of internships that were available and we could apply to |
| Participant 10 | At the just concluded TRB conference, we were discussing how we can also train teachers in elementary and middle schools on some of these technologies and software so they can pass them on to their students to simplify learning |

Theme 8: RQ2c: STEM Outreach to Middle and High Schools, and to

immigrant communities. Nine of the 11 participants suggested that STEM outreach to Middle and High schools and underrepresented minority (immigrant) communities could be beneficial to boost the number of underrepresented minorities in STEM. These are

effective because it allows for a catch them young approach. Other participants suggested other programs as Grants, online workshops, mentoring opportunities.

Participant 6: They would have to get into the immigrant communities, and talk to the parents. Sometimes it's all word of mouth, it only takes one parent or a few to get the word out there, and that way they can expand on the program or on the number of students that are informed about the program and increase people that could participate. It is more about getting out there to know the communities they are trying to work with. They can go through the high schools as well as.

Participant 7: It is good to start out with young girls in high school. Consider mentorship program from high school, offer summer internship opportunities or volunteer opportunities. That will boost STEM for sure.

Participant 8: I am a big proponent of each one, reach one, and teach one and so providing outreach early enough and making the younger women know that STEM is not a field for men. Increasing the awareness of the different roles that STEM encompasses through outreach and exposure to STEM fields, online workshops, mentoring, internships are ways to increase the participation of underrepresented minorities in STEM

Participant 9: Catch them early in high school, and encourage them to stay in STEM. Recruit from different schools and groups, recruit from African countries. Also, for those in the U.S., extend mentoring programs to colleges, because students don't have mentors in the first year of engineering to help them get through the challenges of studying engineering.

Participant 10: A lot of outreach via a lot of organizations that have direct connections with a lot of younger minorities in school.

Figure 3 shows the participants' responses on Ways to boost number of underrepresented minorities in STEM

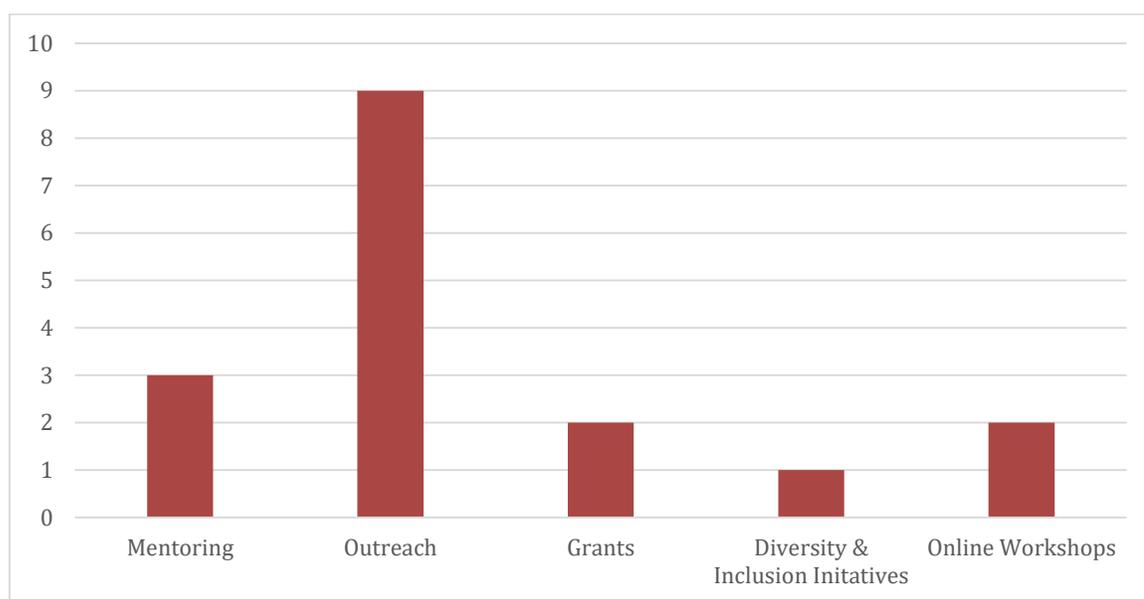


Figure 3. Participants' responses on ways to boost # of underrepresented minorities in STEM

Theme 9: RQ2d: Financial Incentives/Scholarships. Five of the 11 participants suggested that U.S. policy makers could provide financial incentives/scholarships to help improve STEM policies for immigrant Nigerian women in STEM or underrepresented minority groups in STEM. These participants believe that offering immigrant Nigerian women and other underrepresented minority groups financial aid and scholarships will go a long way in getting them interested in STEM. The financial challenge is of huge concern and constraint for immigrants when pursuing their STEM education. Participant

5 stated that while there were scholarship opportunities when she was in college, she was not qualified to apply due to her immigration status. STEM policies should provide financial incentives and scholarship opportunities to enable immigrants in STEM succeed.

Of note is that eight of the 11 participants expressed their concern on the impact current U.S. immigration policy on improving STEM policies for immigrant Nigerian women and other minority groups in STEM. They suggested for the U.S policy makers to review and revise current U.S. immigration policy on Africans/Nigerians to allow immigrant Nigerian women engineers to contribute and add value to the U.S. STEM programs.

Participant 6: Before polices are made that will impact a certain demographic, they should weigh the value that the group is bringing to the economy. Most of the educated qualified professionals, a good number, a good fraction of them are coming from immigrant backgrounds.

Participant 8: There is an immigration ban in place so regardless of the number of opportunities being provided through the STEM policies, if immigrants cannot come into the country to access those opportunities, then there is no point for the STEM policies for this particular group of people that are being excluded from taking advantage of the increasing avenues for them to grow, and benefit from the STEM program

Participant 9: There is a need to be flexible with immigration policy, because with the ban and limitations for migration to the U.S., it makes it more difficult to have STEM policies for immigrants who are not even allowed to come.

Summary

The Main Research Question was developed to explore the career experiences of immigrant women engineers in the Washington DC Metro Area with regard to the intersection of race, gender, ethnicity and immigrant status. The two Sub Research questions focused on the impact of changes to U.S. immigration policy on recruitment of immigrant Nigerian women engineers, and impacts of opportunities outlined in the Women and Minorities in STEM Booster Act on the career experiences of these immigrant Nigerian women engineers. Data was collected via semi-structured interviews conducted via phone and email and recorded with a recording device. Data was manually transcribed, and coded into themes using a Microsoft excel spreadsheet, following Moustakas' process of exploring, scrutinizing and examining the transcribed interview data to identify themes. Nine themes were identified in answering the research questions.

In Chapter 4, I discussed the setting, demographics, data collection method, evidence of trustworthiness, results for data analysis, and a synopsis. In Chapter 5, I will discuss the interpretation of the findings, limitations of the study, recommendations for future research and implications for social change.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this phenomenological research study was to explore the career experiences of immigrant Nigerian women engineers in the Washington Metropolitan area with regard to what impacts opportunities outlined in the Women and Minorities in STEM Booster Act may have had on their career success in STEM, in addition to what impact changes in U.S. immigration policy may have had on the recruitment of immigrant Nigerian women in STEM. The study participants were 11 immigrant Nigerian Women engineers who immigrated to the United States to pursue their engineering program/career, resided in the Washington DC Metro Area, and at least three years of experience in their engineering career.

Data were collected via semi-structured phone interviews for 10 participants and an online interview for one participant. For this study, I used a phenomenological approach to explore the career experiences of these immigrant Nigerian women engineers via their experiences. I identified the first six participants from my contact list, and as soon as I screened them and they met the study criteria, I used snowball sampling to identify the remaining study participants. I sent consent forms out to the participants, and after I obtained their consent, I sent them the Demographics/Interview Information Sheet (Appendix A) and the Interview Protocol (Appendix B). I then requested their availability and preference for online or phone interviews. After interviewing the participants, I transcribed the data collected via audio tape recordings, and I used Microsoft excel

spreadsheet to organize the transcribed data and to identify themes in the data. I identified nine emergent themes from my review of the data collected.

Interpretation of the Findings

The purpose of this study was to explore the career experiences of 11 immigrant Nigerian women engineers residing in the Washington Metro area with regard to what impacts opportunities outlined in the Women and Minorities in STEM Booster Act may have had on their career success in STEM, in addition to what impact changes in U.S. immigration policy may have had on the recruitment of immigrant Nigerian women in STEM. For this study I had 9 interview questions that were tied to the research questions. The MRQ had three corresponding interview questions and focused on the career experiences of immigrant Nigerian women engineers in the Washington Metro Area with respect to the intersection of the social identities of gender, race, ethnicity and immigrant status. RQ1 had two corresponding interview questions and focused on the impact changes to the U.S. immigration policy (bans of family immigrant visa and Diversity Visa Lottery for Nigeria) may have had on recruitment of immigrant Nigerian women engineers. RQ2 had four corresponding interview questions and focused on what impacts the opportunities outlined in the Women and Minorities in STEM Booster Act may have had on career experiences of immigrant Nigerian women engineers. The themes developed from the transcribed interview data were based on the interview questions. And the study findings followed based on the research questions.

Key Findings from MRQ

Based on the analysis in Chapter 4, for MRQ1a and MRQ1b, the participants' responses showed that the participants did not have any negative experience based on their race, gender, or ethnicity while in their home country, Nigeria. Nigeria is a one-race country; as such, there is no racial discrimination. With regard to gender, a few of the participants noted that while engineering is a male-dominated field, the few females in their engineering classes received a lot of support and encouragement for wanting to blaze the trail in a male-dominated field. However, upon arriving to the U.S., the participants faced challenges and had negative experiences due to their race, gender, ethnicity, and immigrant status. Some participants with Lawful Permanent Resident status had to find out upon graduating college that some federal jobs were open to U.S. citizens only, which meant they could not apply for those jobs despite being qualified. This discrimination due to the immigrant status had an impact on participants' access to certain engineering jobs, which may have been available to their peers.

In responding to MRQ1c, which asked participants to speak of an experience in their career about how they were treated based on their race, gender, ethnicity, or immigrant status, 10 out of the 11 participants shared the challenges they faced due to these social identities. While the negative experience due to gender and ethnicity (due to participants' accent) topped the list, other challenges include not feeling recognized for their hard work, not being allowed to be in certain jobs such as customer service because of their accent (Participant 2), being in a situation where their contributions and ideas were ignored because of an accent and having a male or Caucasian colleague validate her

valuable suggestions (Participant 3), being ignored and unvalued by the Manager as an intern (Participant 4), and being in situations where other non-African immigrants received preferential treatment with regard to internships, assignments, and job opportunities (Participants 5 & 6). Other challenges included not having a lot of Black women in engineering. However, since most of the participants completed their engineering degrees at HBCUs, they did not feel the racial discrimination as much while in college. Rather, it was mostly felt when they did their internships and when they started in their careers. The three findings based on the main research questions are as follows:

Finding 1: Immigrant Nigerian women engineers are subjects of discrimination based on their race, gender, ethnicity, and immigrant Status. This negatively impacted their career experiences. In most cases the immigrant Nigerian women engineers did not address these issues but endured them. Some of them are hoping that new initiatives such as diversity and inclusion, HeForShe initiatives (global commitment for equality of opportunities between men and women (UN Women, 2015)), And other measures introduced by their companies would help resolve the discrimination they have faced due to their race, gender, ethnicity, and immigrant status. In some cases, the discrimination was due to their immigrant status as some federal jobs are for U.S. citizens, which limits this demographic from pursuing such job opportunities. This finding confirms existing findings from Jenkins' (2012) study and Williams et al.'s (2014) study, in which different women of color viewed their experiences differently. For the most part, Black women attributed most of the bias experienced on the job to race rather than gender. In contrast,

Asian, Latina, and White women attributed the bias they experienced to gender. This goes to show that a difference in experience exists based on the levels of social identity involved. Although gender is fundamental to assessing the abilities of STEM students or employees, this minority identity contributes significantly to the challenges all women must overcome to stay in STEM fields. However, the challenges begin to compound as other identities come into play. This finding therefore shows that Black immigrant (Nigerian) women engineers are not only facing gender discrimination, as other women or Blacks (African Americans) in STEM, but that they also have to deal with additional discrimination based on their ethnicity and immigrant status.

Finding 2: Ethnicity continues to have a significant impact on the career success of immigrant Nigerian women engineers. This is because the immigrant Nigerian women engineers believe that their accent is the main reason their ideas and suggestions at meetings are ignored unless validated by a different gender or race. There does not seem to be a solution to this problem, and employers seem to have turned a blind eye to this issue thus alienating immigrant Nigerian women engineers from contributing wholly to decision making and to making valuable contributions at meetings. This also means that they do not bring their whole selves to the discussions/meetings. This finding is consistent with other studies on the impact of accent (ethnicity-based) discrimination. Nigerian women engineers have a distinct ethnic background: common ancestry, language, society, culture, or nation (Diogo Da Rosa, 2013). Immigrant Nigerian women engineers speak English with an African accent, which is perceived as posing a challenge to their ability to communicate fluently and naturally with peers, professors, or

employers. Not feeling a sense of belonging in STEM could result in reduced confidence in their ability to succeed (Litzler et al. (2014). The immigrant Nigerian women engineers therefore face the bias of accent discrimination (William et al., 2014), which can lead to feelings of isolation and to perceptions of invisibility. Isolation translates to exclusion and could force immigrant Nigerian women engineers to alienate themselves from activities from which they may otherwise benefit.

For the purposes of data collection and reporting in the United States, race and ethnicity data can either be collected in a combined format or separately (OMB, 1997). In the case of the latter, the terms race and ethnicity can be used interchangeably and a Nigerian immigrant will be categorized as being of Black race/ethnicity. In the case of the former and for the purposes of this study, the Nigerian immigrant will be categorized as being of a *Black* race, and of a *non-Hispanic or Latino*, hence of ‘African Nigerian’ ethnicity. This ethnic social identity of an immigrant Nigerian woman engineer denotes her distinct culture, language and national origin. For this ethnic identity, the immigrant Nigerian woman engineer faces a deeper level of discrimination, different from being female (gender) or Black (race), similar to an African American woman engineer. The heterogeneity within the Black immigrant population must be appreciated as simply using the term Black brushes over the diverse ethnic and cultural identities of the African immigrants. It provides for misleading data for policy making (Agyemang et al., 2005).

The findings from the study conducted by Williams et al. (2014) with 60 female scientists of color also revealed that the lone minority woman of color in the study was concerned about the lack of a support group that forced her to speak up and fend for

herself. She felt a strong difference between her roles and that of women in the dominant culture. This finding highlighted the unspoken differences between a lone minority group such as immigrant Nigerian women engineers and African American women engineers, both of whom are typically grouped as Black women and their concerns are addressed together without a true and clear understanding of the distinct cultural/ethnic differences between these groups of Black women. Understanding these differences in the personal, environmental and behavioral factors will play a critical role in the career success of the underrepresented groups in STEM (Litzler et al., 2014).

Finding 3: Other non-African immigrants in the engineering career are treated better and provided better opportunities than immigrant Nigerian women engineers. The participants stated that this happens when companies are making choices of candidates for internship and job opportunities, and when tasks are assigned in the workplace. This introduces another layer of discrimination among different immigration population when accessing opportunities in STEM. This finding extends knowledge in the discipline as it shows a level of micro discrimination that exists amongst different immigrant groups. The findings of Miller's (2012) study showed discrimination due to gender and phenotype affect the retention of women of African phenotype in STEM. They showed that 'Africanness' tends to make for a situation where it is more challenging for immigrant Nigerian women engineers. The odds of failure are high, for even after attaining academic success despite all the challenges of the multiple social identities, it is easy for immigrant Nigerian women engineers to continually doubt their ability and competency (McGee & Bentley, 2017) because of the constant struggle of being treated

differently than other immigrant women in STEM. The findings from Williams et al.'s (2014) study showed other Asian and Latina immigrant women attributed the bias they faced to their gender and not necessarily to their ethnicity. So, while these non-African immigrant women will most likely have an accent, they do not face the level of micro discrimination meted out to immigrant Nigerian women engineers, thus limiting the opportunities provided to, as well as impacting the career success of immigrant Nigerian women engineers.

Key Findings from RQ1

Interview questions RQ1a and RQ1b focused on the impact of changes in U.S. immigration policy/politics on the recruitment of immigrant Nigerian women engineers. Given that eight out of the 11 participants immigrated to the United States under the three categories of immigrant visas, family-based immigration, employer-based immigration and Diversity Visa Lottery program, the response to RQ1a was positive. Changes to the U.S. immigration policy at the time of immigration of each of the participants did not impact their career success. Some of the participants stated they experienced discrimination due to their immigration status with some of the Federal Government jobs requiring U.S. citizenship. The participants that came into the U.S. with non-immigrant (student visas) had some challenges initially. The non-immigrant (student) visa status does not allow one access to opportunities that may be available in STEM, such as scholarships, student loans, and access to job opportunities. In one case where Participant 4 continued to stay in school to keep her student visa status current and ended up studying up to and earning a Doctoral degree before finding a job where the employer

eventually filed for a change in status to H1B for her. Participants stated that while they did not experience any impact due to changes to the U.S. immigration policy at their time of immigration, changes in policy could potentially have an impact on recruitment for immigrant Nigerian women in U.S. STEM workforce. Presidential Proclamation 9983 issued in January, 2020 placed visa restriction for immigrant visas (family immigration, employer-based immigration and Diversity Visa lottery) for Nigeria (U.S. Dept. of State, 2020). These changes to U.S. immigration policy (including bans on Diversity Visa lottery program and immigrant visas) targeted towards Nigerians have an impact on the recruitment of immigrant Nigerian women in STEM. Participants expressed serious concerns with how these bans and restrictions could impact recruitment in STEM for immigrant Nigerian engineers and other similar African countries since they cannot add value or benefit from the opportunities afforded other immigrants. As a result of this change in immigration policy, Nigerians may seek opportunities in countries other than the U.S. such as Canada, UK or Russia to pursue their STEM education or careers.

Finding 4: Changes in U.S. immigration policy could have an impact on the recruitment of a particular demographic group and their ability to contribute to the U.S. STEM workforce. The United States government should review the changes to immigration policy, particularly the DV lottery program ban and temporary ban on family-based immigration and immigrant visas on Nigerians as this will help increase the number of underrepresented minorities and women in STEM. Nigerians are highly educated and have contributed to the U.S. STEM field. Policy makers could create additional immigrant visa options for immigrants that are interested in pursuing their

STEM education and careers in the U.S. This finding extends knowledge in the discipline and would be beneficial for U.S. Policy makers as they work towards considering immigration policy changes or amendments to the Immigration Act of 1990 in order to improve the number of underrepresented minority groups in STEM. The purpose of the STEM Booster Act cannot be achieved with changes in immigration policy that exclude a certain demographic, Nigerians.

Key Findings from RQ2

Interview questions RQ2a to RQ2d focused on the impacts of the opportunities outlined in the Women and Minorities in STEM Booster Act on the participants, in addition to what policy makers can do to help improve STEM policies for immigrant Nigerian women engineers and underrepresented minorities in STEM. The participants have participated in and benefited from various STEM programs but had no knowledge of this particular STEM Booster Act before participating in this study. Despite their knowledge of similar opportunities outlined in the STEM Booster Act, the participants expressed interest in learning more about the STEM Booster Act so they can raise awareness of it in their communities. The participants stated that they have benefited from the different STEM programs and opportunities, similar to opportunities outlined in the STEM Booster Act and would advocate that efforts be made to enact this Act into Law, as it will benefit more women and underrepresented minority groups in STEM, as well as help improve recruitment and retention of these groups in STEM.

Finding 5: The Women and Minorities in STEM Booster Act should be enacted into Law as it offers significant benefits to immigrants and minorities, and the tenets of

the Act/Law will help fill the gap and address the issue of recruitment and retention of women and underrepresented minorities in STEM. Immigrant Nigerian women are a part of the underrepresented minority group identified in the STEM Booster Act. The STEM Booster Act should be extended to cater to immigrants, since the participants stated that the opportunities outlined in the STEM Booster Act are for all minorities and sometimes the beneficiaries are not necessarily the underrepresented immigrant groups.

Finding 6: HBCUs are very welcoming and provide their ‘minority’ students with lots of opportunities as outlined in the Women and Minorities in STEM Booster Act. This is beneficial for immigrant Nigerian women engineers, since they believe the HBCU environment is more conducive to their success in STEM and is devoid of discrimination due to their social identities. Giving that most of the participants attended HBCUs, they spoke positively on the benefits of attending an HBCU, which feels like home, particularly for someone just immigrating to the U.S. for the first time. In addition, they stated that HBCUs promote STEM programs and offer a myriad of opportunities for minorities in STEM including mentoring, internship opportunities, and eventually full-time jobs, through career fairs. This finding aligns with the findings of Parker (2013)’s phenomenological study of 10 African American female undergraduate students, which showed that students in STEM at historically black colleges and universities (HBCUs) tend to be in the right, supportive, and caring cultural and racial environment for academic success. Additionally, Johnson’s (2012) study, which focused on the impact of campus racial climate on perceptions and overall sense of belonging among racially diverse women in STEM majors showed that factors such as self-efficacy, campus

climate, race, gender, and ethnicity interact to help African American women succeed in engineering.

Finding 7: Outreach in middle, high school and immigrant communities is an important approach through which U.S. STEM Policies can be promoted amongst immigrants. Giving that some immigrants and minorities may not know that these opportunities as outlined in the STEM Booster Act exist, STEM outreach is considered one sure way to raise awareness and get more people interested in STEM. In their response to RQ2c, some of the participants did express a major concern with poor outreach for STEM programs in immigrant Nigerian communities, particularly with a high number of Nigerian immigrants residing in the Washington Metro Area. The participants believe that more outreach will be beneficial to boost the number of women and underrepresented minorities in STEM. Participant 5 stated that she only knows about three other female Nigerian engineers despite having studied here in the U.S. and being in the career for over 10 years. She attributes this to a lack of outreach/awareness of STEM to minority or immigrant communities. This lack of awareness according to her is the reason why most Nigerian immigrants would go into health care even though studying engineering takes the same rigor and provides more pay and benefits. Most of the participants suggest that outreach in middle and high schools and immigrant communities would make a significant impact in boosting the number of underrepresented minorities in STEM. This finding extends existing knowledge by introducing outreach programs as instrumental to raising awareness, particularly for the immigrant population, who may not be aware of opportunities available in STEM.

Connection to Theory

The results of the study show a direct correlation with intersectionality theory in regards to how the social identities of race, gender, ethnicity and immigrant status intersect to impact a person's ability to succeed. Themes 1 and 2 show how these social identities have impacted the participants in their engineering programs and careers upon migrating to the United States. Most of these participants shared their experiences of how they are "multiply marginalized" (Juan et al., 2016, p. 236) due to the intersection of their race, gender, ethnicity and immigration status.

In one case, Participant 6 shared negative experiences due to race, gender, and ethnicity, even citing a situation where there is a varying level of discrimination amongst the different immigrant populations, non-African versus African immigrants. Some of the participants cited challenges and frustration with not being able to apply to jobs that are for U.S. Citizens only, and the impact of accent (nationality/ethnicity) discrimination during discussions at work. The challenges presented by the intersection of these multiple social identities make for a tougher and harder STEM experience with high odds of failure despite having acquired the requisite technical knowledge. Thus, making it easy for immigrant Nigerian women engineers to doubt themselves and doubt their ability and competency (McGee & Bentley, 2017) because of the constant struggle due to the effect of the social identities of gender, race, and ethnicity.

The results of this study also show a correlation to the Multiple Streams Theory. From the participants' response, it was evident that changes in U.S. immigration policy/politics (politics stream) would have an impact on the recruitment of immigrant

Nigerian women in STEM. According to the study participants the Immigration policy changes could impact the efforts of the Women and Minorities in STEM Booster Act of 2019 (policy stream), and will also have an impact on the recruitment and retention of women and underrepresented minorities in STEM (problem stream). Overall, participants suggested the policy makers have to take a holistic review of the immigration policy/politics and seek policy changes such that the purpose of STEM policy targeted towards boosting the number of women and underrepresented minorities in STEM is not downplayed.

Discrepant Finding

The result of the study showed consistency in the experiences of the immigrant Nigerian women engineers residing in the Washington Metro area on how their race, gender and ethnicity intersect to impact their career experience. The results of the study also show that despite their negative experiences due to their social identities the participants have persisted in STEM, giving the length of years in their engineering careers. However, one discrepant finding was on Participant 1's experience and responses to the corresponding interview questions for the MRQ. Participant 1 is not U.S. trained (Bachelor's up to Doctoral Engineering degrees from outside of the United States), and has over 30 years of experience in the field of engineering and considers herself successful as a Professor and Department Chair.

In response to the interview questions MRQ1b and MRQ1c, 10 participants shared stories of the negative experiences in engineering due to their race, gender and ethnicity. However, Participant 1 responded by stating that she did not experience "severe

discrimination,” and described engineering as a rough and competitive career, where though there is discrimination, she has stayed focused on her journey and has chosen not to be bothered by the negativity. She noted that she has survived by understanding the game and playing the “rough and tumble game” with her colleagues. One could interpret this to mean that Participant 1 having been in STEM for over 30 years may be demonstrating “racial battle fatigue” according to the findings of McGee and Bentley’s (2017) study. Participant 1, unlike the other 10 participants sees herself thriving in her career.

Participant 1: People will always want you to know that they are better than you, so I didn’t let that bother me because I know they are not better than me. I am a professor so I see the difference that I make in my students at all times.

This discrepant finding does not take away from the fact that despite their efforts to continually prove themselves as intellectually capable, immigrant Nigerian women engineers have faced and continue to face challenges related to the social identities of race, gender, ethnicity and immigrant status, which impact their career success, when compared to their American or other non-African immigrant colleagues.

Limitations of the Study

The first limitation was about challenges in recruiting the participants because of the shortage of immigrant Nigerian women engineers in the Washington Metro area (District of Columbia, Maryland and Virginia). After I reached out to the first six participants on my contact list, it was a challenge to identify the next four participants. The six participants could not immediately provide me additional contacts but took some

time before coming back with additional participants, who were identified via snowball sampling. While I had planned to interview 10 participants, I ended up interviewing 11 participants.

The second limitation was with a small sample size of 11 participants, which reflect a small sample of the entire population of Nigerian women engineers in the Washington Metro area. Also, all 11 study participants reside in Maryland, since I was not able to identify immigrant Nigerian women engineers that reside in DC and Virginia. However, the focus of the study was on their career experience and the state of residence may not have had an impact. In addition, smaller sample size is acceptable for qualitative studies, particularly because I was able to reach a point of saturation with the responses received (Moustakas, 1994). Due to the small sample size, the findings from this study may not be transferable to other African immigrant women engineers.

The third limitation is the possible introduction of ethical issues and a potential influence in the outcome of the study as a result of my biases, personal experiences, and values. To avoid any researcher bias, especially since I am an immigrant Nigerian woman engineer and may have had some similar experience with the study participants, I ensured that I maintained open communication with the study participants. I sent the consent form and interview questions via email. As feedback that I received from the Walden Faculty Expert review of the interview questions, I sent via email overview of the U.S. immigration policy and an overview of the Women and Minorities in STEM Booster Act. This allowed the participants access to all information they needed to know before the interview. The phone interviews were recorded using an audio recorder. Additionally, I

established trustworthiness via member checking by sending the interview transcripts to the study participants to ensure the validity of their experiences.

Recommendations

The purpose of this phenomenological study was to explore the career experiences of immigrant Nigerian women engineers in the Washington Metropolitan area with regard to what impacts opportunities outlined in the Women and Minorities in STEM Booster Act may have had on their career success in STEM, in addition to what impact changes in U.S. immigration policy may have had on the recruitment of immigrant Nigerian women in STEM.

The findings of the study show that immigrant Nigerian women engineers in the Washington DC Metro Area are subjects of discrimination in their careers, based on their race, gender, ethnicity and immigrant status. In addition, their ideas and suggestions are not valued and always need to be validated by others thus impacting their career success. I recommend the following for future researchers:

First recommendation: Conduct a mixed method research study for immigrant Nigerian engineers in the Washington Metro area who immigrated to the U.S. from FY 2016 to understand impact of changes to the U.S. immigration policy on their STEM education or careers, in addition to impact on recruitment of this demographic group in STEM.

Second recommendation: Conduct a research study to explore the leadership experience of immigrant Nigerian women engineers in the Washington DC Metro Area with regard to impact of Equal Pay Equal Act policy, to better understand how the policy impacts the leadership experience of the immigrant Nigerian women engineers. The 11 participants in

this study have an average of 10 years of experience in their careers, however only one of them spoke to being in a position of leadership.

Third recommendation: Conduct a similar study on immigrant women engineers from a non-African country, possibly from a European country with regard to the impact of changes in U.S. immigration policy on the recruitment of immigrant European women engineers, and their overall STEM experience. The immigrant Nigerian women engineers in this study stated that all immigrants are not treated the same, so this study will shed some light on understanding the differences in immigrant experiences in STEM for the different immigrant women.

Implications

Implications for Positive Social Change

The findings from my research study have implications for social change. The findings show that discrimination still exists and immigrants are still treated differently in the workplace based on their race, gender, ethnicity, and immigrant status. The Federal Government should remove barriers for employment for Permanent Residents/Green Card holders by providing more job opportunities for them. The fact that some U.S. Government engineering jobs still require U.S. citizenship limits the number of immigrants or minorities, who would benefit from the opportunities or are able to contribute their value to these jobs. At the Federal and State Government levels, there is a need to ensure that everyone is treated fairly and equally regardless of race, gender and ethnicity. There should not be negative stereotyping of immigrant Nigerian women engineers because of their race, gender and ethnicity. State Governments should mandate

companies to report on their diversity stats and show there is no discrimination in their recruiting practices. Each State Government could also consider a quarterly or annual report of diverse businesses or companies that have more than 20 employees.

For non-governmental organizations, such as National Society of Black Engineers (NSBE), Society of Women Engineers (SWE), and other similar organizations, the findings of this study may be beneficial in helping them understand the experiences of immigrant (Nigerian) women engineers so that they can better align their goals and objectives to better address the needs of their potential members, particularly immigrants from Africa (Nigeria)..

The findings of this study may be beneficial for engineering companies that showcase Diversity and Inclusion programs. These companies should show what efforts they are making to recruit diverse talent from diverse backgrounds by providing more opportunities for immigrants to grow and develop their careers. They could also showcase their support for a diverse workforce by reporting their diversity stats on the company websites, in addition to any programs they have put in place to ensure equity in opportunities being offered to their diverse workforce particularly for African immigrants.

For immigrant Nigerian women engineers and potential immigrant Nigerian women engineers to the United States, the findings of this study provide information to become more aware of the climate in the schools and workplace, and to help them better navigate their engineering programs and careers. The findings of this study show that the benefits of attending HBCUs as a new immigrant cannot be overstated. Potential

immigrant Nigerian women engineers may use the findings of this study to prepare themselves and be more informed on pursuing their engineering degrees/careers in the United States in addition to the impact of their immigration status on their overall experience in their journey. The findings of the study also provide good information on the benefits of the STEM policies particularly the Women and Minorities in STEM Booster Act and all the different programs offered that can benefit immigrant Nigerian women engineers.

For the Nigerian community, the findings of this study may be beneficial to understand the different opportunities outlined in the STEM Booster Act, which can serve the community. The findings of the study may be beneficial to immigrant Nigerian women engineers in helping them understand that their experience though may seem unique is shared amongst them and they can come together and create a positive structure or even a platform to assist and provide guidance for other immigrant Nigerian women engineers. The findings of this study expose some of the challenges of being an immigrant Nigerian woman in STEM, but provide them as opportunities for the immigrant Nigerian women engineers to network amongst themselves and help one another be successful.

The recommendation for U.S. policy makers is to review the impact of changes in U.S. immigration policy on STEM policies such as the STEM Booster Act that is geared towards increasing the number of underrepresented minorities or women in STEM so that there is an alignment of interests towards a positive benefit not just for the immigrant population but for the United States. In that regard, the members of the House of

Representatives and Senate should work towards signing into Law the STEM Booster Act as it will go a long way to improve experience in STEM education and career, in addition to improve opportunities for success for underrepresented minorities and immigrants in STEM.

Conclusion

The underrepresentation of women and minorities in the STEM field continues to be an area of interest, particularly as the United States is facing a shortage of local workers and there is need for skilled workers in STEM (Litzler, Samuelson, & Lorah, 2014). The findings of this study show that immigrant Nigerian women engineers are subjects of discrimination in the workplace due to their gender, race, ethnicity and immigrant status, making it more challenging for them to have a positive experience in their careers. In addition, while the opportunities outlined in the Women and Minorities in STEM Booster Act may have made for a positive STEM education or career mostly for participants that attended HBCUs, there is need to pass the STEM Booster Act into law and expand it to provide more opportunities directed at immigrants.

Changes in U.S. immigration policy, which include bans from participation in Diversity Visa Lottery programs and temporary ban on family-based immigration and immigrant visas for Nigerians under Presidential Proclamation 9983, do and have impacted the number of immigrants from Nigeria as well as recruitment of immigrant Nigerian workers in STEM. For FY 2020 and for as long as the immigrant visa ban is in place, Nigerians are not able to migrate to the United States under the immigrant visa categories. In addition, even upon reversal of Presidential Proclamation 9983, there needs

to be a deeper conversation on the equity of immigration policy as Africa is underrepresented based on yearly immigration statistics as reported by the U.S Department of Homeland Security (2020).

Consequently, a demographic of Nigerian immigrants are excluded in the effort to boost the number of underrepresented minority groups in STEM via the STEM Booster Act. The findings of this study demonstrate the need for U.S. policy makers to effect the changes needed to ensure that political activities resulting in changes in U.S. immigration policy are aligned with the policy goals of the Women and Minorities in STEM Booster Act geared towards providing opportunities to make for a positive STEM education/career experience as well as address the problem of underrepresentation of women and underrepresented minority groups in STEM. In addition, it is the collective responsibility of the Federal and State governments, companies, and organizations to ensure that everyone is provided equal opportunities and treated fairly regardless of their gender, race, ethnicity or immigration status, such that these social identities do not continually create unfair disadvantages for competent and highly qualified immigrant Nigerian women engineers, whose interest is to succeed and add value in the STEM field.

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Appendix A: Interview Information Sheet

Topic: Exploring the Career Experiences of Immigrant Nigerian women engineers

Demographic Questions:

1. Name:
2. Age Range:
 - 25 to 29:
 - 30 to 34:
 - 35 to 39:
 - 40 to 44:
 - 45 to 49:
 - 50 or older:
3. Marital Status:
 - Single, Married
4. State of Origin (Nigeria):
5. How long have you been in the engineering profession?
 - _____ 0-3 yrs, _____ 3-6 yrs, _____ 6-10yrs, _____ 10+ yrs
6. Year of immigration to the U.S. _____
7. Highest Level of Education Attained
 - _____ Bachelor's Degree, _____ Master's Degree, _____ Doctoral Degree
8. Engineering focus area:
 - _____
9. College(s) attended in the U.S.:
 - _____
10. State of Residence:
 - _____ MD, _____ DC, _____ VA

Appendix B: Interview Protocol

Topic: Exploring the Career Experiences of Immigrant Nigerian women engineers

Time of Interview:

Date:

Interviewer: Ijeoma Ozoude.....

Interviewee:

Purpose: To add to the body of knowledge on understanding the career experiences of immigrant Nigerian women engineers in the Washington Metropolitan area with regard to what impacts opportunities outlined in the Women and Minorities in STEM Booster Act may have had on their career success in STEM, in addition to what impact changes in U.S. immigration policy may have had on the recruitment of immigrant Nigerian women in STEM.

Interview Questions:

Main Research Question (MRQ):

MRQ: What are the career experiences of immigrant Nigerian women engineers in the Washington Metro Area with respect to the intersection of the social identities of gender, race and ethnicity?

MRQ1a: Prior to immigrating to the U.S., how did your race, gender and ethnicity impact your experience in STEM?

MRQ1b: Upon immigrating to the U.S., how has your race, gender and ethnicity impacted your career experience in STEM?

MRQ1c: Could you speak of an experience in your career about how you were treated based on your race, gender, ethnicity or immigrant status?

The sub-questions are:

RQ1: What impact does the ban on family immigration and Diversity Visa

Lottery program towards Nigeria have on recruitment of immigrant Nigerian women engineers?

RQ1a: How, if at all has the U.S. immigration policy impacted your engineering career?

RQ1b: What, if any are the implications of changes in U.S. immigration policy on recruitment of potential or new immigrant Nigerian women engineers?

RQ2: What impact does the Women and Minorities in STEM Booster Act have on career experiences of immigrant Nigerian women engineers?

2Q1a: In what ways, if any has U.S. STEM policies been promoted amongst immigrants or minorities in STEM?

2Q1b: In what ways, if any has the Women and Minorities in STEM Booster Act impacted you in your engineering career?

2Q1c: Are there ways in which the Women and Minorities in STEM Booster Act could be beneficial to boost the number of underrepresented minorities in STEM? If so, can you describe them?

2Q1d: What would you suggest to U.S. policy makers that could help improve STEM policies for immigrant Nigerian women in STEM or underrepresented minority groups in STEM?

Thank you for your participation.