

Comparative Health Systems: Germany Versus China

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Abstract

This review article presents a comparative analysis of the health systems of two diverse countries, Germany and China, which represent developed and developing countries. The essence of conducting this comparison is to give an insight into the functional systems of a developed country, Germany in this case, and to evaluate the performance of a developing country using the same indicators. It provides a detailed account of the building blocks of their health systems (health service delivery, health workforce, access to essential medicines, health systems financing, health information systems, leadership, and governance) and the effects of political and socio-economic climates on their effectiveness. A brief summary of the socio-political climate of each country was given before advancing into the current states of each health system. Additionally, it offers a set of comments highlighting comparative advantages and disadvantages, which may serve as important notes for health managers and policymakers. It concludes that reviewing the building blocks of various dimensions of health systems can be useful for policy development and the construction of an ideal health promotion based framework, but further research is needed to determine the effects of each individual building block on health system performance (especially when their integrity is tested as seen in the case of pandemics). Several existed published materials were reviewed and they served as a basis for the information provided in this narrative review article.

Keywords: Comparative Health Systems, Health Promotion, Building Blocks of Health, WHO Health Promotion Framework

Introduction

It is no new news that global health challenges could affect the fast paced evolution of the socio-economic systems of the world. Currently, several diseases have posed as a challenge to various financial and health systems; some of these diseases are endemic to particular countries while others, although are not pandemics, have created global concerns interfering with the 'health for all' mantra by the World Health Organization (WHO). The world stands still when new or mutated diseases surface and travel from regions in which they were initially noticed to even assumedly 'less susceptible' regions with 'ideal' health systems. The Black Death caused by a strain of *Yersinia pestis* that lasted from 1346 till 1353, Spanish flu pandemic, H1N1 Swine Flu pandemic and the HIV/AIDS pandemic are some of the serious health disasters that claimed a lot of lives and affected socio-economic systems throughout the world. Currently, the world is on its toes battling to curb the COVID-19 pandemic as death tolls increase and financial systems stagger. The health systems of different countries can only be appreciated when existing

health challenges are nipped on the board before they create some sort of chaos. Unfortunately, the rise of pandemics have served as a tool to measure the adequacy of various health infrastructural systems and what was thought to be ideal for many, only seemed to be a farce.

For the past few years, health policy makers and managers have taken interest with comparing the performances of the health systems of several countries solely with the aim of improving performance.^{1,2} Information gathered courtesy various reforms span across all the building blocks of functional health systems, and studies are still being carried out to assess the influence of these reforms. It is imperative to note that an explicit framework is required for the identification of the unique goals of each health system, against which subsequent outcomes shall be criticized, and thereafter a pure definition of health performance can be established.³ Although the WHO has defined the intrinsic goals of a health system to include health improvement, responsiveness to population

health demands and reduction of financial losses due to ill health, it is difficult to compare the overall performance of the health systems of different countries based on these alone. There are other key performance indicators such as life expectancy⁴ and quality, through which health systems can be evaluated. This review article touches the subject matter superficially by highlighting key observations within the building blocks of each health system.

Health systems are made up of building blocks which include health service delivery, health workforce, information systems, financial systems, governance and access to essential medicines. Inadequacy in either of these blocks could affect the overall performance and sustenance of the health care system. It is therefore imperative to note that the ideal health system of a specific country is dependent on the successful simultaneous contributions of each of the building blocks of that system.

Health systems differ in underdeveloped, developing and developed countries. The primary factor used to distinguish developed countries from developing countries is the Gross Domestic Product (GDP) per capita.⁵ China is listed among the top 10 economies in the world contributing to 15.5% of global economy with a nominal GDP of \$14.14 trillion;⁶ it is however not seen as a developed country but the largest developing country. This is because the extremely large population of China contributes to a lower per capita income which is below the accepted minimum threshold for a developed country. Another essential tool to measure the socio-economic status of a country is the Human Development Index. This is used to determine if a country is developed or not. Although some major cities in China boast of good infrastructure and high educational systems, this welfare is not evenly distributed. It has been discovered that a large part of the Chinese population lives in suburbs and all they can afford to spend per day is \$2.⁷ Developed countries on the other hand provide a high quality of life for their citizens, have high per capita incomes and thriving economies; one of such developed countries is Germany. The health care system of Germany has also been known to thrive based on the fact that German citizens enjoy access to universal health care coverage. However, as at the 11th of April 2020, 125,452 people were infected with the COVID-19 virus in Germany, while a more populated China had a total number of

82,052 cases. This pandemic therefore revealed to an extent, the efficiency of the health systems in either of these countries.

The major aims of this paper were to analyze and compare the existing building blocks of the health systems of China (a developing country) and Germany (a developed country) and to justify the efficiency of either system based on the existing information that would suit both societies.

Germany

Germany, officially Federal Republic of Germany or Bundesrepublik Deutschland, is the seventh-largest European country located in the North-Central part of Europe with a variation in topography from North to South.⁸ The population of Germany as of the 11th of April 2020 was recorded to be 83,726,435 people and this contributes to 1.07% of the total world population.⁹ The official language of Germany is German; however Sorbian, Frisian, Romani and Danish are also spoken. English is also one of the most important foreign languages taught in schools; hence approximately 50% of the German population can speak English.¹⁰

The current German political system was evolved in 1949 when West Germany was created from the amalgamation/consolidation of the zones occupied by the United States, Great Britain and France. In 1990, East Germany was merged with the West and they both were referred to as the Federal Republic of Germany.

Germany operates by a federal parliamentary republic and democratic system. This system is made up of strong political parties, state/local governments and an independent judicial system.¹¹ The legislative power of Germany is bestowed on the parliament which is called Bundestag and the representative body of its 16 regional states, Bundesrat.

In Germany, powers are tri-partitioned into the Executive, Legislative and Judiciary. The Executive branch is composed of the Chancellor and ministers. The President of Germany occupies a ceremonial office with limited reserve powers; the president is referred to as the Head of State. The president is elected by the Federal Convention which consists of 1260 nominees by the Legislature and the Bundestag. The Head of Government on the other hand is known as the Chancellor. This office is equivalent to that of the British Prime Minister. The current President of

Germany is Frank-Walter Steinmeier, while the Chancellor is Angela Merkel. The president has the power to propose a candidate to the Bundestag for the office of Chancellor, appoint/dismiss the Chancellor and even dissolve the Bundestag upon the request of the Chancellor.¹² However, it is the duty of the Chancellor to propose ministers for appointment, to determine government policies and be in charge of the armed forces. The legislative branch consists of the elected Bundestag and appointed Bundesrat, while the judicial branch is composed of the federal constitutional courts and state courts.

There are therefore five (5) permanent constitutional bodies of the Federal Republic of Germany which include the Bundesrat, Bundestag, Federal President, the Federal Government and the Federal Constitutional Court.¹³ This method of government operates by the Basic Law for the Federal Republic of Germany.

This political system of governance has several advantages which include adequate power sharing, increased democracy, enhanced leadership opportunities, adequate representation, mutual checks and balances as well as diversity. Disadvantages may include lack of uniformity amongst states due to the autonomy of the federal states, complexities in operations which make it difficult for the general public to comprehend, increased time consumption in decision making and increased expenses.¹⁴

Although several political advancements and socio-economic reforms have been made, it is interesting to note that principles that guide certain aspects of the German health care system, for example, national health insurance have not changed.¹⁵ It has also been observed that healthcare in Germany exists due to the collaboration of conservative forces like the church and social welfare organizations, that have remained committed to ensuring that the integrity of the building blocks of their health system are not jeopardized.¹⁵

The German Health System

The WHO has repeatedly placed importance on health promotion all over the world. Health promotion would be unimaginable without systems in place, systems that would encourage policy creation, coordination and implementation of health related activities. Resources, institutions and bodies make up health systems that aim to improve and promote health.¹⁶ Information regarding health systems have been

revealed through different resources and initiatives, for example, through the European Observatory on Health Care systems that promotes evidence based policy making by analyzing European health systems, producing reliable evidence in response to the needs of policies and communicating evidence in ways that may be useful to policy makers.¹⁷

There are four basic health care models; these models include the Beveridge model, the Bismarck model, the National Health Insurance model and the out-of-pocket model. Germany operates by a multi-payer health care system, which is composed of compulsory health insurance for people who earn less than a certain salary and insurance premiums.¹⁸ Employers and employees pay the most for the sustenance of the healthcare system; they contribute to approximately 7.5% of their salary into the public health insurance pool. This way, the rich can help the poor and the healthy can help the ill. However, regardless of the healthcare model in use, the building blocks of a health system generally remain the same. The building blocks of a health system include health service delivery, health workforce, health information systems, access to essential medicines, health systems financing and leadership/governance.¹⁹ The health system of Germany would be analyzed and described using the generally accepted building blocks of a healthcare system described by the WHO.

Health Service Delivery in Germany

This is an aspect of healthcare systems where patients receive the treatment and supplies that they deserve, either with their personal finances, insurance or some type of aid. Corruption and mismanagement in the other building blocks of the health care system could directly or indirectly affect health service delivery negatively. According to the American Academy of Family Physicians (AAFP), the primary aim of an ideal healthcare delivery system should be to encourage optimal health outcomes by providing affordable, patient-oriented, quality care with an emphasis on service. Health care service delivery can be measured by reviewing several outcomes which would in turn encourage the improvement of patient care, improve patient staff ratio and reduce the per capita cost of healthcare. In a hospital setting, these outcomes include mortality, safety of care, readmissions, patient experience and effectiveness of care, timeliness and

efficient use of medical imaging. Generally, healthcare organizations are motivated by what is called the *Quadruple Aim*; these aims include²⁰:

- Revelation of aspects in which interventions are necessary
- Identification of variations of care
- Provision of evidence on what type of interventions work
- Comparison of the efficacy of different types of treatments and procedures

Health care delivery systems in low and middle income countries are grossly affected by malnutrition, poverty and infectious diseases. Hospitals and other points of primary health care are usually located in urban areas which are unfortunately either far from rural areas or inaccessible due to poor road networks/transportation.²¹ This is however not the case for developed countries like Germany.

The universal health insurance system operated in Germany has contributed positively to its healthcare delivery system. There are several sources of information on health service delivery systems and they include facility reporting systems, health facility assessments and special studies. According to the Organization for Economic Co-operation and Development (OECD), there are about 70% more hospital beds in Germany when compared to other developed countries such as Japan and Korea. The availability of optimum advanced infrastructure has contributed to a high number of discharges from the hospital, about 255 per 1000 patients. Certain surgeries that can be carried out in the outpatient department are still predominantly performed in in-patient settings in Germany; these high hospitalization rates indicate some sort of over-provision of inpatient services.²²

*“Life expectancy in Germany is close to the OECD average, but Germans drink and smoke more than people in many other countries, and obesity rates are increasing. While access to care in Germany is generally good, quality of care indicators show mixed results. Germany spends more on health care than most other countries and is better equipped with health workers and physical resources.”*²²

Amongst other OECD countries, Germany has one of the oldest populations. About 20.9% are currently above 65 years and 5.6% are over 80 years. That is why although there were over 146,286 confirmed cases of corona virus on the 20th of April 2020 in

Germany, only 4676 deaths were recorded and the majority of these unfortunate casualties fell among the old population. The high capacity bed space of German hospitals made tackling the corona virus pandemic easier. Government initiatives even increased intensive care beds to over 40,000 (most of them with ventilators). However, the current strain on the health delivery system was the inadequacy of medical personnel as many of them began to fall sick and were over worked, even though the number of long term health care staff is relatively low when compared to other OECD countries.²³

Health Workforce

A stable workforce in the health sector would increase the ability of a country to meet its health goals; it is an added advantage if the available workforce is motivated, equipped, knowledgeable and properly skilled in handling situations and circumstances evident in their jurisdiction. A study conducted in Vietnam in 2016 concluded that different categories of a health workforce can contribute to improvements in health outcomes and that an increase in the investment of different categories of the health workforce can be an important strategy for improving health outcomes in Vietnam and other similar contexts.²⁴

A country report on Germany revealed that 12% of total employment belonged to the healthcare workforce in 2011. In addition, between 2000 and 2011 over 1.3 million extra jobs were created in human health/social work. In 2010, there were an average number of 11.5 nurses and 3.7 practicing physicians per 1000 inhabitants.²⁵ This increased to 4.3 doctors per 1000 inhabitants and 12.9 nurses per 1000 inhabitants in 2018.²⁶

Health Information Systems

According to the handbook of indicators and their management strategies prepared by the WHO, reliable information serves as the foundation of decision making across all the building blocks of a health system. The key functions of a health information system as highlighted by this handbook include: data generation, compilation, analysis and communication. Decision makers across all the building blocks of a health require diverse types of information, for example, health determinants, health inequalities, health outcomes, health outputs and inputs.

Generally, information regarding the health information

systems of countries can be obtained from agencies responsible for generating, compiling and analyzing the data. While the ministry of health records the quality of data, a national statistics office would be held liable for producing these quality data. The OECD has statistical standards and guidelines that are used to assess the quality of data provided by these statistical offices. The *Statistisches Bundesamt* of Germany is responsible for analyzing statistical data related to health and providing relevant information to the general public. The credibility of the information provided depends on the Federal Statistics Law which emphasizes neutrality, objectivity, scientific independence and confidentiality of individual data.²⁷ Health related information in Germany provided by the European commission is as a result of collaborative efforts from the OECD and the European Observatory on Health Systems and Policies.

Due to the accuracy of the health information systems available in Germany, a country health profile revealing important information was published in 2017. The health status, risk factors and overall health system performance of Germany were highlighted in this report. The report revealed that life expectancy in Germany had increased to 80.7 in 2015 although it was about two years below that of Italy and Spain and that cardiovascular diseases/cancer were the leading causes of death although Alzheimer's and other dementias had increased six-fold.²⁸

Germany introduced two different approaches to increase digital health access, they included: the Electronic Health Card Network (EHCN) and the Patient Accessible Electronic Health Records (PAEHR). The EHCN would connect all public health stakeholders while the PAEHR would provide an avenue for private health insurers to become more involved in patient healthcare.²⁹ Amongst other technological advancements including the use of electronic health records, as of 2015 the Federal Cabinet passed a bill for the E-health Act which provided deadlines for implementing infrastructure and electronic applications and introduced incentives and sanctions if schedules were not adhered to.³⁰

Access to Essential Medicines

The WHO defines essential medicines as medicines that satisfy the priority health care needs of the population. Public health relevance, evidence on efficacy

and safety, and comparative cost-effectiveness are the factors that define an essential medicine. Hence, if a drug is relatively unaffordable or does not satisfy the needs of the majority of the population of a country, it is not an essential medicine.

As of 2018, Germany had the highest expenditure on health as a share of its GDP in the European Union and the second highest in terms of health spending per capita. With the oldest health insurance system in the world, 99.9% of the German population is covered by health insurance. Germany is the biggest producer of pharmaceuticals in the EU., Due to recurrent expenses in maintaining this structure, there was a challenge in the pricing and general assessment of medicines. This led to the introduction of the Act on the Reform of the Market for Medicinal Products in 2011. The AMNOG created a new balance between innovation and the affordability of medicines, thus pharmaceutical entrepreneurs were no longer able to fix prices at their own discretion and there was a fair competition between individual manufacturers and the National Association of Statutory Health Insurance Funds. This affected the manufacturers of generic/inexpensive medicines and thereby contributed to shortage of medicines. Medicine shortage as defined by the European Medicines Agency occurs when supply of medicines cannot meet demand at a national level. According to the 2018 European Association of hospital pharmacists (EAHP), survey on medicine shortage, 100% of hospital pharmacists experienced problems with medicines shortage and 78% of hospital pharmacists agreed that medicine shortages in their hospitals had a negative impact on patient care.

German hospitals experienced shortages most commonly in antimicrobial agents (91%), anesthetic agents (69%), oncology medicines (57%) and preventive medicines. The impact of shortages is relevant for cancer patients because it is the second leading cause of death in Germany after cardiovascular diseases. In 2017, the German Society for Hematology and Medical Oncology published a report on the shortage of cancer medicines. The study reported a shortage of a number of generic cancer medicines and as a result, pharmacists were forced to find alternative solutions. There are several reasons why the shortage of essential medicines have been a problem including: supply and delivery bottle necks, manufacturing problems, low prices (low prices of essential medicines distribution and manufacturing

unattractive to manufacturers), production outsourcing (pharmaceutical companies have relocated to other countries such as India and China due to lower costs of production) and demand fluctuations.³¹

In 2016 the European Medicines Agency and Heads of Medicines Agency created a task force to provide strategic support and advice to tackle disruptions in supply of human and veterinary medicine. Hopefully, the issue related to the shortage of medicines would be rectified as time goes by.

Health Systems Financing

The importance of funds in the management of health systems cannot be overemphasized; the funds are used in the payment of salaries, provision of essential medicines and overall health promotion. According to the Monitoring the Building Blocks of Health Systems, health financing is concerned with the mobilization, accumulation and allocation of money to cover the health needs of individuals in a health system.

Governments usually allocate resources and parts of the budget to the health sector. However, funds released to different departments in the health sector can differ significantly over time. One of the sources of information on health expenditure is the System of Health Accounts (SHA) developed by the OECD for its countries. Healthcare expenditure is usually analyzed based on the resources made available to healthcare providers, the healthcare functions that are being financed and the sources of financing. The healthcare system of Germany is financed by government schemes, compulsory schemes and saving accounts, and other financing agents. In the year 2017, compulsory schemes such as the health insurance system contributed to 78.1% of the financial source for the healthcare system while 12.5% was from household out-of-pocket payments.³² The healthcare expenditure relative to GDP in the year 2017 for Germany was about 11.3%; amongst the EU member states, Germany was ranked with France and Sweden for having the highest healthcare expenditures. According to Eurostat, Sweden had the highest healthcare expenditure per inhabitant in the year 2017, while they spent 5206 Euros per inhabitant, Germany's expenditure per inhabitant was 4.459 Euros.

Due to the corona virus pandemic, emergency spending measures were put in place to counter the spread of the disease. There was an increase in the spending power

of the ministry of health and finance. This was meant to help Germany double the number of intensive care beds that were available, purchase protective clothing masks, contribute to the development of a vaccine and promote public health campaigns.³³

Leadership/Governance

The importance of optimum leadership cannot be overemphasized, simply because in lay man's terms – 'bad leadership is equivalent to poor results'; hence, the survival of a health care system is totally dependent on those who "are in charge". Leadership involves ensuring that strategic frame works are in place, policies and laws are properly implemented, regulations are obeyed and generally every member of the healthcare team is held accountable for their actions.

According to the WHO, there are two types of indicators used to measure the governance of health systems and although these indicators exist, there is no effective blueprint for effective health leadership and governance. These indicators are *rule based indicators* that measure whether countries have adequate policies and strategies for health system governance and *outcome based indicators* that measure whether these policies are properly implemented. The health system governance of Germany would be analyzed using the WHO composite governance policy indices.³⁴

China

The people's republic of China is the largest of all Asian countries located in the Eastern part of Asia; it is also the most populated country in the world with a total number of 1.410.989.088 people as at the 3rd of May 2020. China has a diverse linguistic landscape, and while there are over 297 living languages in China, standard Chinese/Mandarin remains the official language in mainland China. Other languages spoken include Cantonese, Gan, Hakka, Min, Shanghainese and Hunanese.

China is a communist country that is governed by a single political party in which very little democratic activity is permitted. China became a communist country in the year 1949 under the Leader, Mao Zedong. When this happened, the state took over factories and businesses on behalf of the people. Although China moved away from Mao's version of communism, the influence of the Communist Party of China remains today.³⁵ The Communist Party of China (CPC) is the only

party in power in China, while there are eight other political parties which participate in the management of state affairs under the control of the CPC.

The constitution is the fundamental law of China and there are major stipulations within the constitution in reference to the political system of China. Major political principles include:

1. The CPC is the only recognized political party in China
2. All rights belong to the people including the armed forces of the People's Republic of China
3. Socialism which is an economic system based on public ownership would be led by the working class
4. The rule of law is used to govern the country

The constitution also encourages equality amongst citizens, the right to vote, freedom of speech and thought, freedom of religious belief, the right to criticize and make suggestions, the right to work and compensation as well as the right to education and welfare.³⁶ The Chinese executive is supervised by the state council which is the supreme administrative body of the Chinese government. The president is the head of state and also the general secretary of the communist party, while the prime minister directs government action; he/she is usually assisted by four (4) deputy prime ministers. The legislature on the other hand is known as the body of supreme power of the government and it is composed of the National People's Congress.³⁷

Public health initiatives have been an important part of the ideologies of the Chinese Communist Party since the Chinese revolution. It has been proven that poverty induced by political reforms has exacerbated the poor health of the Chinese population, specifically indigenes living in rural areas.³⁸ As a matter of fact, during Mao's era, health promotion was conducted simultaneously with political campaigns; hence it was used as a major means to influence the masses.³⁹ Overtime it was observed that the Chinese health system was more reactive than proactive, and politics has played a huge role in precipitating these events because of the relentless focus on GDP growth compared to human lives.

The Health System of China

As previously mentioned, there are four (4) models of a health care system and China's health care model does not totally fit into a single model. Health care expenditures come from out-of-pocket payments,

government subsidies and insurance run by the state. About 95% of the entire population is covered by state-run insurance; however, patients still pay for a large number of medical expenses from their own pockets because there is a limit to their insurance coverage. The economic reformation played a huge role in the management of the healthcare system in China. Unlike during the Maoist era where the people's republic was responsible for running all hospitals and healthcare was paid by the government, current reforms encouraged charging patients for essential services as the government reduced its spending on hospitals. Although a large population of the country is covered by state-run insurance, they do not all enjoy equal benefits. Rich individuals living in urban regions pay higher premiums and therefore enjoy more benefits when compared to their poorer counterparts who have limited coverage. In 2006, there was a pledge to improve the entire healthcare system in China and this led to a reduction in out-of-pocket expenditure from 60% in 2001 to 29% in 2016.⁴⁰ In a similar way to Germany, the health care system of China would be analyzed using the six building blocks of an ideal health system.

Health Service Delivery

China spent over 5.6% of its GDP in the year 2014 on healthcare, of which 30% came from the central and local governments and 38% from public and private health insurance. There were three types of publicly financed health insurance:

1. Urban employment basic health insurance
2. Urban resident basic health insurance
3. Insurance for rural residents called the 'new cooperative medical scheme' that was launched in 2003

Insurance financed by the public covers primary health care, specialist care, the emergency department, prescription drugs and traditional medicine. A few dental and optometry services are covered, but most operations are covered by out-of-pocket payments. Certain services such as immunization are included in a separate public health package, every resident would benefit from this without copayments or deductibles. Individuals who are unable to pay insurance premiums and make out-of-pocket payments have a safety net. This is usually a medical financial assistance program funded by social donations and the local government.⁴¹

According to a review on the health service delivery

systems in China, there has been an improvement in the quality of healthcare over time, but this has been restricted to urban areas. Primary care is delivered majorly through village doctors who work in rural clinics, as at 2014, there were over 1.06 million village doctors and health workers and they offered cheaper services.⁴² A study of 46 counties and 781 village doctors in China conducted in 2001 revealed that 70% of the 'doctors' did not possess more than secondary school education and had received an average of 20 months of medical training.⁴³

Overcrowding remains a problem for China's ailing healthcare system, with about 10,000 people per day in the outpatient clinic of a typical hospital in Beijing. As explained in the Future Health Index 2018 by Philips, the low number of skilled healthcare professionals when compared to the size of the population is one of the main reasons why access to healthcare in China lags behind most of the other 15 analyzed countries. The analyzed countries include Australia, Brazil, France, Germany, South Africa, India, Japan, Netherlands, Poland, Romania, Saudi Arabia, Russia, Singapore and the United States of America. The concern for the healthcare system in China cannot be overlooked as the government has worked incessantly to make improvements. In the year 2018, the number of beds in the hospitals in China increased to approximately 6.52 million beds compared to 6.12 million beds observed in the previous year. The corona virus pandemic took a negative toll in China and caused thousands of deaths, the health system was challenged and its inadequacies exposed. Due to inadequate bed space and the rising number of infected individuals, the government of China rapidly built a 1000 bed space in the city of Wuhan within 10 days.⁴⁴

Health Workforce

According to the OECD, China has 2.0 practicing doctors per 1000 inhabitants compared to 3.7 practicing physicians per 1000 inhabitants for Germany and 2.7 nurses per 1000 inhabitants. A report in 2005 revealed that China had more physicians than nurses and that 67.2% of them were only educated up to secondary school level. This definitely reflects the quality of physicians present in their healthcare systems.⁴⁵ The importance of having a stable health work force cannot be overemphasized. Health care team members include physicians, nurses, pharmacists, dentists, therapists and

rehabilitation specialists, and it is important that their ratio to number of patients is optimum so as to ensure great results. An article written by Shawn Yuan for Aljazeera highlighted how the corona virus outbreak in Wuhan revealed the inadequacies of the Chinese health care system. Not only were they short of emergency medical supplies, but there were also inadequate trained general practitioners who would have been responsible for managing patients.

Access to Essential Medicines

Essential medicines are medicines that satisfy the health care needs of the majority of the population of a particular region, which must be affordable and generally safe. Health care expenses in China were increasing dramatically as a result of excessive unnecessary drug prescriptions from health care facilities. Excessive drug prescriptions were common in the rural parts of China. This provoked the Chinese government to invigorate the National Essential Medicines Policy. A healthcare reform was therefore launched in April 2009 to tackle the problem of access to essential medicines and an improvement at grass root level was observed, as outpatient and inpatient expenses were reduced, this involved the introduction of the zero-mark up policy.⁴⁶ Another study conducted in China with a focus on Shandong and Gansu provinces revealed that manufacturers, retail and hospital pharmacies paid little attention to China's 2004 National Essential Medicines List (NEML) in their decisions to manufacture, purchase and stock essential medicines and also essential medicines were not frequently prescribed.⁴⁷ In 2018, China enhanced NEML 2012 by implementing the latest NEML. Some of the medicines of the list were not recommended by the WHO but it provided a comprehensive coverage of diseases. Regardless of the setbacks and challenges that the Chinese government may be facing, they are working incessantly to regulate drug prices and improve overall access to essential medicines.

Health Systems Financing

For a health care system to run optimally, adequate funds have to be available for the implementation of policies, reforms and activities that would otherwise propel the system in a forward direction. As at 2016, China had spent 871 billion dollars since the 2009 health reformation to improve its health care system

and had recorded an annual growth rate of 20% in medical input. Spending was driven by the rapidly increasing incomes of consumers and government health reforms. Health care expenditure by the government increased from 458.66 billion yuan in the year 2000 to about 5.9 trillion yuan in the year 2018. There were many reasons behind this growth and although the private per capita health expenditure of Chinese households were increasing, the majority of them were covered by basic insurance and there was a drastic drop in out-of-pocket payments.

The healthcare market of China is seen as one of the most attractive in the world for foreign investors and in 2013 it surpassed Japan to become the world's second largest healthcare market. It was estimated that by 2020, China's healthcare spending will account for 6.5-7% of its total GDP which is about \$1 trillion and by 2030 the healthcare market would be valued at around \$2 trillion.

Health Information Systems

A system designed to manage healthcare data is referred to as a health information system. There are different types of health information systems; including, electronic health recording systems, patient portals, remote patient monitoring systems, clinical decision support systems, and practice management software's etc.⁴⁸ The health sector is vast and there are different information systems for each department. The development of hospital information systems has been slow and have faced unbalanced primarily poor standardization and lack of developed software.

Since the late 1980's China has been undergoing several health reforms, however, it was not up until the 1990's that health information technology began to be developed. Health information technology is still at its infancy in China. After the SARS outbreak in 2003, a project on the construction of National Public Health Information Systems was drafted by the Ministry of Health and steps were made towards the development of public health information systems in China. The creation and implementation of health information network systems in China, is primarily the duty of the Shenzhen Regional Health Information Network which is a government initiative created by the Ministry of Health.⁴⁹ Currently, the majority of the hospital information systems are Hospital Management Information Systems and they are unable to share medical images diagnostic

information due to the different standards and formats adopted by different manufacturers. China has a goal to complete the construction of a nationwide Health Information System (HIS) by the end of 2020 by integrating Population Health Information Platforms (PHIP). A study revealed that the developed PHIP's have strong capacities for health information exchange and that to maximize the use of these developed systems, the Chinese government should clarify the roles of the PHIP's at different levels, provide incentives for non-public institutions to participate in Electronic Medical Records adoption and define a monitoring policy to ensure full adherence to construction guidelines.⁵⁰

Leadership and Governance

According to the WHO, leadership and governance also known as stewardship, involves ensuring that strategic policy frameworks exist and are combined with incentives, appropriate regulations, effective oversight, attention to system design and accountability.⁵¹ The success of every building block of the health system is strongly dependent on the leadership skills of the managers in charge. There are different departments of health in the people's republic of China of which the National Health Commission of the People's Republic of China is one of them. They are responsible for the drafting of laws and regulations for national health policies, coordinating and deepening the reforms of medical and health system, organizing and coordinating the formulation and the implementation of policies and plans useful for disease prevention and control.

While it is the responsibility of the government to oversee the functions of health systems in a country, it does not mean that all leadership functions have to be carried out by the central ministries of health. However, all approaches to leadership and governance must clearly be contingent on national circumstances. The WHO helps governments to develop health sector policies and frameworks, support greater accountability by monitoring health system performance, generate and interpret intelligence and research on policy options and build coalitions across ministries.⁵² There are several indicators used to assay the performance of health governance in a particular country. They include the existence of up to date national health strategies, updates national medicines policy, the existence of policies on the procurement of medicines, the existence of strategic plans against tuberculosis, malaria and

HIV/AIDS, maternal, children and family health policies, the existence of key health sector documents and an ideal method for obtaining data.

In 2016, there was a country cooperative strategy between the WHO and the People's Republic of China. The strategic priorities of this collaboration are to strengthen health systems towards universal health coverage, reduce mortality and morbidity from major diseases, strengthen regulatory capacities, and to promote healthy cities movement in order to address the impact of climate change on health and to enhance China's contribution to global health. In line with this, a strategic agenda for China-WHO cooperation was developed with the overall aim of reducing health inequities.⁵³ The WHO intends to deliver on the six country cooperative strategic priorities through several support mechanisms such as policy shaping, communications, leadership, technical assistance and partnership. Hence, an up to date national health strategy exists in China.

The China of today looks nothing like the China that existed half a century ago. People are living longer and healthier lives than they were fifty years ago. Mass urbanization, economic reforms and health governance have affected the ageing population positively, thereby reducing the prevalence of communicable diseases. In

line with other indicators for health governance, China has an updated National Essential Medicines Policy which was introduced in the new round of health system reforms. There have also been challenges in implementing strategies for critical public health issues, therefore issues such as drug resistance to tuberculosis and viral hepatitis, and access to HIV treatment still persist.

Health reform is ongoing but providing better quality of and access to health services for 1.4 billion people remains an enormously complicated task.⁵³ In 1979, the government introduced the one-child policy which was later modified to encourage parents to have second children if the first were female, it remained this way up until October 2015 when the government changed its rules to encourage two children. The government claimed to have prevented 400 million births. There might be problems associated with productivity as the working population declined by 890,000 in 2019, the Chinese bureau of statistics has stated that the rate of child birth has fallen to its lowest level since 1949.⁵⁴ There is an argument however on whether or not these family planning policies were necessary, regardless of this; the interest of the government in health reforms cannot be ignored.

Table 1. A Comparison between the Health Systems of Germany and China

	GERMANY	CHINA	Comment
Health Service Delivery	<ol style="list-style-type: none"> Germany spends 11.3% of its GDP on healthcare. Germany operates by a universal health insurance system that benefits both the poor and the rich. The ratio of skilled health care professionals to inhabitants is encouraging. There are about 70% more hospital beds in Germany when compared to other developed countries such as Japan and Korea. The ratio of beds to inhabitants as at 2017 was 8:1000. 	<ol style="list-style-type: none"> China spends 5.6% of its GDP on healthcare The health insurance system does not benefit the rich and the poor equally and there are a lot of out-of-pocket payments. The ratio of skilled health care professionals to patients is very poor. There are a lot of unskilled workers with a maximum of secondary school education. There were 4.34 beds per 1000 people in China as at 2017. 	<p>Germany spends more on healthcare and operates by a universal health insurance system that encourages equality, this is more beneficial than China that contributes less of its GDP to healthcare and has issues with out-of-pocket payments.</p> <p>The large number of academically trained high skilled healthcare professionals gives Germany an edge when compared to China that has a large number of village doctors.</p> <p>When comparing the bed spaces per inhabitants between the two countries, Germany possesses twice the number of bed spaces than China. This inadequacy was revealed during the corona virus pandemic, as China was forced to build a 1000 bed capacity space in Wuhan within 10 days while Germany increased its bed capacity to 40,000 in addition to providing ventilators.</p>

Health Workforce	<ol style="list-style-type: none"> China has 4.3 practicing physicians per 1,000 inhabitants. 12% of total employment belonged to the healthcare workforce in the year 2011 and this has increased over time. Most physicians in Germany are trained at college level. 	<ol style="list-style-type: none"> China has 2.0 practicing doctors per 1,000 inhabitants. There are more physicians than nurses in China and 67.2% of them were only trained up to secondary school level. 	<p>The high ratio of academically physicians to inhabitants in Germany makes their healthcare system more reliable than that of China.</p>
Health Information Systems	<ol style="list-style-type: none"> Health related information in Germany provided by the European commission is as a result of collaborative efforts from the OECD and the European Observatory on Health Systems and Policies. There is a uniform system in the technology developed to increase and improve digital health access. All public stakeholders would be connected by EHCN (Electronic Health Card Network) while private health insurers will become more involved in healthcare through PAEHR (Patient accessible electronic health records). 	<ol style="list-style-type: none"> Late development in health information systems and related technology. Majority of the hospital information systems are independent and China has a goal to complete the construction of a nationwide health information system (HIS) by the end of 2020 by integrating Population Health Information Platforms (PHIP). A study revealed that China is doing very well in the implementation and usage of hospital electronic information systems (EHRs, EMRs etc.) although it is a new development.⁵⁵ 	<p>Although China is making great advancements in technology and is catching up quickly, Germany seems to have an edge in its health information system simply because of its uniformity and earlier advancements in technology.</p>
Access to Essential Medicines	<ol style="list-style-type: none"> Although Germany is the biggest manufacturer of pharmaceuticals in the European Union, shortage of medicines is frequently observed. There is an updated essential medicines list in Germany. 	<ol style="list-style-type: none"> China dominates the production of active pharmaceutical ingredients required to produce generic drugs globally. Although India is a large manufacturer of finished products along with China, Indian companies get 80 percent of their ingredients from China. The introduction of the zero markup policy which encouraged the use of traditional Chinese medicine, reduced revenue from drug sales as they became more affordable, reduced revenue from the sales of western medicine and increased government subsidies.⁵⁶ There is an updated National Essential Medicine's List (NEML). 	<p>China remains a global leader in the production of API's and manufacturing of finished products, as a matter of fact, they are seen as a possible threat to the national security of major global players. They encourage traditional Chinese medicines and rely less on western medicinal imports.</p> <p>German pharmaceutical companies have their products manufactured in India while most of the API's come from China. As a country, China is responsible for 80-90% of the global supply for API's used to manufacture antibiotics. China focuses majorly on generic drugs, in the year 2018, generic drugs accounted for 80% of all the drugs sold in Germany.⁵⁷</p>
Health Systems financing	<ol style="list-style-type: none"> The healthcare system of Germany is financed by government schemes, compulsory schemes and saving accounts. 	<ol style="list-style-type: none"> China had spent 871 billion dollars since the 2009 health reformation to improve its health care system and had recorded an annual growth 	<p>Taking into consideration the populations of Germany and China respectively, the German health system is more buoyant than that of China. German</p>

	<p>Compulsory schemes account for 78.1% of the expenses.</p> <p>2. The government spent \$4842.31 per inhabitant in the year 2017.</p> <p>3. Germany's current healthcare expenditure accounts for 11.3% of its GDP.</p>	<p>rate of 20% in medical input.</p> <p>2. Health care expenditure by the government increased from 458.66 billion yuan in the year 2000 to about 5.9 trillion yuan in the year 2018. They spent approximately \$597.6 per inhabitant in the year 2018.</p> <p>3. It is the second largest health care market in the world.</p> <p>4. It is estimated that by 2020, China's healthcare spending will account for 6.5-7% of its total GDP.</p>	<p>citizens benefit from the universal health insurance system and a lot more is spent in taking care of them. Health reforms and expenditure on the health systems of both countries has seen to an increase in life expectancy, while the life expectancy at birth for German citizens is 81 that of China is 76.</p>
Leadership/Governance	<p>1. The Ministry of Health (<i>Bundesministerium für Gesundheit</i>) is responsible for the drafting of bills, ordinances and administrative regulations. The Ministry conducted a major health care reform in the year 2007. This reform was aimed at improving the quality and efficiency of the health care system.</p> <p>2. In the year 2019, Germany committed 514 million Euros until 2019 to rights-based family planning and reproductive health. In the past decade, the German government had introduced a host of family policies to tackle the demographic deficit. E.g. Parents can work part-time and still receive child allowances, paternity leave.</p> <p>3. Policies for the procurement of medicines exist.</p>	<p>1. Ministry of Health was dissolved in 2013 and many of its functions were absorbed into the National Health and Family Planning Commission (NHFPC). This commission was dissolved and replaced by the National Health Commission (NHC) in March 2018, and will focus less on policies related to government-set birth limits and more on medical and health system reforms to serve China's aging society.</p> <p>2. Strict family planning policies exist. E.g. Two-child policy.</p> <p>3. A country cooperative strategy exists between China and the WHO.</p> <p>4. There is an updated National Medicines Policy.</p> <p>5. An ideal policy on the procurement of medicines exists.</p>	<p>The styles of leadership for both countries differ; it is difficult to state which is more preferable because the policies, regulations and methods of administration for each country have its disadvantages and advantages. While China aims to curb its overpopulation problem by enacting its two-child policy, Germans are encouraged to be more productive because of the increase in their ageing population.</p> <p>Both countries have experienced tremendous growth and improvement in their health systems over the past decade and performance is dependent on a variety of factors such as economic reforms and demographics.</p>

Conclusion

It has been established that there are diverse key performance indicators that could highlight the performance of a health system. However, the performance of the health systems of each country was discussed under the building blocks recommended by the WHO. Obviously the health system of Germany surpassed that of China, and this could provide ideas for other developing countries that may want to emulate certain strategies implemented by the German government for its health system. It is also expected that policy makers would take note of flaws and strengths within each system and further research would be conducted, in order to discover ways of measuring and monitoring

performance as well as designing frameworks that would aid in the implementation of health reform policies.

Conflict of Interest

The author declare that they have no conflicts interest.

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