7-2020

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HNR 499

July 29th, 2020

Grand Valley State University

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ABSTRACT

The health care system is an important factor for the well-being of the human population all around the world, and yet, health care can differ greatly depending on a variety of factors including location and culture. When referring to health care, it is appropriate to include skilled physicians, hospitals, care clinics, and medical equipment. This article conducts a literature review that compares the health care systems of two countries, the Republic of Ghana and the United States of America. This information is relevant for not only expanding one's knowledge, but also for travel purposes, as both countries have highly populated cities and tourist areas. For example, Ghana has an estimated 890,000 entering tourists per year while the United States has approximately 79 million entering tourists per year [1]. Additionally, both countries host study abroad programs, including the one at Grand Valley State University where many students have experienced the cultural and educational differences in Ghana. This research can be useful for educating visitors on what to expect with general health care practices in Ghana and in the United States. Additionally, it is very important to know why health care depends on location and how these systems evolved in-order to make improvements based on what other countries are doing in their health care systems.

This review focuses the analysis of the health care systems in these two countries (Ghana and the United States) to six general areas: obstetric care (prenatal, infant, and maternal care), generalized trauma care, unique diseases and illness, visual images of perceived quality, medical equipment and technology, and lastly, the adaptations to the global pandemic of COVID-19. These six factors are important to consider when analyzing health care systems because these factors can affect how a person is diagnosed and treated. Additionally, these factors can differ depending on the health care system's location, specifically due to cultural and traditional values.

It is important to note that there are many health care facilities in Ghana and in the United States, including those in major cities and in rural communities. Having a variety of health care centers in two large countries makes making simple comparisons difficult, as there are many factors to consider. In this review, I attempt to overcome these confounding factors by being specific in my comparison by stating examples to support evidence from previous research, while including many different factors of the health care system, and narrowing down comparative regions within Ghana and the United States when possible (i.e. the state of Michigan). Overall, these health care systems vastly differ between Ghana and the United States due to the illnesses and diseases that are present in the specific areas and the resources that are accessible. Thus, the questions of this paper are: How and why are the health care systems of Ghana and the United States different?

OBSTETRIC CARE

Worldwide, pregnancy is viewed as a natural, yet a potentially dangerous phenomenon where caregivers take into account the physical and mental health of the mother and the fetus. There are many factors that affect the development of the fetus and the health of the mother such as access and commitment to antenatal care, care throughout the delivery process, and postnatal care. Attending more care visits ensures the mother and baby are healthy, as many complications can be diagnosed early and treated by health care professionals [2]. It is therefore important for mothers to attend the proper number of pre-natal and post-natal routine check-ups in proper health care facilities. The World Health Organization recommends at least 15 of prenatal visits (one care visit every four weeks until 28 weeks pregnant, a care visit every two weeks until 36 weeks pregnant, and a care visit weekly until delivery), and three postnatal visits typically within three weeks [3]. The care of the mother and the baby can change depending on the location and culture the expected mother lives, due in-part to the availability of different resources in each country.

A major factor that has been associated with the use of maternal health facilities is education. Many Ghanaian women do not have the same educational opportunities as women in other countries, leading some pregnant women to ignore antenatal care [2]. A survey conducted in Ghana showed that women who received a secondary education or higher were 76% more likely to attend at least four antenatal care visits [2]. This can be due to the fact that women that are less educated do not have the means to afford care visits [4]. Women worldwide with a bachelor's degree earn $450,000 more in median lifetime earnings than high school graduates [4]. Since women with a higher education level tend to make more money than women who are less educated, they are more likely to have the means to afford the care needed before, during, and

after pregnancy [4]. Women with a higher education level tend to have more knowledge about health, so education itself is also a reason that educated women attend more care visits [4]. Thus, if the mother has not attended secondary education or higher, she is likely to ignore maternal health care facilities due to a lack income and knowledge, which ultimately can contribute to a higher mortality rate [2-4]. If less care visits are sought out, there is a greater chance that a medical condition of the mother or the child could be missed [4].

In Ghana, there is also the aspect of limited resources. Many health care facilities do not have the equipment and personal skills to perform prenatal genetic testing or complicated prenatal surgical procedures, which can also affect the health of both the mother and fetus [2,6]. Most of the risks that concern pregnancy happen during the delivery process, such as hemorrhaging [2]. Maternal mortality still remains at high rates in Ghana and is a major Public Health concern. The 2007 Ghana Maternal Health Survey Report estimates a maternal mortality ratio of 580 deaths per 100,000 live births [2]. There are many reasons these statistics are so frightening: it is reported that a skilled attendant is present at around only half of the deliveries due to the fact that half of deliveries are done at home instead of a health care facility [2]. This may be the result of the popular practice of homebirths where skilled physicians are not present due to the presence of a midwife [2,6]. The high rates of maternal deaths during labor is partially due to the lack of financial and tangible resources available [6]. Many Ghanaian women themselves do not have access to the money to pay for the skilled care during delivery, as the husband tends to control the house hold money [6]. A study found other factors such as lack of transport, patient satisfaction, cultural beliefs, sudden labor, and lack of money to all be reasons why women chose against a skilled delivery [6]. These factors can defer a woman going to a hospital for delivery because they do not have the means to afford it, it goes against cultural

values, they had bad past experience at a hospital or other health care facility, or if they do not have the time or means of getting there. Women are also required to provide costly items such as bedsheets and meals for the duration of their hospital stay, and thus is a contributing factor that pushes women to choose to not participate in a delivery experience at a skilled facility [6]. These factors encourage women to participate in homebirths because it is a way to have birth without spending the cost of hospitalization.

Another factor that influences attending obstetric care visits is that many people in Ghana value the spiritual aspect of birth, leading them to seek care at spiritual facilities such as churches and traditional healers instead of health care facilities [5]. The difference between spiritual facilities and modern health care facilities is the distributions of medication and treatments. 80% of Ghanaian women tend to seek treatment at a traditional and spiritual facility because they do not use modern medicines, which are associated with the belief that modern medicines can be more harmful than beneficial [2-5]. It is believed by some that modern medical treatments and drugs put unnatural chemicals into the human body (e.g. chemotherapy) [5]. The reliance on the spiritual aspect of labor and delivery can contribute to maternal death and other delivery. One study in Ghana showed that Ghanaian women choose to focus on the natural aspect of birth and less on the medical aspect due to cultural values, thus not attending as many care visits [2]. Right after the delivery process, many complications can occur including postpartum hemorrhage, neonatal breathing problems, infection of both the mother and infant, and a variety of infant feeding problems (i.e. refusing to eat, fussiness or lack of alertness while eating, and excessively long feeding times) [2,6]. It is, therefore, very important that the mother and the child have access to postnatal checkups and education on what warning signs can look like from skilled physicians [7].

Postnatal checkups are highly emphasized with caesarian births because surgical incisions are required, making the recovery process more complicated. With cesarean section births, postnatal care is taken much more seriously and women tend to seek out health care facilities. 72% of Ghanaian women that had a caesarian birth received a postnatal checkup with a physician within the first 24 hours after delivery and 81% of all Ghanaian women received this care within the first two days [7]. Therefore, Ghanaian health care systems are providing the care to keep the mother and the child healthy, but it depends on if that family is choosing to receive care in the health care system. However, infants also need a postnatal check-up after delivery. According to *The Ghana Demographic*, a staggering 72% of all newborns (both natural and caesarian births) received no postnatal checkup [7]. This is also partly because many people in Ghana put homebirths and spiritual postnatal care above the importance of health care facilities. The spiritual aspects revolving around postnatal care in Ghana include connecting the mind, body and spirit before, during, and after delivery [8]. One main practice that is done after delivery, and is recognized as a type of postnatal care, is to pray for the mother and the infant [8]. Usually the community and family pray for their safety and happiness [8]. This is compared to hospital postnatal care which emphasizes medications and checkups by health care professionals and mitigates the spirituality aspect [8]. However, depending on the family's wishes, religious or spiritual guides are accepted at hospitals [8]. Hospitals are currently attempting to make hospital care cohesive and cooperative with spirituality aspects, but the decision to seek out spirituality aspects offered ultimately falls on the mother and her family.

In the United States, the pregnancy journey is highlighted as one of the most important times in a women's life. Because pregnancy is regarded as a crucial event, pregnant women in the United States attend more obstetric health care visits [7]. In 2016, 76-77% of U.S. mothers

attended the recommended number of antenatal visits, defined as one care visit every four weeks until 28 weeks pregnant, a care visit every two weeks until 36 weeks pregnant, and a care visit weekly until delivery [7,9]. As stated above, a woman's education level can affect the likelihood of attending the recommended number of antenatal visits. In the United States, 83.6% of women who have completed a bachelor's degree attend the recommended number of antenatal visits, while only 17.4% of women who did not attend college attended the recommended number of antenatal care visits [7].

Prenatal and postnatal checks are essential for the well-being of the mother and baby. However, even with the increased rate of visits by educated women seen in the United States, mortality still occurs [7]. Research shows that in the 1900s, when almost all U.S. births took place at home, 100 babies died for every 1,000 born [10]. By 1997, modern medicine had greatly reduced that rate by 93%, to seven infant deaths out of every 1,000, which is primarily due to the increase of hospitalized births with a skilled physician [9]. For example, there are around 80 pregnancy-related deaths per year in the Michigan are from hemorrhage, infection or sepsis, amniotic fluid embolism, thrombotic pulmonary embolism, hypertensive disorders, and anesthesia complications [7]. Many health care professionals know what to look for to prevent these causes of death, but there is still a risk of mortality due to sudden and undetectable complications that are rare. Mortality mostly occurs to the people that are a part of the lower socioeconomic status in the United States due to lack of funds to afford the best care [7].

The United States has a relatively high socioeconomic status compared to Ghana and is divided into a class system that includes: the rich, the middle class, and the poor [10]. In the United States there is a higher access to resources needed in the health care field such as technology, pharmaceutical drugs, and personnel [11]. While health care facilities contain the

technology and treatments needed, many people do not have the means to obtain these medical treatments, especially if they are uninsured [11]. Around 14% individuals do not have health insurance to cover the cost of needed treatment [12]. Among these adults, 40% that have not obtained a high school degree do not have health insurance because they do not have a job that provides health insurance as a benefit [10]. Therefore, affordability and access to health care is not available to everyone in the United States, resulting in differential treatments and care.

Due to the fact that there are different moral and cultural values between Ghana and the United States, the pregnancy journey before and after can be very different. Education plays a role for attending care visits during and after pregnancy due to the fact that women in the United States are more likely to attend care visits before and after pregnancy because more women in the United States are educated [10]. 30% of Ghanaian women who obtained a high school diploma are said to also obtain a college degree, while 56% of women in the U.S. who obtained a high school diploma also obtain a college degree [10]. Spirituality also plays a factor in the pregnancy and delivery journey. Ghanaian people hold spirituality and traditional rituals at a high value, mothers are more likely to trust and respect traditional facilities and caregivers during childbirth [2,5]. This is compared to pregnant women in the United States where a physician's recommendation and instructions are more valued, resulting in more health care facility visits [6-15]. Although it is shown that obstetric health is positively affected by health care visits, there still remains a risk of death or injury. There is also the factor that no matter where a mother lives, there is still the risk of death [6-16]. Therefore, depending on where a person may live, the cultural aspect of birth and pregnancy can be treated very differently.

TRAUMA CARE

Emergency and trauma care refer to health conditions that need care as soon as possible. Emergency and trauma care can be critical to saving a patient's life with life-threatening injuries. With injuries resulting in more than five million deaths worldwide and significantly more disability annually, trauma care has become a Public Health priority [15]. Therefore, it is important to have an advanced and adequate trauma health care system in-order to handle these cases. Trauma care has many aspects involved for optimal success including the correct equipment, skilled and trained medical professionals, adequate medications needed, fast transportation, and fast results of needed tests.

Ghana is a low-middle income country that is considered developing [17,18]. There are different sections of hospital centers located in Ghana depending on their location and the size of the facility (i.e. district-level hospitals, regional hospitals, and tertiary hospitals) [16-19]. A district-level hospital is a smaller health care facility with very little medical supplies, but there are many district-level hospitals in Ghana [16]. Regional hospitals are slightly larger than district-level hospitals and contain more medical supplies, but there are fewer regional hospitals than district level hospitals in Ghana [16]. A tertiary hospital is a health care facility and is the largest hospital located in Ghana that contains a large supply of medical supplies, but there are very few tertiary hospitals located in Ghana [16]. Trauma care equipment is not readily available at emergency care facilities located in Ghana due to lack of available maintenance or skilled personnel [17,18]. Cervical collars were not available at 69% district-level hospitals in Ghana and only 14% out of the 31% of the remaining hospitals provided them [16]. While stationary screening technologies are mostly available at these trauma care centers, no portable X-ray, ultrasound machines, or image intensification that are fast and efficient are available at district level facilities [19]. Basic

surgery and procedures, such as closed reduction of fractures, were readily performed at district level hospitals [17]. However, more specific surgical procedures (i.e. orthopedic surgeries, skin grafting, or neurosurgical skills) are not improving in efficacy and effectiveness because they are not widely performed at these health care facilities [17,18]. While regional level hospitals are a larger in their overall size and in the number of overall departments than district-level hospitals in Ghana, they are still lacking in some aspects. For example, cervical collar, ventilators, portable and fast screening technologies, electronic cardiac monitoring, and specialized equipment were not available at these health care centers [17-19]. Procedures such as vascular repair, skin grafting, intracranial monitoring, neurosurgical procedures, and spinal fixation, which are needed in many trauma injuries, were not typically performed due to lack of trained personnel and adequate equipment [17, 18]. In tertiary hospitals, blood transfusions and medical ventilators and monitoring systems are still not always available, but used more than lower-level care facilities [17]. While fast and portable screening equipment are more available, angiography is not present [17]. The difference in equipment availability in both large and small hospitals in Ghana are illustrated in Figure 1.

Surgical procedures, such as orthopedic procedures, are more likely to be performed, unlike internal fixation and prosthetics for amputees that were not widely available [17]. The lack of adequate materials and procedures in health care facilities in Ghana can be due to many aspects, and two main factors are the absences of the correct equipment and the lack of trained professionals [17-19]. The diagnostic and basic equipment mentioned above are needed in the hospital because not only do they help determine the source of the health problem, but also help make sure the patient remains stable and indicates fluctuance. Without trained professionals, health care workers cannot use the equipment efficiently or read the results the equipment

indicates. Many health care facilities lack trained equipment professionals because they are not as needed as physicians and surgeons. The responsibility of trauma care physicians is to treat acute problems [17-19]. Since many Ghanaian physicians lack the needed equipment and technology, they may have to adapt patient treatment [17-19].

The United States is a middle-high income country that is considered a developed country. There are around 1,154 health care facilities with advanced and adequate trauma centers, which is approximately 25% of the health care facilities in the United States [21]. Factors such as transportation, including ambulances and helicopters, advance trauma care by decreasing the time to the trauma care center for the patient to receive care [21,22]. The United States has 703 trauma care centers with access to helicopters with 571 base helipads and 683 helicopters (Figure 2) [21]. The state of Michigan has one of the best specialty hospitals worldwide for Pediatrics, at C.S Mott Children's Hospital. The success of the hospital is in-part due to availability of fast patient transportation, both ambulance and helicopter. Hospitals across the state transport children with specific needs that cannot be done at the local trauma centers to C.S Mott Children's Hospital by helicopter to reduce transportation time [21,22].

In the United States, trauma care facilities have an extensive trauma team that is made up of a trauma surgeon, trauma residents, emergency medicine attending and residents, nurses, respiratory therapists, radiology and laboratory technicians, and support staff [22]. Within the trauma team, there are many skilled and trained professionals for both basic and special care of patients is also extensive, for example, care of the patient is continuously monitored, critiqued by peers, and protocols revised and updated as indicated to assure the highest quality of care [22]. Many health care facilities in the United States also provide post-rehab facilities and programs to many trauma patients, including intensive care unit (ICU) patients.

When comparing trauma care centers located in both Ghana and the United States, both have room for improvement. Even though trauma care in the United States is well advanced, improvements should still be made. For example, there is still a need for more trauma care facilities in rural areas of the country so people can have easy accessibility and decreased transport time, a major contributor to a decrease in mortality. While trauma care centers in parts of the United States have more specialized trained personnel, but also have a variety of centers, thus a variety of access to equipment needed in emergency care situations. Ghana has a lower availability of equipment, patient transportation options, and specialty trained professions for specific situations. As seen, new transportation that decreases time to the care facility helps improve the patient's odds of recovery because trauma is all about reaction time [17,18]. The health field is always improving, but allowing for the proper equipment will help improve the outcomes.

DISEASES AND ILLNESSES

There are different common illnesses and diseases depending on what culture or environment you are exposed to. This can be due to environmental factors, lack of equipment and trained personnel, lack of funds, and physical factors. When comparing developed and developing countries, such as the United States and Ghana, these factors are prevalent and can help determine the presence, and treatment, of certain illnesses and diseases in the local health care systems.

In Ghana, there are a variety of illnesses and diseases that are present in many local and regional health care facilities worldwide. However, in Ghana, there is a higher rate of tropical and parasitic diseases, which can be due in-part to poor life-style conditions, but also environmental factors (Table 1) [23]. One of the most globally known diseases that occurs in Ghana is malaria. Malaria accounts for ~8% of all deaths in Ghana and is the most common cause of death for children under the age five [23]. Perhaps due to the prevalence of malaria in Ghana, many health care professionals, as well as the general public, are generally well informed about how to recognize the symptoms (convulsions and high body temperature) and know how to effectively treat malaria [23]. One of the earliest recognition signs of malaria is a fever, otherwise known as febrile illness, which many Ghanaians diagnose and begin treatments in the home [23]. Home treatments are effective for mild symptoms, but when symptoms start to worsen or increase, many go to health care systems for further treatment [23]. The best way to prevent death or major illness from malaria is by treating it early. By knowing the signs of malaria, treatment can be sought out right away and death can likely be prevented. Treatments for malaria include drugs and herbal treatments that can be obtained at health care facilities and professional herbalists. In the health care system, the drug Chloroquine is prescribed to treat malaria [23].

Medical drugs are not the only available treatment for malaria. Herbal remedies include "pineapple peels, the bark of the *Nyamedua*, mango, and pear trees, the leaves of guava, nim, bamboo and pawpaw trees and wild bush tea" [23]. If a patient does not want to seek a health care professional or use medical drugs as treatment, they have options. However, the patient's choice is most likely based on what is available and the cost of the treatments. The cost of treatment for malaria at a health care facility in Ghana ranges between $300 and $600 U.S. dollars, while herbal treatment is $30-50, making home treatments an affordable option [23, 24]. In Ghana, traditional and modern perspectives on the health care systems should both be considered due to the nature of the most common diseases.

In the United States, Cardiovascular diseases (CVD), Gastrointestinal diseases, cancer, and hypertension are diagnosed at higher rates, while tropical diseases and parasitic diseases are not as prevalent [25]. The main treatment plan in the United States is prevention of illnesses and decreasing symptoms, including pain [25]. For example, there are vaccines in the United States to prevent viral and bacterial infections. The vaccine is a biological preparation that improves one immunity to that specific disease or illness some include influenza, hepatitis B, the measles and the chicken pox [25]. If there is a disease where there is no vaccination present, the plan is either to treat for a cure using pharmaceutical drugs (e.g. antibiotics), or maintain the disease by preventing it from growing or spreading throughout the body [25]. Some antibiotics, such as Augmentin or Amoxicillin, will cure an illness such as sinusitis [25]. Certain diseases (i.e. hypertension, cancer, and gastrointestinal diseases) require medications and treatment therapies to maintain and decrease the growth and symptoms [26]. Many disease etiologies such as hypertension or gastrointestinal diseases can be traced through genetics, but in some cases the

etiology is unknown [26]. Even if extensive treatment is taken, there is still a risk or mortality in any case.

Different illnesses and diseases occur in different health care facilities depending on location. In the United States, tropical diseases and parasitic diseases occur less frequently than rates seen in Ghana [27]. For example, the rates of malaria in the United States are much lower than rates that occur in parts of Ghana [27]. Research estimates that there are around 228 million cases of malaria worldwide in 2018, and of the African region, Ghana and Nigeria are reported to have an increase in malaria cases from 2017 to 2018 [27]. In a developing country such as Ghana, there are still many commonalities in illnesses and diseases that the health care systems share with the health care systems in the United States. For example, in the United States the three major causes of death are generalized arteriosclerosis, hypertensive CVD, and malignant tumors. While these diseases are diagnosed in Ghanaian health care facilities, these top U.S. diseases are not the main cause of death in Ghana [26]. However, as stated above, health care workers treat diseases such as malaria and typhoid fever more often in Ghana than anywhere in the United States [26]. Thus, specific health care facilities have different procedures, equipment, and treatments in place to adjust to the specific illnesses that are present. Cities in the United States and in Ghana both have similar diseases and illness, but also have different types of treatment. As stated above, herbal medicines are very popular in cities of Ghana to treat diseases that are not as common in the United States [25-26]. Therefore, environment and cultural factors shape health care facilities in different locations.

PERCIEVED QUALITY

The quality of health care can often be difficult to define because the health care systems are so complex. Images of health care systems include the size and cleanliness of hospitals, as well as how patients are treated and their satisfaction levels. Good health in a community is dependent on the nearby health care systems, therefore, health care systems provide different quality and care depending on their locations and the resources available, such as the funds provided. When conditions of health care facilities are improved, quality of health care will invariably be improved upon making clients satisfied with the care they receive. This section addresses the quality and perceived images of the health care systems in both Ghana and in the state of Michigan.

The perceived quality of the Ghanaian healthcare systems was determined by patient satisfaction, which is related to all aspects of the health care system including cleanliness and visual representation of the hospital as a whole (e.g. hospital rooms and surgical rooms). A recent survey shows that there is a positive and statistically significant correlation between the condition of health care facility and client satisfaction [28]. Therefore, not only does infrastructure and cleanliness affect client satisfaction, but also the relationships between health care workers and patients. Location and population of the health care facility is another major factor of the conditions and quality. Research shows that about 69% of the population of Ghana live in rural communities, where only 3% of these households live near a doctor [28]. Since there is a low availability of health care centers and workers, especially in rural areas in Ghana, there is an over population in these health centers, which reduces patient satisfaction rates and health care facility conditions. Hospital rooms in Ghana typically include a medical cart that contains supplies such as bandages and a hospital bed (Figures 3 and 4). While these rooms contain the basic supplies

that are needed, they lack readily available advanced equipment (e.g. defibrillators). This is due to the fact that these health care facilities are in the rural parts of Ghana that do not have access to a large supply of equipment. An example of the visual images of health care systems in Ghana can be seen in Figures 3 and 4.

Patient satisfaction is also used to measure the quality of health care systems in the United States. Patient satisfaction affects clinical outcomes, patient retention, and medical malpractice claims, and thus it affects the timely, efficient, and patient centered delivery of quality health care [30]. With a higher socioeconomic status, the United States has a higher patient satisfaction rate of the health care systems than Ghana due more resources available to obtain advanced medical equipment and more access to a wide variety of buildings [30]. A typical operating room in the United States contains a variety of medical equipment including overhead lights, scopes, scalpel and other surgical tools, operating table, and sterile supplies (Figure 5) [32]. Americans are largely positive about the quality of health care that they receive, with 75% of Americans reporting that they received "excellent" or "good" health care [31]. The factors that can persuade patients' opinions include good doctor-patient relationship, effectiveness of treatment, cleanliness and visual representation of health care facility, and organization [30].

In the United States, the health care field has increased in funds, size, and resources such as equipment and personnel. The condition and quality of health care facilities, specifically in Michigan, are also measured based on client satisfaction, but also on the successes of new plans implemented to improve overall quality of health care [32]. For example, recently in Michigan, the factors of lean production, focusing on cutting out waste and improving quality, in making automobiles have been applied to the health care systems [32]. According the *Journal of Hospital Medicine*, the University of Michigan applies methods of lean production to improve the care of

patients across various venues of hospitalization and aim toward optimal discharge rates [32]. The study showed that lean production allowed for faster production and deliverance of needed supplies such as a peripherally inserted central catheter line (PICC), used for blood transfusions, that is needed to be inserted within 24 hours [32]. Therefore, these lean production methods are quite successful in health care facilitates and are improving patient satisfaction, thus improving quality and conditions of the health centers [32]. In the United States, a *Quality Assurance Strategic Plan* was developed to ensure delivery of patient-focused, safe and quality health care. The guiding principles include: improve services to be client-focused; improve patient safety; improve overall clinical practice and improve the standard for management systems and accountability [29]. This plan is said to improve material characteristics and resources for the health care providers. Therefore, the overall goal is to decrease mortality rates. Since the main way to study quality and conditions of health care facilities is by surveying patient satisfaction, studies show that the overall patient satisfaction is good [29]. However, this study may include bias because many patients do not have anything else to compare their experience with, resulting in a higher patient satisfaction result.

When looking at both quality and conditions of health care facilities in Ghana and in Michigan, it is hard to compare them due the fact that patient discharge and patient intake data cannot be compared. Since both Ghana and the United States are very large areas, there are many factors to consider in addition to those addressed in this paper. Both areas have urban and rural populations, which makes it hard to make a comparison between the areas because they are different confounding factors inside each country. Typical hospital rooms and operating rooms in Ghana are different than hospital rooms and operating rooms in the United States. Health care facilities in Ghana do not have a large stock of medical supplies and equipment, which is shown

through the resources available in the hospital and operating rooms (Figure 3 and 4) [32]. In the United States, hospital and operating rooms contain a variety of medical supplies and equipment because these health care facilities have access to a large amount of medical equipment (Figure 5) [32].

MEDICAL EQUIPMENT AND TECHNOLOGY

When comparing the quality and condition of health care facilities between cities in Ghana and the United States, it is essential to consider access to resources, funds, and intake of patients. These factors can depend on the health care system's location. Health care facilities in major cities in Ghana, such as Accra, the capital city, have more resources such as funds and equipment than health care facilities in rural areas in Ghana, such as Winneba, with a smaller population of 55,331 [33]. This is also relevant in the United States. For example, Michigan's major hospitals are stocked with a variety of resources, and are primarily located in major cities, such as the capital city of Lansing. But in the more rural and unpopulated areas, such as Northern Michigan, the health care facilities are not as equipped with a variety of resources. Therefore, research regarding the availability of technology and equipment in health care systems is dependent on specific location and can differ from facility to facility.

The access to equipment and technology in the medical field is vital. In Ghana, access to a variety of supplies such as advanced medical equipment can be scarce. According to a pilot study, 47% of hospitals in a sample of district hospitals in Ghana were technically inefficient and 59% of them were scale inefficient, meaning they did not have the proper technology (i.e. respirators, monitors, drugs, and other equipment) [34]. Therefore, evidence indicates that inefficiency in health facilities may vary, which can be due to the lack of variety of resources or access to resources depending on location. For example, many facilities in Ghana focus on obtaining the most used equipment (e.g. respirators, drugs, surgical supplies, and bandages). There is also a lack of mobile devices in the health care field in Ghana, which is said to be very effective for health in the future [35]. Mobile devices (i.e. portable screening machines) are lacking, which is recognized as a major impediment to advancing medical care in resource-

limited settings [35]. Research shows that even though most of the continuous positive airway pressure (CPAP) machines were sustainable after 16 months, only five of the eight oxygen concentrators and three of the four generators donated were non-functional at a follow-up study (Table 2) [35]. This is in-part due to the fact that some medical equipment used in health facilities across Ghana are donated and unscreened prior to use [35]. It was also stated that a lot of locally available equipment that can be serviced in local areas are not durable for the task at hand because they are not maintained and are unreliable [35]. Thus, it can be inferred that to improve medical care across Ghana, and other resource-limited countries, updating equipment and technology needs to be a priority. However, to do so, a significant amount of funds need to be available and invested, which currently is not feasible, especially in Ghana.

In the United States, there is more variability and accessibility to different kinds of medical equipment and certain technologies than medical equipment in Ghana. Globally, the medical field makes advancements through access to more funds and money, so there is an availability for new medical equipment and technology. As discussed in the analysis of trauma care equipment, the United States hospitals have newer and more durable medical equipment, as well as an access to a variety of portable and mobile screening and data collecting equipment such as ultrasounds and monitors [36]. In addition to governmental allocation of funds and resources, health care systems can vary in the care provided due to population of the region. For example, there are less equipment health care facilities such as rural hospitals in Northern Michigan, than in urban regions such as Lansing, Michigan. Thus, depending on the health care location, the quality and availability of care can vary dramatically.

The access to resources and money makes a big difference in the health care field. Ghana and the United States both have varying access to resources which means that have a variety of

different equipment. While both areas have struggles with medical technological access, both adapt to these situations differently. Since the United States is a wealthier country, they are able to distribute equipment easier and quicker, while Ghana has many health care facilities that do not have the access to certain technology and if they do, they can only supply for their patients and cannot assist nearby health care facilities. Not only does the research have to take in account the population of the nearby area, but also what is most likely needed. Unlike urban health care facilities, rural health care facilities have limited access to medical supplies and equipment. However, increased funding in the United States allows the rural hospitals to have better to necessary equipment when needed.

DIFFERENT ADAPTATIONS TO THE GLOBAL PANDEMIC OF COVID-19

In the year 2020, a pandemic swept the world. COVID-19, also known as the corona virus, spread across the world and has killed, as of July 2020, 657,262 people [37]. Currently there is no cure or vaccine to prevent the contagious virus from spreading, resulting in governments to set-up specific regulations. Many countries are taking precautions that include quarantine, social distancing, and extreme sanitary precautions [38]. One main way to stop the spread of COVID-19 is to keep a distance of at least six feet from other people, especially strangers, and quarantine [38]. The response to the COVID-19 virus in both Ghana and the United States illustrate different strategies enacted to limit the contagion spread.

As of July 2020, there were 34,406 confirmed cases of COVID-19 and 168 deaths in Ghana [40,41]. This can be due in-part to the fact that 5.35 million Ghanaian people live in urban slums [38]. These areas usually consist of congestion with an average of five people living in one single room making it is hard to keep appropriate spacing and quarantine between the population [38]. These conditions also make it difficult to maintain adequate sanitation and personal hygiene. The World Health Organization (WHO) recommends preventing the spread of pathogens by frequently washing hands under warm water, using a face-mask, hand sanitizing with alcohol-based sanitizer, and covering mouth and nose when sneezing and coughing [38]. In many Ghanaian homes there is no running water, making it difficult to wash hands and use proper hygiene techniques as often as recommended. Studies show that 81% of the population in Ghana do not have access to clean water [38]. Additionally, an increased demand has led to an increase in prices of hand sanitizer and face [38]. People with a limited income, therefore, will not have access to this necessary equipment to resist the virus because they cannot afford the increasing prices of cleaning and sanitation supplies.

Ghanaian health care systems, as in many other countries, are sacrificing and contributing to help treat the virus. Two institutions are donated for the purpose of researching the virus in Ghana, the Noguchi Memorial Institute for Medical Research and Kumasi Center for Collaborative Research [38]. Since many hospitals and other health care facilities are not properly equipped to treat COVID-19 patients, gun thermometers screen for the virus [38]. If patients have a fever, they are then quarantined in isolated centers for treatment. Even though many health centers in Ghana do not have access to a lot of equipment to treat the virus, such as ventilators, many precautions are being taken in the health field to help stop this pandemic. African countries have recently strengthened their preparedness against COVID-19 [38]. Many countries in Ghana have improved airport surveillance and implemented temperature screening at ports of entry, in-part due to equipment that was readily available following another recent pandemic: Ebola [39]. Since Africa was hit with this earlier health pandemic in 2013 to 2016, people in African countries such as Ghana can understand how unpredictable these times can be and thus have been shown to be a little more prepared than other countries [39].

Many wealthier countries with growing economies have also been hit hard from the COVID-19 pandemic, such as the United States. There are, as of July 2020, over 4.44 million confirmed cases and 147,672 deaths from COVID-19 in the United States. The United States contains state governments that have to oversee different types of regulations and rules to help prevent the spread of the virus, as well as to help revitalize the economy. In the United States, there are currently 95,000 critical care beds, including surgical and specialty unit beds, available in hospitals today, but with the rapid increase in COVID-19 cases health facilities are running out of proper equipment [41]. Many hospitals have been grouping patients based on their status, thus creating an organized system to help treat. Many health care facilities all over the nation are

running low on needed supplies and equipment, so health care workers must change their way of business and focus on how to best accommodate the patients that will most likely benefit from care [43]. The problem with this mentality is the fact that the health care system cannot treat everyone with COVID-19. During a pandemic, one way to create a successful outcome is to use resources wisely and to do as much research as possible [38-42]. Currently countries all around the world are in the same position with this outbreak, therefore people globally are working together and collaborating to implement new plans [42]. There is also the aspect of creating and distributing more COVID-19 testing, so health care professionals, government agencies, and the general public can track the number of cases and deaths to and create overall trends, which are helpful when determining what efforts help minimize the spread in certain areas [38-42]. As this is a current pandemic, information is rapidly changing and new strategies and procedures will be implemented to slow the spread of the virus.

When the COVID-19 death rate of the Ghanaian population is compared to the COVID-19 death rate of the U.S. population, it is seen that the Ghanaian population has a lower death rate. This can be due to the fact that Ghanaian population are taking the safety precautions much more seriously than the U.S. population, which may be due in-part to the Ghanaian population having experienced a pandemic before with Ebola [36-41]. However, there is the fact that the death rates, for both Ghana and the U.S., are not scaled for the population size, which can affect analysis. Health care facilities and governmental leaders in both the United States and Ghana are taking actions to overcome this global pandemic. While Ghanaian people may be taking safety precautions more seriously, The United States population has implemented more ways to keep people safe from the virus. For example, many states have implemented a stay at home orders that are very slow to progress into opening the economy, while Ghana is trying to do the same

but faces more obstacles such as the lack of a water supply to every household [36-41]. Both areas and cultures are trying to protect each other and keep everyone safe by contaminating this virus, but different obstacles are faced through the process, thus making this recovery process very different [38-42].

CONCLUSION

There are many different aspects that are associated with health care including obstetric care, trauma care, types of illnesses and diseases, how health care is perceived, medical technology and equipment, and uncertainties such as the COVID-19 pandemic. For each aspect of health care, differences appear due to location and cultural norms. In obstetric care, different types of prenatal and postnatal care are sought out by mothers and are accessed depending on culture. When looking at trauma care, generally, the United States has more trauma facilities and equipment than health care facilities in Ghana, due to the larger country size and population. Different care practices can also be due to the fact that there are different types of diseases and illnesses seen in each location. Different adaptations in the medical field are made to treat illness and diseases more frequently diagnosed. Health care facilities in Ghana and the U.S. will look different due to the different cultures; therefore, how health care is perceived is viewed on patient satisfaction and efforts for future improvements. Due to different economic status and availability, medical technology and equipment are available in health care facilities in the U.S., but may not be available in health care facilities in Ghana. Since the United States has a higher socioeconomic status compared to Ghana, the U.S. has more access to high-costing medical technology. Although there are many aspects to the health care system, there are still uncertainties when unexpected diseases occur. For example, COVID-19 is what today's society is facing all over the world, including in both the U.S. and Ghana. The way these two different locations and cultures adapt to this global pandemic are due to the availability of resources. The current rates of COVID-19 cases, and the prior disease knowledge the countries have faced.

While sharing some commonalities, such as the continual need for improvement, the health care systems in Ghana differ from the health care system in the United States in many

aspects. These differences are important to address because people need to understand how cultural differences affect the universal systems of health. Therefore, there are many factors that affect the health care field and how facilities are established such as culture, environment, global conditions, availability to resources and money. Not only do health facilities differ in countries, but also in regions and areas depending on the community you live in. It is important for the general public to understand the limitations faced by global health care faculties, not only travel reasons, but also for improvement practices. Not only can both the United States and Ghana implement structural and medical processes in their medical systems, but this knowledge of what works and what does not work can be applied to medical systems in other parts of the world.

There is also a lot of insightful information and evidence that illustrate the differences between specific health care systems. However, the health care field is constantly advancing and changing through time and generations. Therefore, this research presents many limitations. For example, there are many limitations with doing a large-scale comparison between two different countries due to endless confounding variables. Due to the global pandemic of COVID-19, I had to adapt my original plans of doing observational research in regions of Ghana to a literature review. I was limited in this aspect of health care systems due to the fact that I was both unable to experience the quality of health care systems first hand and I was not able to do field research in the U.S. or in Ghana. Therefore, I had to adjust my plan and use literature researched published by other authors. By utilizing the aspects of a literature review, I able to make more general statements about health care facilities in Ghana and in the United States. My original proposed research focused on one comparison of the health care systems. In this literature review, I was able to analyze many parts of these health care systems, expanding my knowledge in these areas. It is important to note that not one health care system or facility is better than the

other, but instead learn and take away successful plans and outcomes to improve other health care systems around the world. This research was done to help aid myself and others with future career interests related to the medical field.

FIGURES

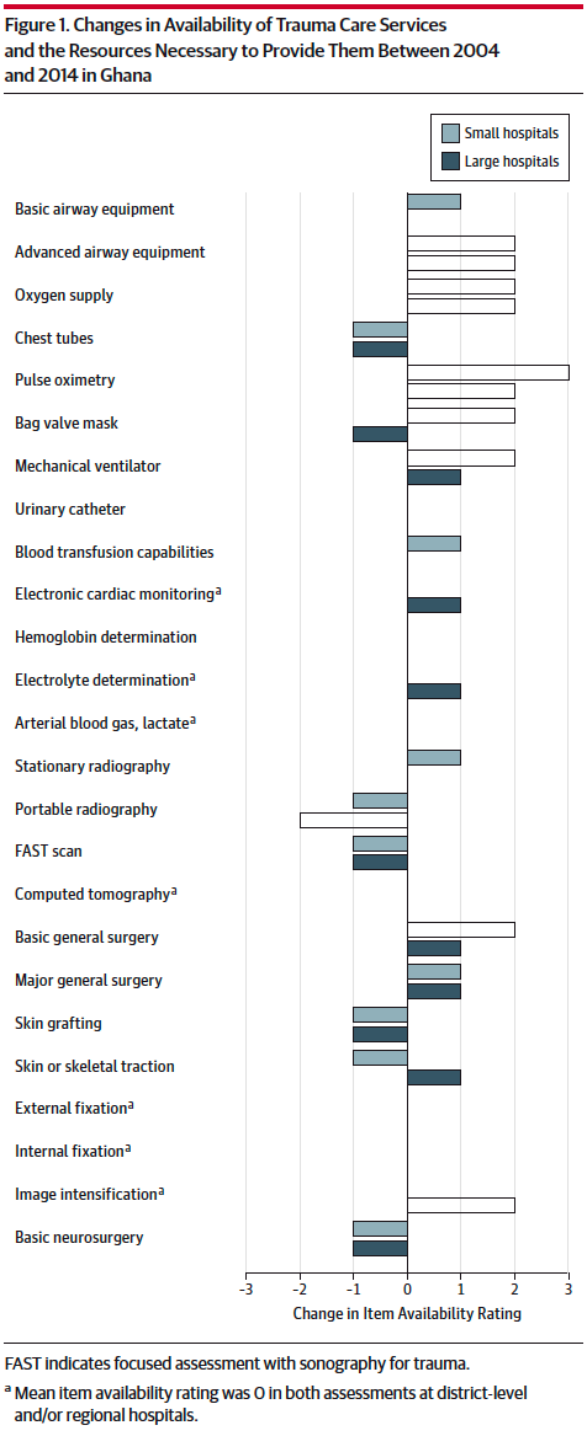

Figure 1: Availability of trauma care supplies and equipment in health care facilities located in Ghana. This figure compares the different trauma care supplies and equipment between large-scale hospitals (dark blue), small-scale hospitals (light blue), and other types of health care facilities (white).
SOURCE: (n.d.). Retrieved from https://pubmed.ncbi.nlm.nih.gov/26502036/

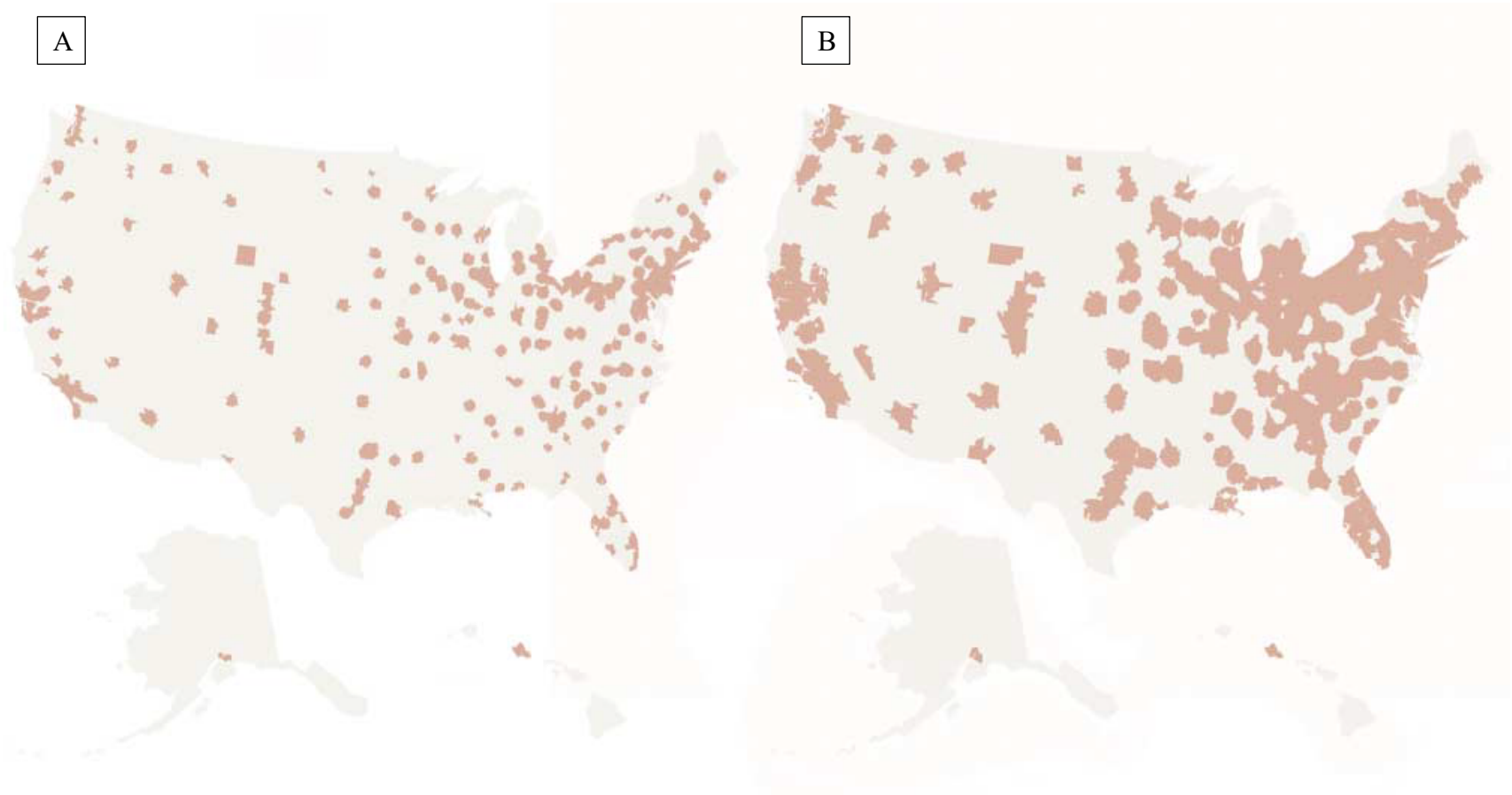

Figure 2: The number of available helipads to available helicopters across the United States (red shade). Map A shows available helipads used for health care in the United States and Map B shows the available helicopters used for health care in the United States. SOURCE: (n.d.). Retrieved from https://jamanetwork.com/journals/jama/fullarticle/200997

Figure 3: A hospital emergency care room in a health care facility in Ghana. This visual image represents an emergency care room in a health care facility located in urban Ghana. The equipment shown is what is available in large urban hospitals located in Ghana (e.g. hospital beds, ventilators, oxygen tanks, and medical cart that contains bandages and other simple medical equipment).
SOURCE: (n.d.). Retrieved from https://www.graphic.com.gh/features/opinion/no-bed-syndrome-a-telling-phenomenon-of-ghana-s-health-care.html

Figure 4: A example of a patient care room in a hospital facility in rural Ghana. This figure is a visual representation of a normal patient care room in the rural regions of Ghana. This image shows the type of resources available in health care facilities in these regions of Ghana (e.g. hospital beds and containers for simple medical supplies like bandages).
SOURCE: (n.d.). Retrieved from https://www.emra.org/emresident/article/a-new-frontier-one-residents-experience-in-tamale-ghana/

Figure 5: Inside an operation room at C.S. MOTT children's hospital in Ann Arbor, Michigan, United States. This figure is a visual representation of an operating room located in a children's hospitals in Ann Arbor, Michigan in the United States. The image shows the type of resources used in an operating room in Michigan (e.g. operating table, overhead lights, scopes, and monitoring equipment) SOURCE: (n.d.). Retrieved from http://www.annarbor.com/news/images-from-the-medai-tour-of-the-new-cs-mott-childrens-hospital

TABLES

Table 1: An overview of the medical test ordered and performed in a hospital in Ghana. This table shows the most prevalent diseases diagnosed in Ghana. For example, there were many tests ordered to test for Malaria and many cases were confirmed positive. Many of the illnesses and disease that were tested came back positive, thus making it important for health care systems to address and treat. SOURCE: (n.d.). Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2641803/

Diseases and Illnesses Tests in Ghana from The Report of Medical Research Institute		
Test	Total Number Performed	Number Positive
Sputums for tubercle bacillus	6,876	2,198 (32%)
Dark ground for syphilis	10	1
S. typhoid in blood	939	271
S. paratyphoid A in blood	939	7
S. paratyphoid B in blood	939	2
Malaria in blood	11,097	1,025
Trypanosomes in blood	11,097	1
Microfilaria in blood	11,097	10
Schistosoma mansoni in urine	8,589	449
Trichomonas vaginalis in urine	8,589	77
schistosoma mansoni in feces	5,762	9
Hookworm in feces	5,762	424
Ascaris (roundworm) in feces	5,762	675
Taenia (tapeworm) in feces	5,762	29
Trichiuris trichiura in feces	5,762	31
Entamoeba histolytica in feces	5,762	161
Strongyliodes in feces	5,762	227
O. volvulus in skin	42	19

Table 2: The availability and status of equipment in a health care facility located in Ghana. Number provided means that number of items that are present, but may not be in service. Items present and functional means that the item is both available and working. As seen many portable and manual devices like oxygen concentrators and generators are either nonfunctional or not present at the time when needed, thus making it hard to care for patients.

SOURCE: (n.d.). Retrieved from https://pubmed.ncbi.nlm.nih.gov/23980121/

Status of Equipment in a Regional Hospital Located in Ghana		
Item	Number Provided	Items Present and Functional
Automated Patient Monitor	7	7
Temperature Probes	7	7
CPAP Training Mannequins	4	4
CPAP Written Training Mannequins	4	4
CPAP Machines	8	7
Blood Pressure Cuffs	7	5
Pulse Oximeters	7	5
Manual Suction Devices	8	4
Generators	4	1
Oxygen Concentrators	8	2
Portable Pulse Oximeters	4	1

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