بسم الله الرحمن الرحيم

NAPATA COLLEGE
SCHOOL OF MEDICINE

Factors affecting choice of specialty amongst Sudanese house officers and General Practitioners in 3 Sudanese hospitals in 2019

A research submitted for partial fulfillment for the award of the degree of (MBBS) in school of medicine in Napata College

By:

Hassan I. Osman* [1], Mohammed Algum Elamin [2], Abu Bakr Mohammed Osman [3], Mohammed Bahaaeldin Abdulghaffar [4], Aya Abdelrahman Abraham [5]

[1,2,3,4,5] Medical Student, Faculty of Medicine, Napata College – Khartoum, Sudan

*Correspondence:

Hassan I. Osman, MBBS

Napata College – Khartoum, Sudan

hassan.io@live.co.uk

Supervisor
Dr. Hadeel A. Hassan
MBBS, MPH, community medicine registrar

قال تعالى:

" قالوا سبحانك لا علم لنا الا ما علمتنا انك انت العليم الحكيم "

Abstract

Background: All around the world, there has been an outcry by health officials discussing the shortages/possible shortages in certain specialties of medicine. In this research, we have identified the specialties suffering from this risk in Sudan as well as the cause(s) behind such a manifestation. **Objectives: General:** To determine the factors influencing specialty choice amongst Sudanese GPs and House Officers in 3 Sudanese hospitals. **Specific:** To determine the most attractive career paths for recently graduated medical personnel. To determine the factors influencing said career choice. To determine which medical specialties are likely to suffer from shortages in the upcoming future. **Methods:** A total coverage sample of 250 participants was obtained using a questionnaire designed to help achieve our objectives. The data was run through SPSS v.21. **Results**: 71.43% (178) of our respondents were female. 71.43% (178) were between 24-26 years of age. 67% (167) of our respondents were single. 57% (142) of our respondents were House Officers. The most sought after specialty was Obstetrics/Gynecology with 24% (60) of our respondents choosing it as their desired specialty of practice, followed by Internal Medicine at 16% (40). Helping patients was chosen as the primary motivation behind the choice of 24% (60) of our participants, followed by fewer work hours at 12% (30). **Conclusion**: Most recent graduates are single females aged 24-26 years who plan on perusing Obstetrics and Gynecology as their specialty of choice. They have made this choice because they believe it is the best manner in which they could be of aid to their patients.

Keywords:

Napata College; Specialty choice; Recent medical graduates;

الملخص:

الخلفية: في جميع أنحاء العالم ، كان هناك احتجاج من قبل مسؤولي الصحة لمناقشة النقص / النقص المحتمل في بعض تخصصات الطب. في هذا البحث ، حددنا التخصصات التي تعاني من هذا الخطر في السودان وكذلك السبب (الأسباب) وراء مثل هذا المظهر. الأهداف: عام: تحديد العوامل المؤثرة في اختيار التخصص بين الأطباء العامين والمسئولين في 3 مستشفيات سودانية. محدد: لتحديد المسارات الوظيفية الأكثر جاذبية للعاملين الطبيين حديثي التخرج. لتحديد العوامل التي تؤثر على اختيار المهنة المذكور. تحديد التخصصات الطبية التي من المحتمل أن تعاني من نقص في المستقبل القريب. الطرق: تم الحصول على عينة تغطية إجمالية من 250 مشاركًا باستخدام استبيان مصمم للمساعدة في تحقيق أهدافنا. تم تشغيل البيانات من خلال SPSS v.21. النتائج: 71.43٪ (178) من المبحوثين كن من الإناث. 71.43٪ (178) تتراوح أعمارهم بين 24-26 سنة. 67٪ (167) من المجيبين كانوا عازبين. كان 57٪ (142) من المبحوثين من موظفي المنزل. كان التخصص الأكثر طلبًا هو طب التوليد / أمراض النساء حيث اختار 24٪ (60) من المجيبين لدينا التخصص المطلوب للممارسة ، يليه الطب الباطني بنسبة 16٪ (40). تم اختيار مساعدة المرضى على أنها الدافع الأساسي وراء اختيار 24٪ (60) من المشاركين ، تليها ساعات عمل أقل بنسبة 12٪ (30). الخلاصة: معظم الخريجين الجدد هم من الإناث العازبات الذين تتراوح أعمارهم بين 24-26 عامًا والذين يخططون لمراجعة أمراض النساء والتوليد كتخصصهم المفضل لقد اتخذوا هذا الاختيار لأنهم يعتقدون أنه أفضل طريقة يمكن من خلالها مساعدة مرضاهم.

Dedication:

This work is dedicated to the late **Dr. Abdelmahmood M. Ali, RN** who passed away during the finalization of this work. Abdelmahmood was a colleague of the authors and was supposed to graduate at the same time as the authors. May he Rest In Peace.

Acknowledgements:

In preparation of this research, we had to take help and guidance of some respected individuals, who are very well deserving of our deepest gratitude. The completion of this research gave us immense pleasure. We would like to thank our supervisor, Dr. Hadeel A. Hassan, MBBS, MPH of Napata College who was worked very hard in seeing to it that this project was completed in the best of possible manners. We would also like to extend our deepest gratitude to the administrations and staff at Elsheikh Mohammed Ali Fadul Eduacational and AlSaudi Educational Hospital, Alnaw Hospital and Albuluk Hospital for their enourmously helpful contribution to our data collection. In no way, shape or form would we have been able to complete this research without the cumulative efforts of the aforementioned individuals. To all of them: Thank you very much.

Table of Contents

Chapter 1

a) **Introduction……..Page.1**
b) **Problem Statement……. Page.2**
c) **Research question …… Page.3**
d) **Research hypothesis……. Page.3**
e) **Justification/rationale…….. Page.3**
f) **Objectives (General and Specific)…….. Page.3**
g) **Hypothesis……. Page.3**
h) **Research Question…… Page.4**

Chapter 2

a) **History of medical study…….. Page.6**
b) **Literature review…….. Page.6-9**

Chapter 3

1) **Study design……. Page.11**
2) **Study area……. Page.11**
3) **Study population…….. Page.11**
4) **Inclusion/Exclusion criteria…… Page.11**
5) **Sample size……... Page.11**
6) **Data Collection……. Page.11**
7) **Data management and analysis…….. Page.12**
8) **Ethical Considerations……. Page.12**
9) **Limitations…… Page.12**

Chapter 4

a) **Results……..Page.14-22**

Chapter 5

a) **Results summary (compared to hypothesis)…….. Page.24-26**
b) **Results summary (compared to other studies)…….. Page.26-27**
c) **Implementations…… Page.27**
d) **Future Research……. Page.27**

Chapter 6

a) Conclusions……Page.29

Chapter 7

a) Recommendations……...Page.31

b) List of references ……. Page.31-32

List of Figures and Tables

Figures

Figure	Page
4.1	22
4.2	23
4.3	23
4.4	24

Tables

Table	Page
4.1	24
4.2	25
4.3	25
4.4	26
4.5	26
4.6	27
4.7	27
4.8	28

List of Acronyms and Abbreviations:

BIID = Body Integrity Identity Disorder

E.g. = example

EHS = Exploding head syndrome

EM = Emergency Medicine

ESS = Empty Sella Syndrome

FFI = Fatal Familial Insomnia

G.P = General practitioner

IHFP = The International Health Fellowship Program

IH = International health

MBBS = Bachelor of Medicine, Bachelor of Surgery

PC = Primary Care

P value = Pearson value

SMC = Sudanese Medical Council

SMSB = Sudanese Medical Specialties Board

PHC = Primary Health Care

USA = United States of America

CHAPTER 1
INTRODUCTION

Body of the Thesis:

1-1 Introduction:

With a vast, unprecedented increase in the scope of medical research led by younger and less traditional researchers, a new interest in research erupted resulting in researchers being of not only a different dynamic than what is traditional, but also in better quality researchers being published on both a national and international level.

In this research we attempt to discuss a topic rarely covered on a local level, that is the factors which drive the recent, different trends in specialty choice amongst young doctors, namely house officers and general practitioners. In our attempt to better understand why these changes have occurred, we reviewed previous literature on the topic (all abroad the Republic of Sudan) as well as developed a questionnaire that aimed to truly bring forth the causes behind these trends once and for all.

A general practitioner, a house officer, and a medical student all have one thing in common. That is, that they possess the capability to enter whatever specialty their hearts desire. Unlike specialists, who are virtually committed to a single medical specialty (that is, unless they wish to undergo numerous years of training all over again). This indicates that at a certain point in time (usually after becoming a G.P in our local system of medical education); junior doctors have to make a choice in regards to what line of study they would like to pursue. It is relatively rare for specialists to start over and choose a different specialty than what they practice. Here, we attempt to diagnose the driving factors behind this major choice in the life of a doctor. Part of being intellectually successful is “thinking outside the box”, which is exactly what we have attempted to do when it comes to this research. By thinking outside the box, we have decided that we would plan a different approach towards our graduation project (for MBBS).

In our field of study, it is common, and logical, for students to think of clinical scenarios they might encountered during their rotations or of a disease which they have studied about. It is not, however, common for students and professionals to think to explore for diseases which are not mentioned in the medical references from which they study (e.g. FFI, BIID, AIWS, EHS, ESS, etc.) or of changes and trends occurring in their fields of study. We, in our attempt to conduct a proper research which truly adds knowledgeable value and not merely another average research project, have chosen the latter of the two aforementioned options. As medical students in The Republic of the Sudan, we have noticed the appearance of numerous “new” specialties in the training (residency) programs the SMSB provides, which is why we concluded that to study the factors affecting the choice of specialty amongst medical professionals was a step in the correct direction as far as researches are concerned. This paradigm “shift” has led to new trends evolving and new specialties being listed in the Sudanese Medical Council. The motive behind this research was to associate

causes with this trend.

Until now, people rarely envision a medical doctor as someone other than a physician who works at a hospital or a private practice, examines patients, prescribes medicine, performs surgery, etc. and most who apply for the school of medicine envision the same thing and are motivated by it. It is, to this day, very rare for someone to envision medical doctors as educators, community practitioners and researchers. This is not unusual, given how long it takes for a paradigm shift to occur on substantial levels (as far as communities are concerned) and, in all honesty, we do not expect anything different for our particular topic (envision of medical doctors).

One of the most important notes of advice we can give our fellow medical students is that there is no such thing as a "better" medical specialty, it is a personal choice one has to make depending on their personal interests. Since the application to medical school is, a truly tedious process in which high levels of competition exist, medical students are usually "over-achievers". With that being said, you should always remember that you do not have to be the best at everything. A dermatologist is not the best reference of advice for a brain tumor, and that's perfectly fine.

Again, such a conclusion is important for researchers into this topic to note. It is also important for senior decision makers (e.g. Ministries/Departments of Health; the WHO, etc.) to consider since a paradigm shift of such sorts, if too skewed in a single direction, could result in the collapse of healthcare systems, or even worse. A paper discussing the disasters related to the decrease in PC physicians is quoted later on.

In short, the goal of this research is to determine the primary causes of the observable change in choice specialty amongst Sudanese medical personnel and thereby predict what the results may entail in regards to future practice in the Republic. Questionnaires were printed out and distributed as well as distributed online via multiple social media platforms using Google documents.

1-2 Problem statement:

In our research, we attempt to explain the cause behind the recent shift in medical specialty choice amongst medical personnel in the Republic of the Sudan. This is of severe significance since it will determine the "constitution" of the future medical workforce. We believe the trend to be worldwide and not simply limited to Sudan. On a local level there are numerous data on locally endemic diseases, on malpractice and almost anything else you can imagine in regards to a 3rd world country. However, there are virtually no researchers on rarer diseases, on the factors driving a choice or on why medical malpractice occurs. We plan on breaking that cycle. It is true that we face multiple issues as a nation, but that is no reason to limit innovation. The following data will aid significantly in our understanding of the specialties medical graduates (pre-resident medical graduates) tend to gravitate towards. This will allow us to better understand what future specialists will most likely practice, ergo helping us predict the future of medical practice here in Sudan.

1-3 Justification:

In our quest to derive a better understanding of how it is that recent graduates of medical school choose their future lines of practice, we have seen 1st hand how poorly understood this topic is, amongst both medical students and professionals. For that reason, we strive to play a role in the increasing said understanding. Unbeknown to many, such research is critical to the advancing of healthcare systems since it aids us in foreseeing future problems (e.g. a shortage of psychiatrists or primary care physicians). Luckily, the nation of Sudan has recently experienced an unprecedented increase in the total number of medical schools. If such research proves, for example, that a shortage of psychiatrists is to be expected; then we may take action by addressing the issue forthrightly.

Such addressing of this issue may be manifest in the form of meeting with heads of educational faculties, a collaboration with community physicians to increase the public's awareness of the vastness of medical specialties as well as work towards decreasing the stigmata, social prejudices and stereotypes associated with certain disciplines of medicine.

1-4 Objectives:

As is always the case, objectives are divided into:

1-4-1 General:

To determine the driving cause(s)/factors resulting in G.Ps and house officers choosing their specialty of practice.

1-4-2 Specific:

In this paper, we aim to address the following notions:

1) To determine the most attractive career paths for recently graduated medical personnel.
2) To determine the factors influencing said career choice.
3) To determine which medical specialties are likely to suffer from shortages in the upcoming future.

1-5 Research hypothesis:

As aforementioned, the notions we propose to address are ones that play a role in the advancement of the Sudanese healthcare system. Our hypothesis is that factors such as income and lifestyle will play a significant role in influencing the specialty choices of our target population. That hypothesis is, in part, derived by our understanding of the Sudanese socioeconomic situation.

1-6 Research questions:

1) What are the most attractive career paths for recently graduated medical personnel?
2) What are the factors influencing said career choice?
3) Which medical specialties are likely to suffer from shortages in the upcoming future?

CHAPTER 2
LITERATURE REVIEW

2-1 History of medical study

Ever since the dawn of time, humans have fallen ill and passed away as a result of said illnesses as well as a multitude of other causes. Although this is unfortunate, it has resulted in some humans noticing it and attempting to not only understand it, but also acting so they can bring an end to the illness's capability to bring closer our demise. These efforts have resulted in a globally increased life expectancy, decreased juvenile mortality rates, and much, much, more.

Back in the 20th century; Dr. Douglas Guthrie – a Scottish surgeon – took it upon himself to tackle the immense literature regarding the history of medicine and articulate it in the form of a book, ergo making it easier for us to understand the different changes that have occurred as far as the field is concerned. The book, titled 'A history of Medicine' was first published in 1945 [1]. The ~500-page book is a wonderful read and is of immense help in increasing knowledge regarding how this beautiful art came to be.

Since the history of medicine is, at least for the time being, of little concern to us; we will not be discussing it in immense detail. It is, however, of critical importance that we note out that we, as medical students, have noticed an inexcusable, massive lack awareness to the history of medicine amongst medical professionals. We, hereby, demand that efforts be put forth towards increasing physician awareness of medicine as history is a major aspect of any discipline.

Previous literature on the topic:

Most literature on the topic focused on graduating students, who differ in their view of the world from house officers and G. Ps because they have yet to enter the world of clinical medical practice. Some of the most important factors for someone to wish to study medicine were helping people, scientific interest and the mind-boggling intellectual challenges medicine has to offer [2-3]. Of course, it is important that we remember that educational systems around the world differ in how they function, ergo why some literature targets students while some targets practitioners.

A study of medical students in the USA has shown the increased significance of lifestyle as well as income in the determining of choice of specialty amongst their study population [4], which we kept in mind whilst conducting our research. In that paper (which was written by Dr. Newton and colleagues [4]; the variables, as aforementioned, were that of lifestyle and income. Although the paper was published back in 2005, the data it brought light upon is so significant it is nearly impossible to disregard it. The paper concluded the increasing effect both lifestyle and income play in the choice of future specialties by medical students (of course, it is important here that we note that the difference in medical study around the world will result in some of the upcoming literature being of students and some of it being from post-graduates). One other important aspect of this publication is that it found that

"Contrary to previous reports, the students' responses indicate they perceived the primary care specialties as lifestyle intermediate compared to other specialties." [4]. This paradigm shift is of great significance. The conclusion was articulated by the authors in a manner so eloquent that we have decided to quote it directly here:

"Lifestyle and income have become more important to medical students in their career choice, and the relative influence of these factors varies considerably between specialties. This study suggests that previous efforts to dichotomize careers into those with controllable and uncontrollable lifestyles may mask important complexities." [4]

Another study also concluded that a controllable lifestyle was the most significant factor contributing to changing specialty choice trends [5]. In that study, Dorsey and colleagues decided to tackle a problem similar to ours, but with a different approach. They sought out to determine whether or not lifestyle was a controlling factor in regards to medical specialty choice amongst senior medical students in the US; and, if so, to what extent it poses as a determining factor. In their study, the authors concluded the following:

"Perception of controllable lifestyle accounts for most of the variability in recent changing patterns in the specialty choices of graduating US medical students." [5]

In an article out of neighboring Saudi Arabia [6], the authors recommend a 3-step approach to determining the choice of specialty for students, the steps are as follows:

1) Self- understanding
2) Career exploration
3) Decision making

In a study by Bittaye et al. [7], it was stated that personal intelligence/ability preference and career opportunities were more important factors to the newer generation of students in choosing a medical specialty later in life. In a survey performed by The Association of American Medical School to investigate the factors that influence the choice of medical specialty, some of the factors that were chosen to have strong to moderate influence were; Personality fit (98.3%), Role model influence (78.0%), Future family plans (62.6%) and Competitiveness of specialty (41.1%).

A study which took place in the nation of Israel found results that were quite similar to others from around the world [8]. The same study noted that such an occurrence was not unexpected due to a more globalized world and the differences between older and younger generations.

Back in 2008, [9] then Director-General of the WHO, Dr Margaret Chan, made it clear in her message in the world health report that she was planning on true advancements in primary health care. The report stated "These avenues are defined in the Report as four sets of reforms that reflect a convergence between the values of primary health care, the expectations of citizens and the common health

performance challenges that cut across all contexts. They include:

1) *universal coverage reforms* that ensure that health systems contribute to health equity, social justice and the end of exclusion, primarily by moving towards universal access and social health protection;
2) *service delivery reforms* that re-organize health services around people's needs and expectations, so as to make them more socially relevant and more responsive to the changing world, while producing better outcomes;
3) *public policy reforms* that secure healthier communities, by integrating public health actions with primary care, by pursuing healthy public policies across sectors and by strengthening national and transnational public health interventions; and
4) *leadership reforms* that replace disproportionate reliance on command and control on one hand, and laissez-faire disengagement of the state on the other, by the inclusive, participatory, negotiation-based leadership indicated by the complexity of contemporary health systems."

A paper out of neighboring Nigeria [10] in which the authors questioned 287 "preresidency medical graduates" (quite similar to our target population, with the exception of nomenclature) concluded a particularly high interest in the fields of surgery and pediatrics to other fields of medicine. The study covered a wide age range (24-53 years), with personal interest being the primary causation behind specialty choice. We hypothesize our work will yield similar results.

A 2018 study out of Pakistan [11] which had obtained 1400 responses (targeted at medical students) concluded a limited interest in family medicine amongst Pakistani graduate medical students. The study also indicated an enormous gravitation amongst said towards internal medicine, general practice, pediatrics, surgery and EM, respectively. The study was primarily focused on addressing the disaster that was, and still is, the practice of family medicine in underdeveloped nations. The authors had the following to say:

"Family medicine as a specialty is a multidimensional field of medicine. It deals with not only prevention and screening but also diagnosis and first-hand treatment of many acute and chronic health problems, along with a residency training in the field. In many underdeveloped countries, however, general practitioners (GP) are non-specialists with no training in primary care owing to their little exposure to ambulatory and preventive care."

Data, such as that presented in the 2010 paper by Bodenheimer and Pham [12], may play a huge role in motivating medical professionals to take on certain specialties over others. This is, of course, a hypothesis. The hypothesis is based upon our assessment of the 5 personality traits which, as per our hypotheses (fueled by an immense accumulation of knowledge of the human psyche) indicate that doctors, for some part, fit the personality types which manifest themselves as politeness, compassion, understanding, empathy, sympathy, "hard-work", etc. it is true that doctors are sometimes disagreeable with other doctors, but it is important that we not that medicine suffers from a bureaucracy-like climate (top-down order following) which

may greatly contribute to the numerous cases made by medical students on social media as to how they are sometimes mistreated by superior doctors. Of course, this is only a hypothesis and can be wrong. In short, compassionate people may base decisions on data that may indicate suffering of other people.

Back in 2007, a paper by Hin Hin Ko, et. al. [13] concluded that proper and adequate exposure to PHC during the training phase and the selection of students who are interested in PHC might be a solution to the decrease in practicing/enrolling primary care physicians' problem they observed [13]. We hypothesize that exposure of medical students to the newer specialties put in place by the SMSB and SMC could result in an increase in their appeal and, ergo, enrollment rates.

Many studies related to this topic focus, as expected, on the rapid decline and decay of family medicine as a practice. This is a worldwide issue. A great example of a paper which attempted to tackle the issue would be that of *Thomas Bodenheimer* [14]. In the paper, Dr. Bodenheimer poses the issue at hand forthrightly – will family medicine, the backbone of any healthcare system, collapse? The article is initiated by the following quote from the American college of physicians:

> The American College of Physicians recently warned that "primary care, the backbone of the nation's health care system, is at grave risk of collapse." [15]

Back in 2017, Dr. Edmond Fernandes published a blog article in THE TIMES OF INDIA [16] titled "Why community medicine (public health) is the sexiest profession of the 21st century". In the blog article, Dr. Fernandes forthrightly addresses the disastrous state of public health. He urges community physicians to address the problem by leading a movement which would revive public health as a sector. In the same blog article, the issue of community medicine "dying" in the eyes of medical students is also addressed; it is hypothesized that this "death" occurs as a result of lack of exposure to field practice. The article is a collection of thoughts, eventually collected and further discussed in Dr. Fernandes' book [16].

An article out of India by Nandanwar et. al. [17] discussing the perception of community medicine as a line of practice amongst medical students concluded the following:

> "Students perceptions regarding the field of community medicine showed that community medicine is essential for successful medical practice. But the teachers must make this subject more interesting by giving more practical insight and improving the teaching modalities." [17]

Another study out of neighboring Saudi Arabia [18] concluded that the most desirable specialty amongst medical students was Internal Medicine with the primary motivator for students being a willingness to help others during times of need/distress. [18]

CHAPTER 3
RESEARCH METHODOLOGY

Study Design:

This is an observational descriptive facility-based cross-sectional study which aims to accomplish the aforementioned objectives.

Study Area:

For any study to be representative, it has to cover a certain geographical area. In our scenario, that study area is the Sudanese city of Omdurman. In specific, our respondents were from 3 facilities, those being:

1) Elsheikh Mohammed Ali Fadul Eduacational and AlSaudi Educational Hospital, (350 patients/day, 6 units, 8 buildings, 88 G.Ps and house-officers)
2) Albuluk Educational Hospital (200 patients/day, 5 units, 5 buildings, 70 G.Ps and House-officers) &
3) Alnaw Educational Hospital (350 patients/day, 8 units, 9 buildings, 92 G.Ps and House-officers)

Study Population:

Our target population included practicing Sudanese GPs and House officers who intend on pursuing their fellowships (i.e. residents/registrars to be). Our research are had a total of 250 physicians meeting our requirements (mentioned in the inclusion/exclusion criteria). Of these, 210 responded.

Inclusion/Exclusion criteria:

For a participant in our study to be considered eligible, he/she had to be a medical school graduate, currently practicing medicine in Sudan (particularly Omdurman) and are planning on pursuing their fellowships. They have to hold a maximum degree of GP (not a resident/registrar or specialist)

Sample size:

Total coverage sampling with a total size of 210 respondents to 250 requests.

Data Collection:

In our particular scenario, we were fortunate enough to be able to utilize technological advancements (e.g. WhatsApp and email) to aid us in quicker collection of our data.

After meticulously and carefully crafting our questionnaire, taking into consideration all the aforementioned, we uploaded it to Google docs, and met with medical directors

of our target hospitals. After inquiring as to the number of G. Ps and House-officers per institution and requesting that we may distribute our questionnaires amongst the hospital's staff; we sent them the link to our questionnaire on Google docs via WhatsApp and e-mail. We also prepared a number of physical copies of the questionnaire in case the hospital administration was to refuse. Luckily, we were met with great welcoming by all those we approached – they all also agreed to have the questionnaire filled online as opposed to the traditional paper and pen method.

Data management and analysis:

Following completion of the collection of the data, the data was run through v.21 of SPSS for purposes of analysis.

Ethical Considerations

Data regarding ethical considerations are all available with the corresponding author following reasonable request.

Competing Interests: None

Limitations

As is the case with all research projects, we had our limitations. The most significant of those were:

1) Data could be subject to change given the nation's political and economic transformation (e.g. some house officers may choose a different specialty if not for certain financial or cultural biases (of which they be unaware) towards certain fields of practice).
2) The possibility of some participants not properly understanding the manner in which the questions were articulated (albeit extremely unlikely)

CHAPTER 4
RESULTS

Results

As expected, we analyzed the data in a manner which would assure we took into account all variables, ergo permitting us to bring forth the most accurate data possible.

All of our collected data was analyzed using IBM SPSS Statistics v.21 after having been collected in the aforementioned fashion. Under each of the cross-tab figures presented below is the P value associated with said figure.

Pie Charts

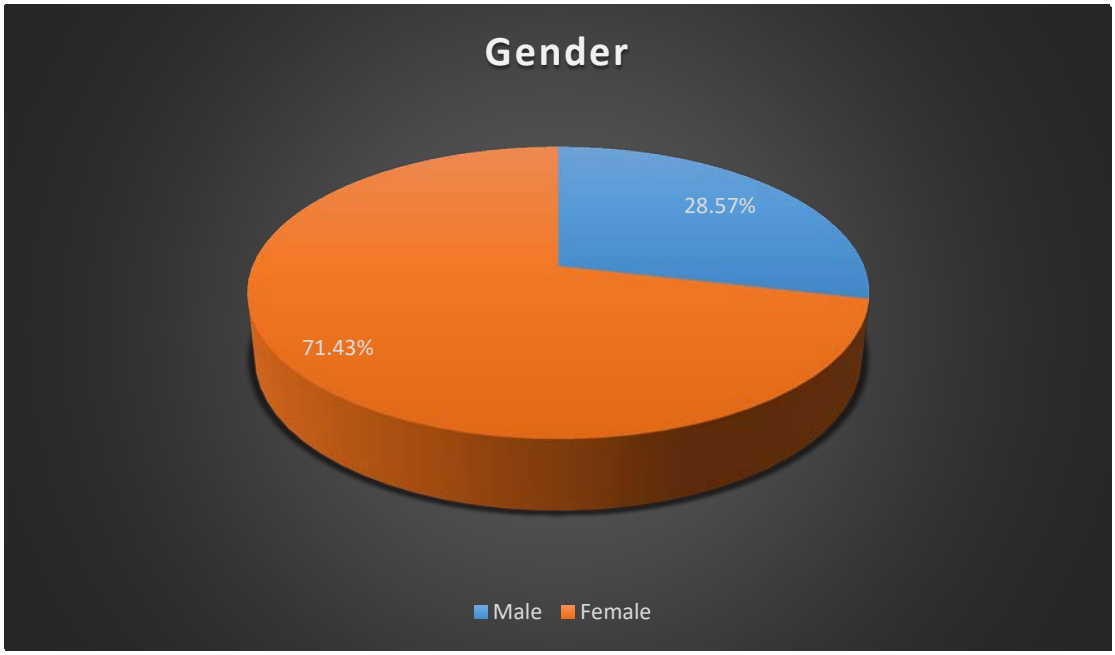

Figure 4.1.

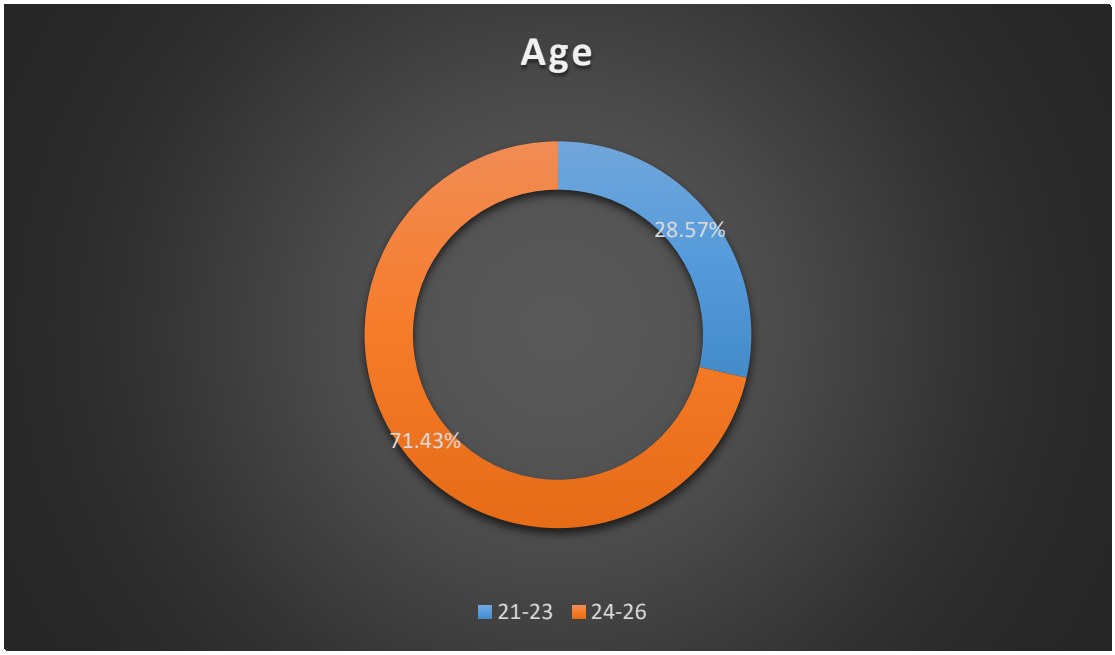

Figure 4.2.

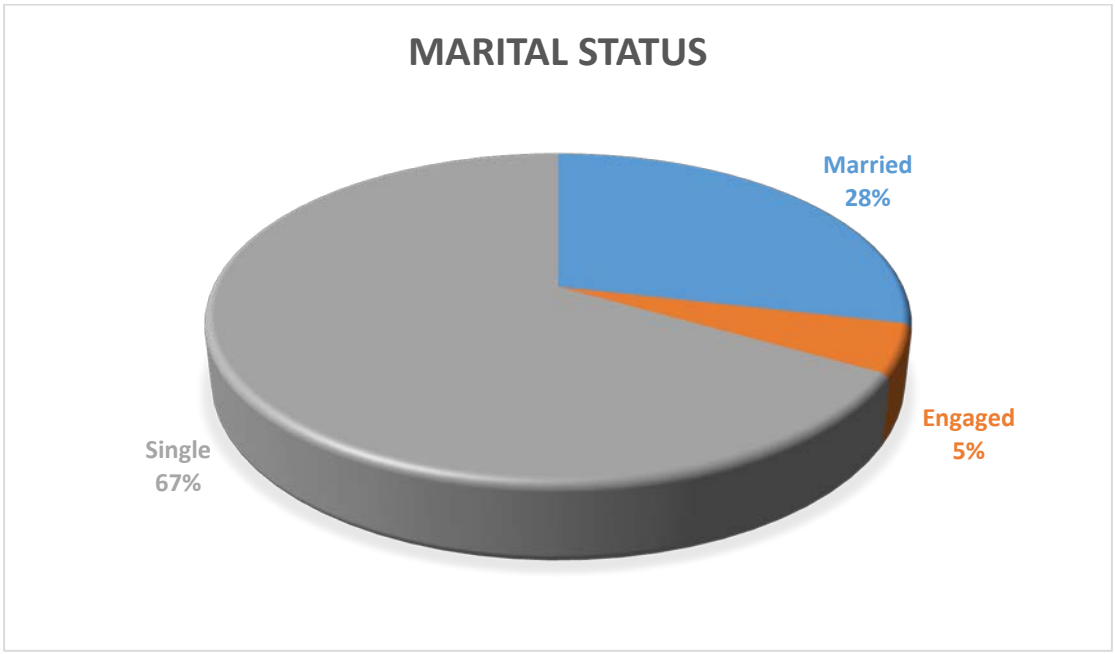

Figure 4.3.

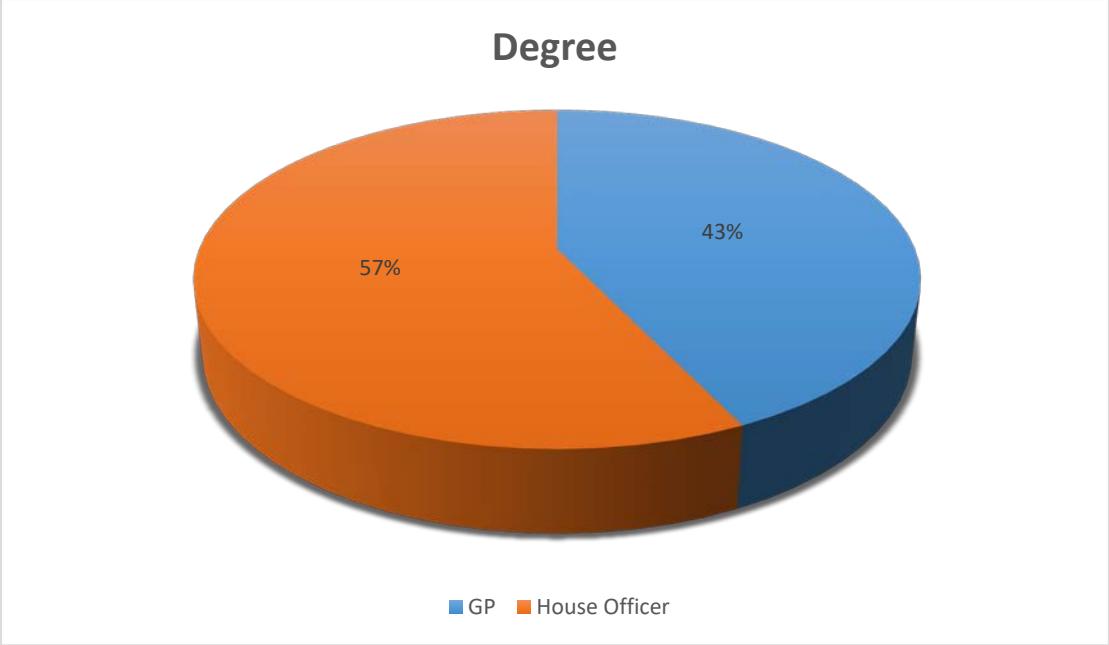

Figure 4.4

Which medical specialty do you see yourself seeking?

Table 4.1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	internal medecine(and subs)	40	19.0	19.0	19.0
	Surgery	30	14.3	14.3	33.3
	OB/GYN	60	28.6	28.6	61.9
	pediatrics and child health	10	4.8	4.8	66.7
	Ophthalmology	20	9.5	9.5	76.2
	Dermatology	20	9.5	9.5	85.7
	Orthopedics	10	4.8	4.8	90.5
	Cardiology	10	4.8	4.8	95.2
	did not make a choice yet	10	4.8	4.8	100.0
	Total	210	100.0	100.0	

Table 4.2

Why did you choose said specialty?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	financial compensation	10	4.8	4.8	4.8
	fewer hours of work	30	14.3	14.3	19.0
	social prestige	10	4.8	4.8	23.8
	better suited academic requirements	10	4.8	4.8	28.6
	decreased work stress	20	9.5	9.5	38.1
	social factors	20	9.5	9.5	47.6
	time in operating room(theater)	10	4.8	4.8	52.4
	a quickly advancing specialty	10	4.8	4.8	57.1
	increased opportunities for research	10	4.8	4.8	61.9
	Illness of a friend/relative	10	4.8	4.8	66.7
	employment experience /influence	10	4.8	4.8	71.4
	helping patients	60	28.6	28.6	100.0
	Total	210	100.0	100.0	

Chi-square test

To assure that our data is as accurate as possible, a chi-square test was run on all the data. To better illustrate our findings, we decided to present them in Figures below. As mentioned, we used SPSS to ascertain the correlation between our findings.

Table 4.3:

Choice of specialty * gender

		Gender		Total
		Male	female	
	internal medicine(and subs)	20	20	40
	Surgery	20	10	30
	OB/GYN	0	60	60
	pediatrics and child health	0	10	10
	Ophthalmology	0	20	20
	Dermatology	10	10	20
	Orthopedics	10	0	10
	Cardiology	0	10	10
	did not make a choice yet	0	10	10
Total		60	150	210

P value = .239

Choice of specialty * age

Table 4.4:

		Age		Total
		21-23	24-26	
	internal medicine(and subs)	10	30	40
	Surgery	10	20	30
	OB/GYN	0	60	60
	pediatrics and child health	0	10	10
	Ophthalmology	10	10	20
	Dermatology	20	0	20
	Orthopedics	0	10	10
	Cardiology	0	10	10
	did not make a choice yet	10	0	10
Total		60	150	210

P. value = .170

Choice of specialty * degree

Table 4.5.:

		Degree		Total
		general practicioner(GP)	house officer	
	internal medecine(and subs)	10	30	40
	Surgery	10	20	30
	OB/GYN	60	0	60
	pediatrics and child health	0	10	10
	Ophthalmology	0	20	20
	Dermatology	0	20	20
	Orthopedics	10	0	10
	Cardiology	0	10	10
	did not make a choice yet	0	10	10
Total		90	120	210

P value = .055

Why did you choose said specialty? * gender

Table 4.6.:

		Gender		Total
		male	Female	
	financial compensation	0	10	10
	fewer hours of work	10	20	30
	social prestige	10	0	10
	better suited academic requirements	0	10	10
	decreased work stress	10	10	20
	social factors	0	20	20
	time in operating room(theater)	0	10	10
	a quickly advancing specialty	0	10	10
	increased opportunities for research	10	0	10
	illness of a friend/relative	10	0	10
	employment experience /influence	10	0	10
	helping patients	0	60	60
Total		60	150	210

P value = .114

Why did you choose said specialty? * age

Table 4.7:

		Age		Total
		21-23	24-26	
	financial compensation	10	0	10
	fewer hours of work	20	10	30
	social prestige	0	10	10
	better suited academic requirements	0	10	10
	decreased work stress	10	10	20
	social factors	10	10	20
	time in operating room(theater)	0	10	10
	a quickly advancing specialty	0	10	10
	increased opportunities for research	0	10	10
	illness of a friend/relative	0	10	10
	employment experience /influence	0	10	10
	helping patients	10	50	60
Total		60	150	210

P value = .645

Table 4.8.:

Why did you choose said specialty? * degree

		degree		Total
		general practicioner(GP)	house officer	
	financial compensation	0	10	10
	fewer hours of work	0	30	30
	social prestige	0	10	10
	better suited academic requirements	0	10	10
	decreased work stress	0	20	20
	social factors	20	0	20
	time in operating room(theater)	10	0	10
	a quickly advancing specialty	10	0	10
	increased opportunities for research	0	10	10
	illness of a friend/relative	0	10	10
	employment experience /influence	10	0	10
	helping patients	40	20	60
Total		90	120	210

P value = .158

List of variables:

a) Age
b) Gender
c) Degree (House officer or G.P)
d) Marital Status
e) Specialty preference
f) Reasoning behind entering medical school

These results represent a clear interest in Obstetrics and Gynecology as a specialty by our respondents. It also shows that our respondents genuinely believe that their specialty of choice is the best way in which they could provide the most help for their patients.

CHAPTER 5:
DISCUSSION

Result summary (relationship to hypothesis)

Our work has shown that although the Sudanese MOH and SMSC have added a number of new specialties as far as their residency program are concerned, the anachronistic practices of medicine are still in play.
Out of a total of 250 practitioners between all three locations, 210 (84%) responded. This response rate was, in our estimation, quite revealing as to the trends followed by Sudanese General Practitioners and House Officers as far as specialty choice is concerned. The results were as follows:

Most (71.43%) (150) of our respondents were females aged between 24-26 (71.43%) (150), the remainder were aged between 21-23 (28.57%) (60); who were single (66.67%) (140), 4.76% (10) were engaged and 28.57% (60) were married. Most of whom happened to be house officers (57.14%) (120), the remainder (42.86%) (90) were GPs.

In our questionnaire, we listed all the specialties in which the SMC offers residency programs so as to allow for all specialties to be displayed before the respondent. A small percentage (4.76%) (10) of our respondents have yet to make a choice as to what specialty they would like to pursue. The specialty in which most of our respondents reported to be interested in pursuing was Ob/Gyn (Obstetrics and Gynecology) at 28.57% (60) followed by Internal Medicine (and subs) at 19.05% (40) and Surgery (and subs) at 14.29% (30). This was followed by Ophthalmology and Dermatology both at 9.52% (20). Cardiology, orthopedics and pediatrics all received a shared 4.76% (10).

Following this, we asked our respondents to name their primary reason as to making their previous choice. Their responds were as follows:

i. 28.57% (60) claimed that helping patients was their primary motivation behind choosing the specialty they did.
ii. Secondly, 14.29% (30) chose working hours (fewer hours/ better lifestyle) as their primary motivation.
iii. Thirdly, 9.52% (20) chose decreased work stress as their primary motivator for their specialty choice
iv. Another 9.2% (20) chose social factors as their primary motivator
v. Financial compensation, social prestige, illness of a friend/relative, employment experience/influence, increased opportunities for research, financial compensation, better suited academic requirements, time in the OR and the chosen specialty being a quickly advancing one all got 4.76% (10) each.

After that question, we asked our respondents' as to when they chose their specialty. 47.62% (100) said they chose their specialty during their time at medical school. Another 47.62% (100) said they did so after graduating medical school. The remaining 4.76% (10) made their choice prior to entering medical school.

90.48% (190) of our respondents said that entering medical school was a personal choice as opposed to them being forced into it by parental/societal influence which is what 9.52% (20) of our respondents stated.

52.38% (110) of our respondents said that they are 1st degree relatives with other medical personnel. The remainder 47.62% (100) were not 1st degree relatives of other medical personnel.

Of the aforementioned 52.38% (110) who were related to a medical professional, only 23.08% (25) said that their relatives had an influence in their choice of specialty. The remaining 76.92% (85) claimed to have made their specialty choice independently of their affiliation with a medical professional. 84.62% (93) of our respondents are not planning on perusing the same specialty as their relatives; the rest, 15.38% (17) are planning on following the footsteps of their relatives.

71.43% (150) of our respondents said that they would like to go through their residency programs in Khartoum, 19.05% (40) said that would like to travel abroad for their residency programs. 4.76% (10) claimed that they are indifferent to the geographical location of their residency program. Another 4.76% (10) chose Western Sudan as the area which they would like to spend their residency years. We followed up that question with one asking our respondents to clarify the reason behind their choice; in response 33.33% (70) said that "excellence of practice" was their primary motivation for making the above choice. 28.57% (60) said that their primary motivator was related to their families living nearby (it is accepted that the Sudanese community is one in which families are closely related, which could provide a possible explanation for this staggering percentage). 19.05% (40) of our respondents chose the presence of a certain supervisor/chief in the area as their primary motivation. 9.52% (20) attributed their choice to the availability of opportunities for advancement in their chosen area. Another 9.52% (20) attributed their choice to the general living situation in their area of choice.

The above question was followed by one inquiring as to which type of hospital setting would our respondents prefer to spend their residency years. Our options were *a) public hospitals* and *b) private hospitals* to which 71.43% (150) of our respondents chose the former. Only 28.57% (60) chose the latter. As a follow up inquiry, we asked our respondents to clarify the reasoning behind their previous choice. Staggeringly, 33.33% (70) of our respondents said they believe that they will be better qualified as practitioners following the end of their residency period. 23.81% (50) of our respondents claimed belief in better qualified seniors in public hospitals as opposed to private hospitals. Weirdly enough, a staggering 23.81% (50) of our respondents claimed better work environments as the primary motivator behind their choice. Keep in mind that a frequency Figure of all the aforementioned data as well as that which is upcoming; the Figures as well as our conclusion will do a better job of illustrating all of this data. 14.29% (30) of our respondents attributed their choice to the costs associated with residency. Although we provided our respondents with sufficient space for them to elaborate as to why they chose this option, none of the 4.76% (10) of our respondents decided to do so.

Our data has also shown an increased interest in financial compensation amongst doctors of a relatively young age group, and an increased interest in patient care amongst relatively older doctors.

In our attempt to clarify which stage of medical practice is believed by post-graduates to have worse working conditions; we asked our respondents as to which stage of practice is of greater importance to them (i.e. we asked them which is of greater importance to them; working conditions during their respective residency programs or working conditions following the end of these programs.). 71.43% (150) of our respondents stated that both are of equal importance to them. 23.81% (50) of our respondents chose working conditions during their time as a resident (registrar) as of greater importance to them. The remaining 4.76% (10) chose working conditions post-residency as of the greatest importance to them.

Above, we hypothesized that "factors such as income and lifestyle will play a significant role in influencing the specialty choices of our target population.", that hypothesis was challenged by our findings which have shown that the primary motivator driving specialty choice amongst our target population.

The nation of Sudan possesses a relatively centralized healthcare system with great focus on the state of Khartoum (in which the capital exists). That was shown to be a driving factor as most of our respondents chose Khartoum when we asked them where they would prefer to spend their residency training period. Most of our respondents attributed their choice of Khartoum to excellence, or at least superiority, of practice followed by location of family.

Result summary (relationship to other studies)

Our results were in line with all the aforementioned literature as far as the variables resulting in medical graduates choosing their respective lines of practice. In addition to the results, our work showed many of our respondents choosing aiding/helping patients as their primary motivator to choosing a specialty. As expected, and was the case for the literature above perceived lifestyle changes associated with specialties (whether or not they are true) seem to have influenced our respondents' choices. Our work also showed the likelihood of certain specialties (e.g.: community medicine and psychiatry) suffering from shortages of practitioners, both examples received 0 responses from our respondents'. Other results were, in short, 'in line' with those concluded by our colleagues from all over the world.

The argument illustrated in the literature review chapter of this research by Nandanwar [17] is a sensible, logical, coherent and direct one. We do agree with them that teaching staff do play a role in guiding medical students towards certain specialties (you always hear the story of how a professor made someone rethink what specialty to practice (for better or worse)).

In short, our study was in excellent correspondence and reported similar data to the available literature. The primary difference was that a greater percentage of our

respondents reported an interest in Obstetrics and Gynecology as opposed to other researches.

Implications (other theories) (world impacts)

Our work allows us to predict a future lack of physicians in certain disciplines of medicine (e.g. psychiatry, family medicine, dermatology, etc.). It also implies a lack of interest in research opportunities by practicing physicians. We believe that immediate action should take place as to increase exposure to research as it is dire need of a true upcoming so as to advance us as a nation.

Future research

Although no one can truly predict the future, educated hypotheses can be arrived at by researcher efforts. We currently plan on placing forth efforts that would help us conceptualize the causation behind the lack of attractiveness towards certain specialties.

It is necessary for a research to be carried out suggesting why it is that these specialties are suffering from the trouble they happen to be suffering from – e.g.: a study of the psychology of community medicine vs the psychology of the average medical student – as such a variable may prove to provide a breakthrough in our understanding of how students and recent graduates interact with the options provided to them. A consideration of ours is to conduct a research of the aforementioned sorts in the future.

Such efforts are planned to take place in combination with educational faculties so as to create a true change in regards to the future of medicine in Sudan. Once efforts are put into place, our plan is to conduct a research similar to this one so as to assess the changes that have took place.

CHAPTER 6:
CONCLUSION

Conclusions

In conclusion, we have found that:

1) A majority of Sudanese doctors will choose their specialty based on what they believe will be of greatest aid to their patients.
2) A highly centralized, at least as is believed by post-graduates, healthcare system exists in the nation of Sudan.
3) Younger physicians place financial compensation higher in their hierarchy of choices as opposed to relatively older physicians
4) Fields such as community medicine, clinical immunology and psychiatry are expected to suffer from shortages in the future.
5) There appears to be a surge in the number of female physicians in Sudan.
6) Greatest specialty of interest to younger physicians is Ob/GYN

CHAPTER 7:
RECOMMENDATION(S) + LIST OF REFERENCES

Recommendations

We recommend a paradigm shift of the Sudanese medical education system which will allow better exposure to misrepresented fields of medicine (previously discussed).

We also recommend greater exposure to fields expected to suffer from future shortages as well as studies into the psychological aspect of these specialties so as to determine the reasoning behind the disdain displayed by young graduates.

Another recommendation of ours would be the mandating of frequent update courses and examinations amongst practicing physicians (especially those who happen to be educators) so as to virtually guarantee that students cease to receive anachronistic information on how medicine is practice as well as the latest updates on the ever-expanding art that is medicine.

And finally, we recommend educational faculties + educationalists look into their policies in order to aid in the occurrence of the necessary paradigm shift for the disaster to be avoided.

List of references:

- Vancouver referencing was used

1) Guthrie D; A history of Medicine; THOMAS NELSON AND SONS; 1945
2) Hyppola H, Kumpusalo E, Neittaanmaki L, Mattila K, Virjo I, Kujala S, et al. Becoming a doctor- was it the wrong career choice?. SOC SC MED 1998;
3) Vaglum P, Wiers-Jenssen J, Ekeberg O. Motivation for medical school: the relationship to gender and specialty preferences in a nationwide sample. MED EDUC. 1999;
4) Newton DA, Grayson MS, and Thompson LF. The Variable Influence of Lifestyle and Income on Medical Students' Career Specialty Choices: Data from Two U.S. Medical Schools, 1998–2004; ACADEMIC MEDICINE. 2005 September; Vol.80 No.9: 809-814
5) Dorsey ER, et al. Influence of controllable lifestyle on recent trends in specialty choice by US medical students. JAMA. 2003;
6) Al-Ansari SS, Khafagy MA. FACTORS AFFECTING THE CHOICE OF HEALTH SPECIALTY BY MEDICAL GRADUATES. J FAMILY COMMUNITY MED. 2006 Sep-Dec; 13(3): 119–123.

7) Bittaye M, et. al.; 2012; Medical students' choices of specialty in The Gambia: the need for career counseling; BMC MED EDUC.
8) Weissman C, et. al.; 2012; Medical specialty considerations by medical students early in their clinical experience; Israel Journal of Health Policy Research; Weissman et al. Israel Journal of Health Policy Research 2012, 1:13 http://www.ijhpr.org/content/1/1/13
9) WHO. The World Health Report 2008. 2008;
10) Eze, BI, Maduka-Okafor FC, Okoye OI, Aguwa EN. Factors Influencing Choice of Medical Specialty of Preresidency Medical Graduates in Southeastern Nigeria. JOURNAL OF GRADUATE MEDICAL EDUCATION. 2011 September. Pp. 367-371. Available from: http://dx.doi.org/10.4300/JGME-D-10-00101.1
11) Bilal M, Haseeb A, Mari A, et al. (August 06, 2018) Factors Determining Pakistani Medical Students' Career Preference for General Practice Residency Training. Cureus 10(8): e3114. DOI 10.7759/cureus.3114
12) Bodenheimer T, Pham HH. Primary Care: Current Problems And Proposed Solutions. hlthaff. 2010 May; 29:5: 799-805. Available from: doi: 10.1377/hlthaff.2010.0026 HEALTH AFFAIRS 29, NO. 5 (2010): 799–805
13) Ko HH, Lee TK, Leung Y, Fleming B, Vikis E, Yoshida EM,. Factors influencing career choices made by medical students, residents, and practising physicians. BC MED JOURNAL. 2007 11; VOL. 49 NO. 9: 482-489
14) Bodenheimer T. Primary Care — Will It Survive?. N ENGL J MED. 2006 August 31; 355;9: 861-864. Available from www.nejm.org
15) The impending collapse of primary care medicine and its implications for the state of the nation's health care. Washington, D.C.: American College of Physicians, January 30, 2006. (Accessed August 10, 2006, at http://www.acponline.org/hpp/statehc06_1.pdf.)
16) Fernandes E. https://timesofindia.indiatimes.com/blogs/global-health-focus/why-community-medicine-public-health-is-the-sexiest-profession-of-the-21st-century/. 2017
17) Nandanwar DY, et. al.; 2017; Community medicine: perceptions among medical students and career preference: a cross sectional study; INTERNATIONAL JOURNAL OF COMMUNITY MEDICINE AND PUBLIC HEALTH
18) Nemri IA, Agabawi AK, Akel MS, Noorelahi AM, Eldeek BS, Alghamdi SS, Alghamdi NA, Ayuob NN. Factors affecting the specialty choice of medical students at king Abdulaziz University in Jeddah, Saudi Arabia. Int J Community Med Public Health 2015;2:570-5.

* Some references are not in Vancouver style because a certain citation was requested by their respective journals.

-x-x-x-x-x-x-x-x-x-x-x-x-x-x- x-x-**End of work**-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-