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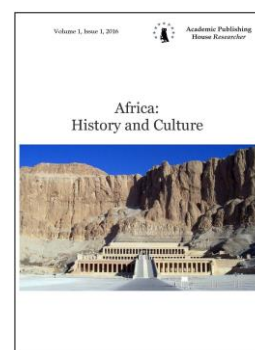
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Firms' Demographics and Barriers to Innovation in Ghana: Can SMEs in Developing African Economies Swot Something Up?

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Abstract

In recognition of the relevance of Small and Medium Scale Enterprises [SMEs] and innovation in economic development, efforts are being made to find strategies to overcome the barriers to innovation among SMEs. However, it is not clear from extant literature, as to whether all SMEs, irrespective of their demographic features, face the same barriers to innovation. It is on this premise that this study seeks to investigate the differences in constraints to innovation faced by SMEs as a result of their varied demographic characteristics. The study adopted a quantitative approach and sampled one hundred SME firms in Ghana as respondents for the study. The demographic characteristics considered in the analysis include education of owner-managers; control of activities (family control or non-family control); sector of SME; firm size (number of employees) and years of operation. The barriers to innovation also comprise of human, management, technical, supply, demand, government and culture related barriers. The results reveal that, SMEs with different demographic characteristics face different barriers to innovation. However, in most cases, irrespective of the educational background of SME owners, they face the same barriers with respect to management, lack of technical expertise, supply related barriers, and government related barriers. This study recommends that, developing African economies should quickly learn to reform SMEs on the basis of their demographic characteristics to enhance their innovative capacities.

Keywords: barriers to innovation, demographic information, developing African economies, Ghana, innovation, small and medium scale enterprises.

Introduction

Despite the increasing proliferation of small and medium scale enterprises (SMEs), the impact of SMEs on the economic development as well as their participation on the global stage has been limited. In connection to this, Patel (2007) explains that, the low participation of SMEs on the global stage is mainly because of the low level of innovation among these firms. Consequentially,

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some scholars argue that low level of innovation is as a result of some constraining factors that impede the innovativeness of such firms. However, recent debates in the innovation literature have erupted the question whether SMEs inability to innovate has solely been as a result of the presence of constraining factors. To this, some scholars have circuitously suggested that a firm's demographic characteristics are likely to affect the impact of these constraining factors on a firm. Such scholars assert that factors such as firm size, sector of operation inter alia, may have direct or indirect impact on a firm's innovativeness (D'Este, Iammarino, Savona, & Von Tunzelmann, 2008; D'Este, Iammarino, & von Tunzelmann, 2012).

Hence, this calls for empirical studies to help probe into the possible impact or relationship that a firm's demographics have on/with the constraining factors of innovativeness.

Stemming from this, some recent discussions in both academia and practice have focused and indicated a low level of innovation among SMEs (Patel, 2007) as well as the role constraining factors play in this respect. Remarkably, this attention has heightened further because of its negative impact on economic growth, poverty reduction and development (Feldens, Maccari, & Garcez, 2012). Most scholars (Blanchard, Huiban, Musolesiz, & Sevestre, 2012; Madrid-Guijarro, Garcia, & Van Auken 2009; Tiwari, & Buse, 2007; Feldens et al., 2012) focusing on investigating the constraints to innovation have often assessed such areas as barriers to innovation. Others have looked at perceived barriers to innovation (Lekovic, 2013), actual barriers to innovation (Blanchard et al, 2012) and revealed and deterring barriers to innovation (D'Este et al., 2012).

In an attempt to demonstrate the importance of demographic characteristics on the innovativeness of SMEs, some scholars have assessed the impact of SME demographics on their innovativeness (Baldwin, & Lin, 2002; Hyytinen, & Toivanen, 2005). However, empirical evidence in this respect is inconclusive (Wziatek-Kubiak, Peczkowski, & Balcerowicz, 2010). Studies, in this respect, have suggested a relationship between SMEs demographic characteristics and the compelling factors likely to impact their innovativeness. However, this relationship has not been empirically investigated; especially in relation to SMEs in developing economies. Identifying such nexus may help SMEs to identify, per their demographic characteristics, the categories of constraints that are likely to impact their innovative behaviors as well as help them understand the intensity of these constraining factors on their innovative activities.

The current study will attempt to understand how SMEs demographic characteristics relates with the constraining factors. For some scholars postulate that smaller SMEs are likely to, by virtue of their size, succumb to constraining factors and still be able to innovate. Drawing from some empirical results and cursory observations of SMEs and their constraints to innovation, a probable nexus may exist between a firm's demographic characteristics (for instance; size) and its innovation constraints (for example, internal constraints).

SME demographic characteristics

In recent decades, scholars examine SMEs characteristics and their potential implication on such factors as performance (Hyytinen, & Toivanen, 2005) and innovation (Baldwin, & Lin, 2002) and entrepreneurial orientation (Eruh, & Adebayo, 2012). These characteristics are defined in relation to size, number of employees, purpose, degree of risk, sector, growth focus and key attributes. The following paragraphs reveal some discussions on these characteristics.

Discussions on the ideal size of SMEs have been considered on several forums and platforms in global business. Yet, a concise, precise and standardized definition has not emanated from these discussions (Arowomole, 2000). In other words, several scholars and institutions hold and define SMEs with respect to size, in diverse ways. The lack of agreement on a concise and standardized definition has forced countries and institutions to individually posit definitions that construes with their geographical and demographical characteristics (Darren, & Conrad, 2009). In spite of the ambiguity with regard to the standardized size of SMEs, most scholars agree SMEs constitute considerably smaller business organizations; mostly ranging from 11-100 employees (Alarape, 2008). This assertion, according to Alarape (2008), is explicity justified by its acronym [SMEs]. Eruh and Adebayo (2012) also explain that size can also refer to the extent of business, market size and share as well as size of investment. Also in this respect, SMEs were found to be relatively smaller in size. Even though SMEs are relatively smaller in these respect, scholars note that their relative category of sizes [*large SME or small SME*] may affect their performance and innovation (Baldwin, & Lin, 2002; Hyytinen, & Toivanen, 2005).

Additionally, Kayanula and Quartey (2000) also explained that the majority of the activities of SMEs in Ghana and Malawi were in relation to soap and detergents, textile and leather, clothing and tailoring, ceramics, timber and mining, bricks and cement, beverages, food processing, bakeries, wood furniture, electronic assembly and agro processing. This goes to prove that SMEs in most developing nations often belong to the manufacturing, agro and service sector. For this reason, these three sectors were considered in the current study. However, the question that has not been asked is whether these sectors have any role in determining the kind of constraints the firm is opened to; hence the current study seeks to assess this nexus.

As found in recent literature, another characteristic of SMEs, popularized especially among most developing nations, is the organizational skills to manage efficiently, moderate growth, moderate need for achievement and chief of all, with regard to current study, is the little innovation in such firms (Esuh, & Adebayo, 2012). This characteristic was not only true with respect to developing economies, but Hadjimanolis (1999) found this to be also true with firms in underdeveloped economies.

Even though the length of existence is generally assessed in several studies as an important demographic variable, especially with respect to SMEs and constraints to innovation (Hewitt-Dundas, 2006), most of these studies have not attempted to investigate its possible relationship with these constraining factors. At best, scholars in this study area have considered the firm age as a control variable, in order to control its impact in their assessment of the innovative behaviours of firms as well as the constraints faced (Galia, & Legros, 2004; Madrid-Guijarro et al., 2009). This may directly point to the fact that firm age has some nexus with the innovativeness of SMEs as well as their constraining factors; hence the need for an empirical study to assess this relationship.

Finally, some researchers have made attempt to examine the impact of a firm's age on its innovativeness. However, very little empirical evidence exists in this respect. Madrid-Guijarro's (2009) investigation of Spanish firms found that a firm's age did not have a significant impact on the innovativeness of that firm. However, by cursory observation and some expert analysis in developing countries like Ghana, the rigidity of small and medium scale enterprises tends to be increasing with their age and length of service, thereby affecting their innovativeness.

Methods

The sampling frame for the current study includes all registered enterprises in the listed on the National Board for Small Scale Industries [NBSSI] database in Ghana. The sample frame was limited to only firms based in the Greater Accra Region. Some of these firms considered had branches in other regions, whereas others had migrated from other regions to be based in the capital. Thus, most of these selected firms had broader coverage across the other regions in Ghana and beyond. In view of this, their responses as captured, demonstrate the broadness of the perspectives considered in the study, thereby warranting the relative generalizability of the findings.

The current study adopted the purposive sampling approach. This method was considered appropriate for the study because the current study included only registered firms in the database of NBSSI [*as such firms are often well structured in terms of organization and product delivery*]. In addition, such firms must have more than five employees and have a starting capital not more than \$5000 (Quaye, & Acheampong, 2013). After a pilot study, 120 firms were considered for the current study. However only a hundred (100) respondents [*one from each firm*] responded. This gave us a total response rate of 83.3 %.

The researchers used self-administered survey questionnaires which was developed with a good reliability and validity. Each questionnaire had two sections; the first section collected data on the demographic characteristics of the SMEs, which included four main demographic characteristics peculiar and relevant to firms in the Sub Saharan sub-region. The second section has two broad classifications of variables namely, external and the internal factors. Under these two broad categorizations, the sections in all have eight (8) sub-divisions including human related, culture and system related, management time, technical expertise, financial, supply related, demand related and environment related factors. The internal and external variables numbered 5 and 3 respectively. With an average of three constructs to measure each variable, in all 46 constructs were used to assess the factors constraining innovation among SMEs. Respondents

were allowed to assess all eight variables on a four Likert scale, spanning from no impact to high impact.

Results

Demographic information of SME owner-managers and businesses

In an attempt to offer a lucid description of the respondents for the current study, the researchers, in relation to the objectives of the study gathered the demographic information on the businesses as well as the owners of the SMEs. This was done to assess the background of the respondents as well as how such information impacts the overall finding of the study. Additionally, these discussions allowed the researchers to contextualize the findings of the study to the type of SMEs considered. In view of this, the researcher investigated the educational background of the owner-managers, as this is likely to have some impact on the innovative propensity of their business. Moreover, with regard to the firm, the study gathered information on the sector, educational background of the owners, number of employees, control of activities and the number of years of operation (see [Table 1](#)).

Table 1. Demographic Information of SME owner-managers and business (N = 100)

Variables	Frequency
Sector	
<i>Manufacturing Sector</i>	44
	56
Number of employees	
<i>5-10</i>	61
<i>11-20</i>	15
<i>21-30</i>	10
<i>31-40</i>	11
<i>41 and Above</i>	3
Years of operations	
<i>1-5</i>	70
<i>6-10</i>	27
<i>11-15</i>	3
<i>16 and above</i>	-
Control of activities	
<i>Controlled by a Family</i>	33
<i>Managers who are not relatives</i>	67
Education	
<i>Primary</i>	11
<i>Junior High</i>	1
<i>Senior High</i>	18
<i>Professional</i>	19
<i>Tertiary</i>	51

The results in [Table 2](#) show that firms with different control of activities, sector of operation, and firm size (number of employees) were significantly different with respect to management time related barriers. For example, management of relatively larger SMEs may have more time in supervision, and hence less time to innovations. Nonetheless, these firms faced the same constraints to innovation irrespective of the educational background of the owner manager and years of existence. Thus, owner-managers with formal education face the same management related barriers. Again, years of existence has no nexus with the management prioritizing and making time for innovation.

Table 2. Management time related barriers

ANOVA						
Demographic features		Sum of Squares	df	Mean Square	F	Sig.
Education of owner-managers	Between Groups	6.781	10	.678	.571	.834
Control of activities	Between Groups	4.740	10	.474	2.429	.013
Sector of SME	Between Groups	6.889	10	.689	3.454	.001
Number of employees	Between Groups	42.120	10	4.212	3.910	.000
Years of operation	Between Groups	6.785	10	.678	1.763	.079

With respect to technical expertise related barriers, [Table 3](#) shows that firms with different control of activities, sector of operation, years of operation and firm size (number of employees) were significantly different with respect to technical expertise related barriers. For example, SMEs in the manufacturing sector often have a higher need for technical expertise; hence, lack of technical expertise may be a chief barrier to innovation compared to firms in the service. Nonetheless, these firms faced the same constraints to innovation irrespective of the educational background of the owner-managers. Even though educated owner-managers may appreciate the need for expertise more, they may be equally constrained financially and in the non-availability of technical experts.

Table 3. Technical expertise related barriers

ANOVA						
Demographic features		Sum of Squares	df	Mean Square	F	Sig.
Education of owner-managers	Between Groups	18.919	12	1.577	1.465	.153
Control of activities	Between Groups	7.534	12	.628	3.747	.000
Sector of SME	Between Groups	9.135	12	.761	4.272	.000
Number of employees	Between Groups	50.948	12	4.246	4.243	.000
Years of operation	Between Groups	8.722	12	.727	1.957	.038

Additionally, the findings of the study reveal in [Table 4](#) that firms within different sectors of operation, sizes (number of employees) and years of existence were significantly different with respect to supply related barriers. However, it also demonstrates that SMEs face the same constraints to innovation irrespective of the educational background of the owner manager and their control of activities.

Table 4. Supply related barriers

ANOVA						
Demographic features		Sum of Squares	df	Mean Square	F	Sig.
Education of owner-managers	Between Groups	17.036	9	1.893	1.783	.082
Control of activities	Between Groups	1.543	9	.171	.750	.662
Sector of SME	Between Groups	4.764	9	.529	2.397	.017
Number of employees	Between Groups	24.808	9	2.756	2.192	.030
Years of operation	Between Groups	6.470	9	.719	1.872	.006

The study found that SMEs different on the demographic categories considered in this study were all significantly different with respect to demand related barriers. For instance, SMEs in different sectors may have different constraints and difficulty in how they identify customer needs and perception of their products.

Table 4. Demand related barriers

ANOVA						
Demographic features		Sum of Squares	df	Mean Square	F	Sig.
Education of owner-managers	Between Groups	37.084	14	2.649	2.983	.001
Control of activities	Between Groups	7.023	14	.502	2.826	.002
Sector of SME	Between Groups	8.069	14	.576	2.956	.001
Number of employees	Between Groups	68.484	14	4.892	5.981	.000
Years of operation	Between Groups	26.929	14	1.923	11.586	.000

Moreover, [Table 5](#) indicates that only sectors of operation and firm sizes were statistically significant. Thus, firms within different sectors and those with different sizes have relatively different experience in respect of government related barriers. For example, firms with different sizes may face different challenges in terms of taxes, as smaller firms may enjoy some tax exemptions that larger SMEs may not have or enjoy. Nonetheless, irrespective of the educational background of the owner-manager, control of activities and years of existence, SMEs in these different categories show no difference in the government related barriers faced.

Table 5. Government related barriers

ANOVA						
Demographic features		Sum of Squares	df	Mean Square	F	Sig.
Education of owner-managers	Between Groups	25.275	25	1.011	.857	.658
Control of activities	Between Groups	7.112	25	.284	1.403	.133
Sector of SME	Between Groups	9.715	25	.389	1.927	.016
Number of employees	Between Groups	71.553	25	2.862	3.188	.000
Years of operation	Between Groups	10.693	25	.428	1.043	.428

Finally, [Table 6](#) reveals that SMEs demographic differences affect the kind of culture barriers faced by a firm. In this stance, as was the case with demand related barriers, the study found that the educational background of the owner-manager accounted for the culture related barriers faced by these firms. This was possible in this instance because a person's educational background is likely to affect their predisposition to culture. Highly educated SME owners will face lesser bottlenecks with regards to cultural constraint, where owner-manager with a lower educational background may hold on to entrenched cultural positions.

Table 6. Culture related barriers

ANOVA						
Demographic features		Sum of Squares	df	Mean Square	F	Sig.
Education of owner-managers	Between Groups	28.385	14	2.028	2.047	.023
Control of activities	Between Groups	10.842	14	.774	5.842	.000
Sector of SME	Between Groups	11.048	14	.789	4.935	.000
Number of employees	Between Groups	57.086	14	4.078	4.283	.000
Years of operation	Between Groups	18.947	14	1.353	5.207	.000

Discussion

The study considered a quantitative assessment of one hundred (100) SME firms as respondents, and statistically juxtaposed their demographic characteristics against the barriers faced. The demographic characteristics considered in the analysis include education of owner-managers; control of activities (family control or non-family control); sector of SME; firm size (number of employees) and years of operation. On the other hand, the barriers to innovation considered comprised; human, management, technical, supply, demand, government and culture related barriers. The results revealed that SMEs with different demographic characteristics faced different barriers to innovation. However, in most cases, irrespective of the educational background of SMEs owners, they face the same barriers with respect to management, lack of technical expertise, supply related barriers, and government related barriers. In the instance of demand and culture related barriers, the educational background of owner-manager, however, were found to be confounded with the same barriers in this respect.

Even though educated owner-managers may appreciate the need for expertise more, they may be equally constrained financially and in the non-availability of technical experts. Blanchard et al. (2012) acknowledge the impact of firm size and sector on barriers faced, and how they cause SMEs to face different challenges. Educational background of SME owners had been discussed as a barrier to innovation among Spanish manufacturing SMEs ([Madrid-Guijarro et al., 2009](#)). Also in some rare instances, "control of activities" also did not make a difference in the type of barriers to innovation faced by SMEs. These include such instances where the firm is faced with supply related and government related barriers to innovation. The implication of this is that this classification (family controlled or managers controlled) must be considered, in an attempt to deal with barriers to innovation like government related barriers. On other hand, strait jacket remedies can be applied in the instance of management, technical expertise and demand related barriers. It is noteworthy that, size as a variable or determinant of innovation is a biasing factor and does not allow researchers to tell the actual innovation propensity of firms. In this respect, these researchers postulate that firm size as a variable ought to be controlled, in order for the researchers to ascertain the actual innovation propensity of the firm ([Madrid-Guijarro et al, 2009](#)).

Baldwin and Lin (2002) argue that the degree or intensity of innovation varies with industry and that industries with ferociously dynamic technological environment require high intensity for innovation. This argument explains that the technological environment is an important demographic of a firm as it has potential to affect its innovativeness. The most widely empirically supported view in this respect is that firms in low and medium technology industries have a lesser tendency of been impeded in their innovation process compared to firms within the class of high

and medium high technology industries. Extant literature indicates that firm's demographic characteristics even though not a major factor constraining firms in their attempt to adopt the innovation process, it is a contributing factor that tangentially affect the firm's ability to innovate (Baldwin, & Lin, 2002; Hyytinen, & Toivanen, 2005).

Several efforts have been made by both government and other stakeholders to improve SMEs' contribution and development in developing economies. For examples, several studies have assessed and postulated ways by which access to finance can be improved among SMEs (Abor, & Quartey, 2010) and to enhance their adoption of technology for innovation (Quaye, 2014). Whereas, others have also influenced policies geared at creating conducive environment for these firms to thrive (Okpara, 2011; Blanchard et al., 2012). Additionally, though these challenges in operation as well as barriers to innovation have been adequately identified, strategies and policies to mitigate these barriers and constraints in SMEs' operations are still too general. Thus, these proposed solutions (both policy direction and management) do not take into consideration the possible difference that their specific demographic characteristics may erupt into. It is in this respect that the study has categorized SMEs on the basis of their demographic characteristics and assessed the differences in barriers faced as a result.

Conclusion

Again, the study's findings provide reason for the failure of government policy and activities to deal with barriers to innovation in most developing African economies. The study recommends that proposed solutions (both policy direction and management) must take into consideration the possible difference in their specific demographic characteristics, as this may have implication on the kind or intensity of barriers faced. Particularly, immense attention should be paid to the educational background of the owner-managers, control of activities and the tenure of business. The study also has implication for further studies. In order to strengthen the case for this paper, future studies can focus on replicating this study in other developing economies. Additionally, it would be interesting to find how these findings compare to findings in a developed economy. Thus, a comparative study between a developed and developing economy can be conducted to further show whether these demographic differences matter for barrier to innovation.

Conflict of Interest

The authors declare that there was no conflict of interest.

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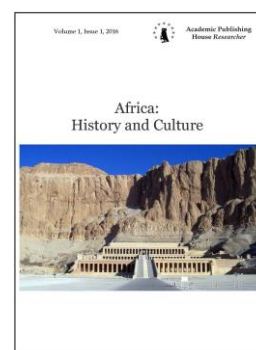
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Math Anxiety and Achievement among Male Senior High Students in the Eastern Region of Ghana

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Abstract

This study measures the math anxiety levels and related math achievement of selected male senior high students in the Eastern Region of Ghana. A simple random sampling method was used to select 25 male students in within the General Science Programme. Results show significantly low math anxiety levels in both Core and Elective Math subjects. However, the mean for Core Math related anxiety was higher than Elective Math. In addition, significant positive correlations and differences exist among the performances of male students on Core and Elective Math achievement. This study has implications for pedagogy, psychology and policy.

Keywords: Ghana, male, math achievement, math anxiety, senior high, students.

Introduction

Historically, there is an ancient negative stereotype among different cultures that males naturally perform better in math-related subjects than females (Tobias, 1993). In recent times, research had showed that this gender gap does not exist among elementary and high school students (Hyde, Lindberg, Linn, Ellis, & Williams, 2008).

Originating as a form of anxiety, math anxiety seems to affect the performance and general achievement in the field of mathematics and other related sciences. Fiore (1999) describes math anxiety as “*the panic, helplessness, paralysis, and mental disorganization that arises among some people when they are required to solve a mathematical problem*” (p. 403).

Math anxiety is caused by several factors. In addition, it is a negative attitude of fear developed towards mathematics. Research shows that reduction of math anxiety has a negative correlation with achievement and performance (Wilbert, 2006). While students’ math attitudes and achievement leading to math anxiety are often caused by parents and teachers (Jacobs, Davis-

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Kean, Bleeker, Eccles, & Malanchuk, 2005), peers' attitudes and behaviours may also lead to math anxiety (Ryan, & Patrick, 2001). Students with math anxiety do not only perform poorly but have little interest in mathematics-related subjects (Maloney, & Beilock, 2012).

Notwithstanding these, little is known about the level of math anxiety among male students in Ghana regarding Core and Elective Math. Little have been documented on the nature of students' performances with respect to math anxiety in Ghana. Based on these findings, we hypothesised that significant differences would exist among the levels of math anxiety towards Core and Elective Mathematics among male senior high students. In addition, we hypothesized there would be significant relationships between the performances male senior high students on Core and Elective Mathematics within a term. Finally, our prediction was that higher there would be significant differences among the performance of male senior high students on Core and Elective Mathematics.

Method

Twenty-five (25) students who read both Core and Elective Mathematics within the General Science Programme at Senior High School level were randomly selected in the Eastern Region of Ghana. Their average years of education and chronological ages were approximately 12 and 17 years respectively. Students in the General Science Programme in Ghana generally read the following subjects;

1. English Language
2. Integrated Science
3. Social Studies
4. Core Mathematics
5. Elective Mathematics
6. Elective Chemistry
7. Elective Physics
8. Elective Biology

It is important to note that mathematics play and essential role in their academic career as it forms the key basis of approximately 63% of their core studies. This makes math anxiety and its consequences very undesirable to students, parents and teachers within this arena.

Using self-administered questionnaires that were developed by the authors, quantitative responses about the factors that contribute to math anxiety were collected. In addition, their respective scores in both Core and Elective Mathematics were taken from their end of term examination results. The following terms were selected based on the basis that these students were in their second year, third term. Their first year, first term results were not used because the authors reasoned that it would be much unfair since students came from different Junior High Schools [both *elite and less-endowed*] and would need that term to stabilise.

Results used included;

- i. First Year, Second Term
- ii. Second Year, First Term
- iii. Second Year, Second Term

Following strict ethical standards, data collecting and handling were done appropriately. This study was part of a bigger project which looked at factors affecting math attitudes and performance among male senior high students in Ghana.

Results

From our analysis in Table 1, Tests of Between-Subjects Effects showed that math anxiety has a significant effect on both Core Math [$F_{(1, 24)} = 7.26, \rho = .013, \eta^2 = .240$] and Elective Math [$F_{(1, 24)} = 10.54, \rho = .004, \eta^2 = .314$] subjects.

Table 1. Tests of Between-Subjects Effects of Math Anxiety on Both Core and Elective Math

Variables	Levels	Mean	SD	F	ρ	η^2
Core Math	Low Anxiety	831.81	97.50	7.26	.013	.240
	High Anxiety	697.14	46.12			
Elective Math	Low Anxiety	681.25	00.29	10.54	.004	.314
	High Anxiety	526.07	25.02			

Notes:

- i. SD = standard deviation
- ii. $N = 25$
- iii. $df = 1, 24$
- iv. *R Squared for Core Math = .240 (Adjusted R Squared = .207)*
- v. *R Squared for Elective Math = .314 (Adjusted R Squared = .284)*

From the analysis in [Table 1](#), it is also clear that the mean (standard deviation) of low Core Math anxiety is greater than high Core Math anxiety $\{[831.81(97.50)] > [697.14 (46.12)]\}$. Similarly, the mean (standard deviation) of low Elective Math anxiety is also greater than high Elective Math anxiety $\{[681.25(00.29)] > [526.07 (25.02)]\}$.

Nonetheless, it is again obvious that the mean (standard deviation) of high Core Math anxiety is greater than the mean (standard deviation) of high Elective Math anxiety $\{[697.14 (46.12)] > [526.07 (25.02)]\}$.

[Table 2](#) measured the paired sample relationships and differences of Core and Elective Math performances among selected male students over three consecutive terms.

The first pair indicates a significant positive correlation [$r_{(24)} = .607, \rho = .001$] and difference [$t_{(24)} = 4.190, \rho = .000$] among the performances of male students on Core and Elective Math respectively in First Year, Second Term.

In addition, the second pair shows a significant positive correlation [$r_{(24)} = .723, \rho = .000$] and difference [$t_{(24)} = 4.774, \rho = .000$] among the performances of male students on Core and Elective Math respectively in Second Year, First Term.

Likewise, the third pair reveals a significant correlation [$r_{(24)} = .566, \rho = .003$] and difference [$t_{(24)} = 4.091, \rho = .000$] among the performances of male students on Core and Elective Math respectively in Second Year, Second Term.

Table 2. Tests of Paired Sample Correlations and Differences of Core and Elective Math Performances

Programme of Students		Mean \pm SD	r	t
Pair 1	Tscore_F1T2CM	56.99 \pm 8.59	.607*	4.190**
	Tscore_F1T2EM	50.00 \pm 10.00		
Pair 2	Tscore_F2T1CM	56.60 \pm 7.51	.723**	4.774**
	Tscore_F2T1EM	50.00 \pm 10.00		
Pair 3	Tscore_F2T2CM	57.40 \pm 9.37	.566*	4.091**
	Tscore_F2T2EM	50.00 \pm 10.00		

Notes:

- i. * = .01
- ii. ** = .001
- iii. SD = standard deviation
- iv. $N = 25$

- v. $df = 24$
- vi. T_{score_F1T2CM} = Total Score for First Year, Second Term [Core Math]
- vii. T_{score_F1T2CM} = Total Score for First Year, Second Term [Elective Math]
- viii. T_{score_F1T2CM} = Total Score for Second Year, First Term [Core Math]
- ix. T_{score_F1T2CM} = Total Score for Second Year, First Term [Elective Math]
- x. T_{score_F1T2CM} = Total Score for Second Year, Second Term [Core Math]
- xi. T_{score_F1T2CM} = Total Score for Second Year, Second Term [Elective Math]

Summary of results

- i. Math anxiety has a significant effect on both Core and Elective Math.
- ii. The mean (standard deviation) of low Core Math anxiety is greater than high Core Math anxiety.
- iii. The mean (standard deviation) of high Core Math anxiety is greater than the mean (standard deviation) of high Elective Math anxiety
- iv. A significant positive correlation and difference exist among the performances of male students on Core and Elective Math respectively in First Year, Second Term.
- v. A significant positive correlation and difference exist among the performances of male students on Core and Elective Math respectively in Second Year, First Term.
- vi. A significant correlation and difference exist among the performances of male students on Core and Elective Math respectively in Second Year, Second Term.

Discussion

This study shows interesting results regarding the levels of math anxiety and performance in Core and Elective Mathematics among male senior high students in Ghana. From the results, majority of the selected boys in the General Science Programme have low Math anxiety. This result may not have necessarily been as a result of male gender superiority in mathematics (Preis, & Biggs, 2001), but probably due to a more complex multifactorial mechanism which are yet to be explained fully (Awanta, 2000).

This study also indicates that the mean of 'High Core Math Anxiety' is greater than the mean of 'High Elective Math Anxiety'. This may also be primarily due to the fact that students within the General Science Programme probably feel that Core Math is quite difficult or may have perceived some sense of fear of math failure vis-à-vis their programme [*which is purely math-inclined*] (Khatoon, & Mahmood, 2010; Makari, 2012). Nonetheless, this sense of math fear was less likely to have stronger negative effects on their performances in Core Math as the sample was generally less anxious (Lyons, & Beilock, 2010).

Undeniably, though significant differences do exist between Core and Elective Math performances over the three terms of participants' schooling in the Senior High, it is also noteworthy that there are positive relationships between their performances in these two related math subjects. Though these positive relationships are more expected, the difference can be due to different factors. These differences can be due to poor teaching approaches used in teaching by teachers or students' previous negative experiences with Elective Math after their first term in their first year (Rossnan, 2006; Sarfo, & Adusei, 2015).

Conclusion

In conclusion, our findings show the level of math anxiety among male students in Ghana vis-à-vis Core and Elective Math. They also indicate the nature of students' performances with respect to math anxiety among boys. Math anxiety has the ability to negatively affect math achievement in math disciplines at the Senior High level. The finding that boys in the General Science Programme [*who take in addition to Core Math, Elective Math and related subjects like Elective Physics and Elective Chemistry*] have significant differences in the two main mathematics subjects is worrisome. Future studies to explain these successively consistent differences in Core and Elective Math achievement will not only increase our knowledge of the existing situation of math anxiety and math achievement but also help improve the teaching of math.

Conflict of Interest

The authors declare that there was no conflict of interest.

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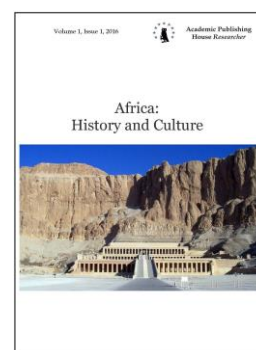
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Orthodox Health Seeking Behaviour in the New Juaben Municipality of Ghana: Disparities in Patients' Socioeconomic Status

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Abstract

An individual's decision to seek help from a particular health system is influenced by many factors, which are both intrinsic and extrinsic. The aim of this study was to examine socioeconomic factors as predictors of help-seeking, using the people of the New Juaben Municipality as a case study. Using a cross-sectional survey, data was collected using standardised questionnaire: Socioeconomic Factors and Health Seeking Behaviour (SFHSB) Questionnaire from a cross section of the population of the municipality on the determinants of intentions of seeking help. Data was analyzed using independent t-test. Results indicated that for this population, the intention of seeking hinged on proximate determinants like affordability, accessibility and acceptability of the provision of healthcare. Results further revealed that availability of finances did not necessarily determine where to seek help. A belief in a particular health system played a significant role and that the use of churches and other spiritual centres was very prominent as was the use of orthodox health system. Testimonies of previous users also played a major role in the future patronage of health services.

Keywords: Ghana, New Juaben municipality, orthodox health seeking behaviour, patients, socioeconomic status.

Introduction

Socioeconomic status (SES) is a combination of factors including income, level of education, social status and occupation. It is therefore a way of looking at how individuals or families fit into society using economic and social measures that have been shown to impact individuals' health and well-being. Socioeconomic status and health are closely related, and SES can often have effects on a person's health seeking behaviour due to differences in ability to access health care as well as dietary and other lifestyle choices that are associated with both finances and education. Socioeconomic status has long been noted to be a cause of health disparities among populations (Gwatkin, 2000). Both income and wealth are significant predictors of the likelihood to develop a chronic condition (Uzochukwu, & Onwujekwe, 2004); however, SES plays an even greater role in

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the functional ability of an individual, once they have already been diagnosed with a chronic condition like hypertension or a disabling condition like stroke (Ostrove, Adler, Kuppermann & Washington, 2000).

Socioeconomic status has been implicated to influence the health seeking behaviour of all manner of persons, irrespective of geographical location or racial background. Tipping and Segall (2005) have demonstrated that the decision to engage with a particular medical channel is influenced by a variety of socio-economic variables, which include sex, age, the social status, the type of illness, access to services and perceived quality of the service. Health seeking behaviour is thus influenced by the living standards, level of education, family size and income (Ankrah, 2004). Other studies (Gorman, & Sivaganesan, 2007; Matthews, Räikkönen, Gallo, & Kuller, 2008; Mbugua, Bloom, & Segall, 2005) have also demonstrated that socioeconomic variables have a very significant role on individuals' choice of healthcare and these appear in many forms. These include the care received by patients either at home or at hospitals (Anarfi, 1992; Anarfi, 1994), cost-benefit analysis as well as the direct and indirect cost of treating a patient (Ainsworth, & Over, 1994), evaluations of the cost of intervention programmes (Asamoah-Adu, Weir, Pappoe, Kanlisi, Neequaye & Lamptey, 1994) and the economic consequences of disease condition on families (Barnett, & Blaikie, 1992).

Socioeconomic statuses are critical factors that influence the utilization of health care services among many societies (Haddad, & Fournier, 2006). Poor people and people in the lower socioeconomic ladder seek assistance of religious healers, practitioners of folk medicine, home remedies and over-the-counter medications. They believe that alternative health practices are less costly and end in the reduction of symptoms. Anderson and Armstead (2005) believe that people from higher socioeconomic background tend to utilize orthodox medicine more than paying visits to traditional healers. These research methodologies laid a lot of emphasis on socioeconomic factors that influence health seeking behaviour but not much attention was paid to perception of efficacy of treatment and accessibility, all of which influence health seeking behaviour. Other findings by Ryan (2008), on health seeking for cardiovascular disorders have shown that the decision to seek health at a particular facility is not necessarily dependent on socioeconomic factors. Ryan (2008) found that health seeking behaviour is dependent on a combination of factors like belief in the aetiology of the disorder and the length of the illness are some of the determinants that result in whether one would seek help from an orthodox, spiritual or the traditional healthcare system. Most of the respondents in the research engaged in multiple health seeking behaviours, and that cut across social economic status.

Svab and Zaletel-Kragelj (2007) looked at the SES and racial and ethnic differences of a sample of 9744 men and women aged 51 to 61 who were suffering from cardiovascular disorders. The findings of this study showed that SES did not play a large role in the prevalence of disease; however, SES played a significant role in the functional health status of individuals once they had been diagnosed with hypertension, stroke, and arthritis. Lower SES is related to access to health care. Individuals who are of lower SES are less likely to get the necessary treatment, and are less likely to get treatment at earlier stages of the disease. The problem with the methodology of this study was that participants of this study were mainly those in the middle class without recourse to those at the lower socioeconomic level. According to Ward, Mertens and Thomas (2004), there may be structural barriers such as lack of health insurance, lack of financial support, geographical distance to treatment facilities, and access to transportation that prevent individuals from getting the care they need. For such groups of people, visits to traditional healers are more probable. Though this research looked at people from the lower socioeconomic background, there was no mention of belief systems which influenced the decision to seek help from a particular healthcare provider.

Cooper et al. (2007), in a study on cardiovascular disorders found that though socioeconomic factors influence health seeking behaviour to some extent, factors like culture and belief systems of the people cannot be ignored since cultures differ. Swanepoel (2008) posits that home remedy and non-traditional healers serve as substitute product that are used more by rural dwellers than others, because of the retention of the African tradition. While urban and other town residents were exposed to this culture and socialization, their higher level of education, access to more information and financial resources account for resocialization and re-adaptation to traditional medical care utilization. The researchers failed to take into consideration the level of acceptability

and the belief in the efficacy of treatment of orthodox medicine for which reason the rural dwellers sought help from non-traditional healers, but not necessarily socioeconomic factors.

Bourn and McGrowder (2009) have however showed that where cultural practices are more pervasive, one's status in terms of level of education, marital status, income and social standing have no effect on the health seeking behaviour of the people. While it has been established that higher rates of consultation for cardiovascular disorders are associated with a range of socioeconomic factors, the precise relationship between these factors and frequent attendance is unknown (Carr-Hill, Rice, & Roland, 2006). There has been considerable research to assess the impact of cost recovery in the form of cost of healthcare on health care seeking behaviour of people (Mbugua et al., 2005; Hussei, & Mujinja, 1997). In Kenya, Mbugua et al. (2005) put it that there was a drop of 42% in attendance for curative services in fee-charging Kibwezi health centres while in Tanzania, there was 50% decline in use of out patients' facilities after the introduction of user fees (Hussei, & Mujinja, 1997). However, there is no existing information on how user fees affect healthcare seeking in Ghana for diagnosis and treatment of cardiovascular disorders. Studies have also investigated the impact of user fees on the demand for particular types of services and there appear to be no studies on its effect on the cardiovascular conditions under study. Other studies have examined health seeking behaviour in African communities but there were no conclusive findings on the link between socioeconomic status and health seeking behaviour (Shea, & Swinkels, 2004; Sentell, & Halpin, 2006).

Low literacy and lack of awareness about services, schemes and entitlements, poverty, and cultural factors are among the crucial factors that determine the health-seeking behaviour in the state (Prasad, 2009). Recent surveys by Iyalomhe (2007) reveal that the continuing deficiencies in the awareness, treatment and control of hypertension were closely associated with certain socioeconomic factors. They concluded that in many cases, failure to achieve BP goals may be attributable to the poverty of patients' knowledge, perception, attitudes and life-style practices (Hennis, Wu, Nemesure, & Leske, 2002; Mari, Ukai, & Yamamoto, 2006). Iyalomhe, Omogbai and Ozolua (2008) showed that distance to health facilities was found to be an important factor associated with decrease in healthcare demand for cardiovascular disorders. This finding revealed that distance has significantly large and negative effect on health seeking behaviour for cardiovascular disorders. This suggests that the probability of seeking healthcare for cardiovascular disorders would increase significantly if accessibility were easier. The studies, however, focused only on economic factors that influenced the health seeking behaviour of the people, without taking into consideration other factors relating to their culture and belief systems that have profound influence on people's health seeking behaviour.

Matthews et al. (2008) in a study among people suffering from cardiovascular disorders showed that for each extra 1 km travelled to the health facility unit, usage for the facility fell by approximately 1 %, and the poor were more willing to pay a higher price to reduce the time. Deininger and Mpuga (2003) found user fees to be particularly important in determining access to health services, particularly for the poor. Verpoorte, Choi and Kim (2005), examined socioeconomic factors and health seeking behaviour for cardiovascular disorders and found the poor are more likely to use traditional medicine. Ahorlu, Dunyo, Afari, Koram, and Nkrumah (1997) showed that traditional medicine is not always more expensive than conventional medicine. Survey respondents in Ghana reported that the cost of malaria treatment at a health clinic ranged from ₵1,900 to ₵3,000 [US\$1.30 to US\$2.00 in 1997], treatment at home using drugs bought from pharmacies or health care workers ranged between ₵200 and ₵1,000 [US\$0.10 to US\$0.70], and treatment by a herbalist was virtually free.

Method

Study design and area

A cross-sectional survey method was used to carry out this study. The study was undertaken in the New Juaben Municipal area (see Figure 1). The New Juaben Municipality falls within the Eastern Region of Ghana. The Municipality covers an estimated area of 110 square kilometres constituting 0.57% of the total land area of the Eastern Region. The Municipality shares boundaries with East-Akim Municipal on the North-East, Akuapem North District on the East and South and Suhum-Krabo-Coaltar District on the West. Koforidua, which is 85 kilometres from the national capital Accra, serves both as the municipal and regional capital.

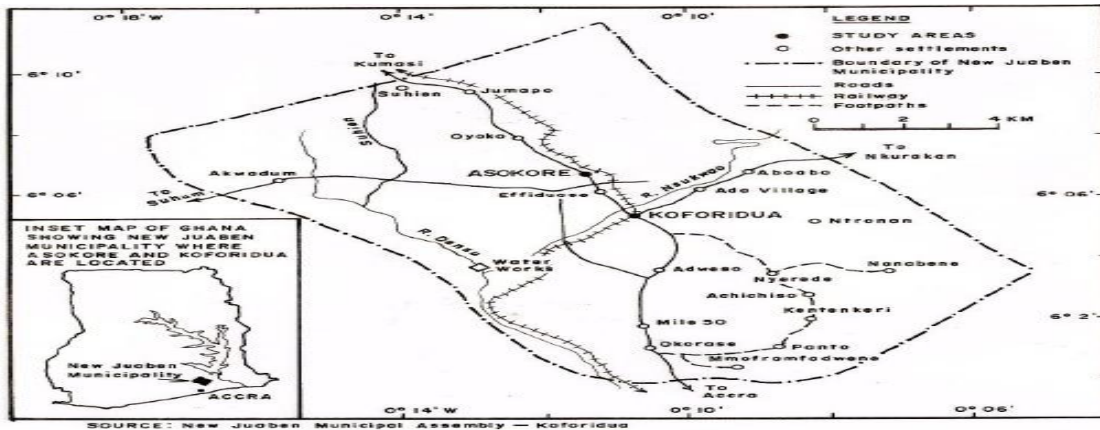


Fig. 1. A map of New Juaben

Population and Participants

The 2010 national housing and population census figures released by the Ghana Statistical Service indicate that the municipality has a population of 147,528, with a growth rate of 2.6 %. Females are the dominant group and constitute 51.5 % and males 48.5 % of the population. According to the 2010 Census, people under 15 years constitute 35% of the population; those between 15-64 years constitute 60 % while those above 65 % years constitute 5 % of the population. This signifies that New Juaben Municipality has a fairly young population with a dependency ratio of 64.7 per 100 persons in the 15-64 age groups (Ghana Statistical Service, 2012).

Procedure

Ethical approval for the study was obtained from the Department of Psychology, University of Ghana. Informed consent forms were then given to study participants, who read and signed before taking part in the study. For those who could not read and write, the informed consent was read to them to their understanding before they consented to take part in the study. Participants were people of different ethnic and professional backgrounds and were also aged 18 years and above. On the days of data collection, the researcher, with research assistants met participants at previously approved destinations. Data collection started after each participant had completed the consent form. They were asked to drop the completed forms in a box provided at vantage points. Research assistants were at hand to provide assistance to anyone that needed one. To ensure anonymity, no form of identifier was on the questionnaire and the participants were informed that participation was voluntary and they could withdraw from the study at any stage as they wished. It took participants between 30 to 35 minutes to complete the questionnaire. Data collection for the study took a period of two months to complete. The participants for the study did not receive any form of inducement or reimbursement for their participation.

Data Analysis

The researchers used collected demographic details of participants in addition to their general socioeconomic elements and health seeking behaviours. The Socioeconomic Factors and Health Seeking Behaviour (SFHSB) Questionnaire which is a 21-item scale measured socioeconomic factors and health seeking behaviour. The categories were; i. cost of treatment, ii. Income levels, iii. Proximate determinants (affordability, accessibility and acceptability). The scores on the SFHSB were calculated by adding to respective items a 7- point Likert Scale for a total scale score (i.e., where 0 = "Don't Know", and 6 = "strongly agree"). The reliability statistics after pilot test recorded a Cronbach's Alpha of .799. Correlation Between Forms indicated a reliability of .577 while Spearman-Brown Coefficient indicated for both Equal Length and Unequal Length values of .732 and .732 respectively. Lastly, Guttman Split-Half Coefficient recorded a reliability value of .731.

The SFHSB was further subjected to principal component factor analysis after the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of only four coefficients of .3 and above. The Kaiser-Meyer-Okin measure of sampling adequacy was .624, meeting the commonly recommended value of .6 and above. The Barlett's Test of Sphericity reached statistical significance, ($\chi^2_{(21)} = 75.481, p = .000$). Finally, the communalities were all above .3 further

confirming that each item shared some common variance with other items. Given these overall indicators, factor analysis was deemed to be suitable with all 21 items. Principal components analysis was used because the primary purpose was to identify the factors underlying the power distance scale. Principal components analysis revealed the presence of one component with eigenvalue exceeding 1, explaining 39.114 % of the variance. All the factors loaded onto one component.

Results

The researcher hypothesized that people with high socioeconomic status are more likely to seek help from orthodox health system for the treatment of cardiovascular disorders as compared to those with low socioeconomic status, and this was examined employing the independent *t*-test. The test results on this hypothesis are presented in [Table 1](#).

Table 1. Independent t-test of Orthodox Health Seeking Behaviour among Patients with Low and High Socio-economic Status

Socioeconomic Status	N	Mean	Standard Deviation	<i>t</i>	<i>df</i>
Low Socioeconomic Status	453	70.543	14.465	2.800	556*
High Socioeconomic Status	105	65.962	17.636		

* $p < .01$.

Results presented in the above table revealed that the likelihood of seeking help from orthodox health system by participants with low socio-economic status ($M=70.543$, $SD=14.465$) was significantly higher than their counterparts with high socio-economic status ($M=65.962$, $SD=17.636$), $t_{(556)} = 2.800$, $p < .01$. The higher the mean, the more likely is the patient willing to seek healthcare from the orthodox health system, implying that patients with low socio-economic status likewise sought treatment at the orthodox health system as shown in [Table 1](#).

Discussion

The study found that affordability of the treatment is a very important component of accessibility: that is, financial accessibility influenced patients' health seeking behaviours. There were respondents who found hospital services to be cheaper than treatment from a traditional healer. Their reasons were that at the hospital, payment for services was one stop, but at the traditional centres, one had to pay in bits both in cash and kind. The cumulative effect of this is that one ends up paying more at the traditional centres than at the orthodox hospitals. Habtom and Ruys (2007) and Heinzerling, (2005) found similar explanations.

The cumulative cost of health care was that traditional treatments were much more expensive, took longer, and more often included inpatient treatment. These findings are different from previous reports of other authors, who had argued that, in Africa mainly poor and less educated people seek care from traditional healers because they offer treatment at lower cost and are easier to reach (Cook, & Zumla, 2008). However, it seems that people in the New Juaben know exactly where to seek help, their choice is not a chance decision (Leonard, 2000).

Limitations and Directions for Future Research

It is important to cautiously interpret the findings of this study, since several issues might have introduced some biases in the current study. First, the cross-sectional nature of the study meant that it is difficult to readily establish a cause-and-effect relationship, though it is agreed that cross-sectional studies have the advantage to study large groups of people at one point in time.

Secondly, only a section of residents of the New Juaben Municipality were included, therefore caution should be exercised when drawing conclusions and generalising them to other populations.

Despite these limitations, the present study has added current literature about socio-economic status and health seeking in the New Juaben of Ghana and highlights some very key elements within the context of the study. Future studies are required to find out if the cost of traditional medicine, which hitherto was regarded as very cheap, is now taking a toll on the finances of people seeking help.

Conclusion

The importance of why people seek medical care is undoubtedly critical in health policy planning. This study has revealed that health seeking behaviour is not a simple realisation of symptoms and people taking remedial actions of just going to any nearby health centre, hospital or herbalist. It rather involves going through a decision making processes. This study has broader implications for policy planners and implementers who take decisions that have direct bearing on the health and wellbeing of the people. The implication for policy makers is that there is the need for them to understand that provision of healthcare does not necessarily mean the availability of physical structures and equipment. Healthcare provision should be tailor-made to suit the economic capacities and needs of the potential consumers.

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Conflict of Interest

The authors declare that there was no conflict of interest.

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