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The Relationship Between Healthcare and Education and Their Impact Global Health

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Introduction

There is often a direct correlation between the access, affordability, and quality of healthcare and quality of education, which can be seen on an international scale. Education, defined both in terms of formal classroom education, as well as patient education conducted by physicians and health care providers, consistently relates to the accessibility and quality of healthcare globally. The relationship between healthcare and education often results a cycle in which individuals experience little to no accessibility and affordability to either of these basic rights. Further, in cases in which one system is available, the other is significantly deficient in the sense that an individual cannot perform fully in school if he or she is in poor health. In such cases, a health concern may be left improperly treated due to a lack of education. This correlation warrants serious ethical considerations concerning both insufficient healthcare provisions and inadequate education of the patient.

This project included an evaluation of three countries: Kenya, India, and the United States focusing on the ways in which effectiveness of education and healthcare relate to one another. Kenya and India were selected as locations of focus because of their relative similarities in levels of poverty and access to healthcare and education, as well as the significant parallels that arise due to their shared histories of British colonialism and the resulting impacts this reality has had on views of modern medicine and medical volunteers due to a potential distrust of outsiders and their agenda. The United States will be used as a point of reference. For each country of focus, a brief history of the acquiring of independence will be discussed to understand the relationship between those nations and their past colonizers. Also, Kenya, India, and the United States will be studied for the major shifts in both healthcare and education policies since independence. Policies of both healthcare and education will be reported through 2012 at the

latest to ensure a preservation of accuracy given the rapid changes in law and policies that are occurring. It will be evident that there are similarities in education and healthcare policies within each country, and additional conclusion can be drawn about the ways in which a formal education influences a population's understanding of disease and disease prevention, as well as the ways in which a lack of healthcare affects the ability of a population to attend formal schooling. These conclusions will provide a better understanding of the cycle of challenges presented by the system of healthcare and education for one another.

In continued consideration of Kenya, India, and the United States, two definitions of education of formal schooling and patient understanding will be used to further evaluate the effects of education on healthcare. Additionally, a general study of the use of vaccinations and other methods of disease prevention indicates that the population's understanding of the spread of disease and the health concerns of each country. Also, a discussion of patient outcomes of the mortality and morbidity of disease allows for conclusions to be made of understanding of medical and health concerns for which patients may or may not be accesses proper treatment. Furthermore, an evaluation of the traditional medical practices used in each country and the prevalence of these practices today could indicate the populations' understanding and trusts of modern medicine and the effects on population health. Also, an overview of the demographics of healthcare providers in each country could allow one to draw conclusions on both the quality of healthcare being provided as well as the quality of the education of health concerns and the trust of a patient for this provider.

Finally, an example of an ethical dilemma related to healthcare and education will demonstrate the importance of the two topics to one another. The ethical debate over the genetic engineering of food to contain vaccines created a discussion of concerns of the delivery of

healthcare without education, where people are given necessary immunization for proper preventive care but resources are spent on excessive genetic modification rather than the education of people about the contents and effects of vaccinations. Therefore, the complex issues surrounding both systems of healthcare and education show the many ways in which they relate and create challenges for populations internationally.

Kenya: Acquiring of independence

The history of Kenya in acquiring independence and the years since play a role in the workings of the country's healthcare and education systems and the various other factors associated with post-colonialism adjustments. Kenya was under the rule of the British for centuries.[1] After the end of World War II, internal sentiments in Kenya as well as international affairs challenged the Colonial empire.[2] The Kenyan subjects of the British rule had been defiant of the empire for some time, but were considered relatively unthreatening by the British because of the colonists' utter lack of power. However, the international concerns of prewar and throughout World War II were refocused postwar, which presented a great challenge to Britain. Before and during the war, the world paid little attention to the colonies of Africa that were under the control of the British. After the war, however, both the United States and the Soviet Union argued for decolonization, presenting an external challenge for the British power.[3] Additionally, the newly founded United Nations focused on "human rights and the rights of self-

[1] "Kenya profile - Timeline." BBC News. January 04, 2017. Accessed March 1, 2017. http://www.bbc.co.uk/news/world-africa-13682176.

[2] Cheikh A. Babou "Decolonization or National Liberation: Debating the End of British Colonial Rule in Africa." *The Annals of the American Academy of Political and Social Science* 632 (November 2010): 42. Accessed April 10, 2017. https://www.jstor.org/stable/pdf/27895947.pdf.

[3] Ibid. 42

determination for all nations [and] provided a new international forum that undermined the discretionary policies of the imperial powers and helped to build an international consensus against colonial rule."[4] The United Nations mandated several stipulations on the extent of colonial rule in the UN Charter, particularly the moral aspect of the relationship between the colonizer and the colonized.[5] However, UN failed to implement these rules, and the people of Kenya experienced little to no relief of the oppressive rule of the British, causing further resentment toward the British and increased efforts in their fight for independence.[6]

Kenyans became particularly angered with their British rulers during the second world war when the British forced their subjects to fight in the war or increased labor force in Kenya in mines and farms to produce war materials.[7] While the subjects were a major aspect of the war efforts, the colony's economy continued to suffer and the forced labor took a major toll on the morale of the Kenyan people.[8] Many other Africans colonies, as well as other international colonies such as India, who struggles under British rule also experienced this sentiment. Toward the end of the war, the people of Kenya organized into the Kenya African Union (KAU), which was formed in 1944 and had the purpose fighting for independence.[9] From 1944 through 1967, several other African countries such as Madagascar, Somalia, Congo, Nigeria, Tanzania, Rwanda, and many more acquired independence from the European colonizers of Britain and France.[10] Therefore, despite the Kenyans long and tedious efforts, the success of other nations

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[4] Ibid. 43
[5] Ibid.
[6] Ibid.
[7] Ibid. 44
[8] Ibid.
[9] "Kenya profile - Timeline." BBC News. January 04, 2017. Accessed March 1, 2017. http://www.bbc.co.uk/news/world-africa-13682176.
[10] Cheikh A. Babou "Decolonization or National Liberation: Debating the End of British Colonial Rule in Africa." *The Annals of the American Academy of Political and Social Science* 632 (November 2010): 44-48. Accessed April 10, 2017. https://www.jstor.org/stable/pdf/27895947.pdf.

provided them with hope throughout their struggle for independence. They eventually acquired independence in 1967 under the rule of their first president, Kenyatta, giving the name of Kenya to the nation. While the battle for independence ended at that time, Kenya faced boundless difficulties in the creation and implementation of policies in such a young and economically poor country, leaving a post-colonialism resentment toward the British.

Kenya: Major shifts in healthcare policy post-independence

During the period of colonization, Kenyan healthcare was particularly inequitable because the policy required "user fees and out-of-pocket fees," which most poor people could not afford and therefore could not access public facilities and basic healthcare.[11] These fees discriminated against Kenyans and caused great disparities within the population's access to healthcare.[12] After Kenya achieved independence, universal healthcare became a primary policy concern.[13] The government eliminated user fees in 1965, and healthcare was funded by taxes to create a level of equity. However, this source of funding proved inadequate when the health sector exhibited "poor economic performance, inadequate financial resources and declining budgets."[14] Therefore, user fees were re-introduced in 1989, suspended in 1990, and slowing reinitiated in 1991.[15] They were initially suspended in 1990 because of a lack of improvement, but then reintroduced in 1991 with limitations so that fees were charged for prescriptions and laboratory work, but not for basic consultations.[16] Additionally, the government created a private

[11] Jane Chuma and Vincent Okungu. "Viewing the Kenyan health system through an equity lens: implications for universal coverage." International Journal for Equity in Health. May 26, 2011. Accessed March 1, 2017. https://equityhealthj.biomedcentral.com/articles/10.1186/1475-9276-10-22.

[12] Ibid.
[13] Ibid.
[14] Ibid.
[15] Ibid.
[16] Ibid.

health sector, which is a far costlier form of medical care that accepts insurance to cover medical costs. While the private sector provides healthcare for forty-nine percent of Kenya's population, they caused an increased inequity among the population because people began to view the public sector negatively. They began to recognize the fact that the public sector charged fees for a low quality of care, creating a distrust of these more affordable means of healthcare.[17]

Kenya: Major shifts in education policy post-independence

Education proved to be a major challenge for Kenya for a great deal of time following independence as the plans continued to lack in application. In 1966, the High Commissioner of Kenya, Dr. Karanja, addressed the Kenyan people about the efforts to improve the state of the young country, and stated

> Among the social services we are also trying to expand our secondary school education. After all, the Plan by itself will remain a blueprint if you have not got the manpower to implement it. And as I have already mentioned, manpower problems consist of the scarcity of high-level and medium-level people, and an increasing surplus of unskilled workers. It is hoped that by 1970 pupils enrolled in secondary schools-that is in the senior forms-form five to form six-will increase from last year's 1,800 to 4,800.[18]

The country saw only minor increases and various decreases over time to the overall education statistics. However, a major shift in education policy came in the early twenty-first century. Free primary education program began in 2003 and a free secondary education system began in

[17] Ibid.
[18] J. N. Karanja "Kenya after Independence." *African Affairs* 65 (1966): 294. Accessed April 10, 2017. JSTOR.

2008.[19] However, in 2010, one million children in Kenya were not attending school.[20] More than twenty-five percent of the population did not graduate high school, and ten percent of the population failed to complete primary school.[21] The enrollment at university is disproportionally higher than the funding, so universities suffer over crowdedness, regarding both the infrastructure and the staffing.[22] Education is only compulsory, or required by law, until the age of 14 years.[23] Therefore, many children, especially those living in rural poverty, continue to lack access as well as enforcement to attend school, indicating the need for greater implementation of policy to guarantee accessibility and affordability to a quality education for all children.

India: Acquiring of independence

The fight for independence in India was long and tedious battle, lasting from the early nineteenth century through their victory in 1947.[24] The initial desire for independence began under the leadership of Rammohun Roy, a high-class Bengali who wanted to reform religion in India, to fight social standing that determined class, and to raise awareness of the inequalities surrounding the caste system.[25] Throughout the nineteenth and early twentieth centuries, India continued Roy's efforts by informing people of the national history of India and educating through Western-styled institutions.[26] The struggle for independence grew in momentum under the leadership of Gandhi, who gave new light to the movement in the form of nonviolent,

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[19] "Education in Kenya." WENR. June 2, 2015. Accessed February 28, 2017. http://wenr.wes.org/2015/06/education-kenya.

[20] Ibid.
[21] Ibid.
[22] Ibid.
[23] Ibid.
[24] Azar Ahanchi. "Reflections of the Indian Independence Movement in the Iranian Press." *Iranian Studies* 42, no. 3 (June 2009): 423. Accessed April 2, 2017. https://www.jstor.org/stable/pdf/25597564.pdf.

[25] Ibid.
[26] Ibid. 424

peaceful protest.[27] Throughout both world wars, Gandhi led the boycotts of British goods and strikes against their rules.[28] Simultaneously, violence between Hindus and Muslims concerning the establishment of a Muslim state increased drastically, and Britain could no longer maintain power.[29] Therefore, the independence of India as a British commonwealth country was official on August 15, 1947.[30] After decades of struggling through various leaders and demanding civil rights from the powerful hand of Britain, India finally achieved freedom, but faced new challenges to keep the young country economically afloat while facing the crimes of religious violence.

India: Major shifts in healthcare policy post-independence

Immediately following the acquisition of independence of India, the government did not view a development of a nationwide healthcare policy as an urgent need given the national unrest concerning the religious struggles. Additionally, Indian still use Ayurvedic medicine widely, both as a primary form of healthcare and in conjunction with modern medical practices.[31] Considering the constant presence of Ayurvedic as an affordable and arguably effective form of medicine, the development of healthcare policies was delayed. Following the suggestion of the World Bank in an effort to improve the financial situation of the country, the government introduced user fees on public healthcare[32]. User fees significantly increase the costs of

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[27] Ibid.
[28] Ibid.
[29] Ibid.
[30] Ibid.
[31] "Ayurvedic Medicine: In Depth." National Institutes of Health. April 07, 2016. Accessed March 12, 2017. https://nccih.nih.gov/health/ayurveda/introduction.htm.

[32] Bitjoya Roy and Siddharta Gupta. "Public-Private Partnership and User Fees in Healthcare: Evidence from West Bengal." *Economic and Political Weekly* 46, no. 38 (September 17, 2011): 74. Accessed March 31, 2017. http://www.epw.in/journal/2011/38/special-articles/public-private-partnership-and-user-fees-healthcare-evidence-west.

healthcare and act as "a deterrent for the chronically poor households to access care, to comply with the treatment protocol, and makes already poor people poorer"[33]. User fees are still being implemented today, and the nation seems to be doing little work to decrease or arrest the growing costs of healthcare.[34]

In addition to public hospitals which provide healthcare with user fees, India's healthcare system includes private institutions. These privately-owned hospitals are considered some of the best healthcare establishments internationally. Individuals from developed and wealthy nations consider private hospitals in India to be an affordable and high quality means of healthcare, inspiring the widespread usage of medical tourism to India. For individuals from India, the private healthcare is typically far too expensive, and only the top five percent of the population have voluntary health insurance.[35] Therefore, despite the quality of the healthcare that could be accessible to many, the lack of affordability of healthcare creates too great a barrier for a large majority of the population of India.

India: Major shifts in education policy post-independence

Similar to healthcare, the system of education was not of primary concern of policy makers immediately after independence due to the political unrest from the religious violence. Upon independence from Britain in 1947, it was estimated that eighty-five percent of the population was illiterate and only thirty percent of primary aged children were enrolled in

[33] Ibid.
[34] Ibid. 75
[35] Bhatia, Mrigesh. "International Health Care System Profiles." India: International Health Care System Profiles. 2016. Accessed March 17, 2017. http://international.commonwealthfund.org/countries/india/.

school, and the government made little effort to address the problem for twenty years.[36] However, in 1988, the National Literacy Mission (NLM) set out to achieve "functional literacy for 80 million illiterates ages 15-35."[37] This large goal was implemented throughout the country and showed significant improvement in education of the population overtime. In 2001, literacy rates increased to sixty-five percent of the population being literate.[38] In the 1990s twenty million children were enrolled in school, and from 1950 to 1998 the number of primary schools increased fourfold and enrollment rates grew sixfold.[39] Both private and public institutions exist for higher education, and most high level qualifications are related to sciences and mathematics, such as engineering, medicine, and technology.[40] However, further improvement in the equity of education is necessary. Education is mandatory for ages 5-14 years, but sixty percent of students drop out by grade five and twenty-three percent never enroll in school at all.[41] Therefore, while the education system shows high quality for students who can access and afford the resources, the great inequalities in the country makes education inaccessible for many.

The United States: Acquiring of independence

Following the Seven Years War, the British rule had expanded over a great deal of land in North America, leading the thirteen colonies to believe they were entering a time of peace and prosperity.[42] However, soon after the war, the British recognized that they needed to pay a great

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[36] "Education in India." WENR. February 1, 2006. Accessed February 28, 2017. http://wenr.wes.org/2006/02/wenr-feb-2006-education-in-india.

[37] Ibid.
[38] Ibid.
[39] Ibid.
[40] Ibid.
[41] Ibid.
[42] Maier, Pauline. "The American Revolution, 1763–1783." The Gilder Lehrman Institute of American History. November 30, 2011. Accessed April 1, 2017. https://www.gilderlehrman.org/history-by-era/essays/american-revolution-1763%E2%80%931783.

war debt, so they implemented the Sugar Act and the Stamp Act in 1764 and 1765, respectively, to tax the colonists. Several colonies petitioned against these acts to Parliament, although their efforts were in vain as the British disregarded all complaints.[43] The stamp collector of Boston then resigned, leaving no one to distribute or tax for stamps and attracting the attention of the colonizers.[44] The British responded with the Townshend duties that placed tariffs on other common goods imported from England, which then sparked the colonist to act in great opposition and boycott British goods.[45] Then, in 1773, the Tea Act was passed, granting monopoly of the American tea market to the East Indian Company and significantly increasing the cost of tea and the control over the American economy.[46] These events led to the Boston Tea Party in 1774 and the British response of the Intolerable Acts that same year, which vastly increased the British control.[47] The colonists revolted, and after years of attempting to make peace with the British and decrease the impact of British control over their goods, the Americas declared independence.[48] The Founding Fathers signed the Declaration of Independence on July 4, 1776.[49] While the relationship between the United States and Britain was troubled at the beginning considering the conflicts and revolution, the countries have grown over time to be allied forces and arguably two of the most powerful nations in the world today.

[43] Ibid.
[44] Ibid.
[45] Ibid.
[46] Ibid.
[47] Ibid.
[48] Ibid.
[49] Ibid.

The United States: Major shifts in healthcare policy post-independence

Healthcare in the United States has transformed throughout the more than 200 years since independence, and continues to be one of the most debated topics of the nation with conflicting views concerning the human right to health and the role of government in making healthcare more affordable and accessible. Chart 1 outlines some major shifts in healthcare policy that affect the affordability and accessibility of healthcare. As summarized in Chart 1, many of the major improvements to the affordability of healthcare are services through Medicare and Medicaid, which are social insurance services that provide private medical insurance to people of age to receive social security and people of extremely low incomes[50]. Those who do not qualify for Medicare and/or Medicaid are expected to be privately insured by benefits through their employers. However, issues of individuals and families being underinsured and uninsured is a rising problem, with estimates suggesting that forty-two million people in the United States are without any form of insurance[51].

[50] Bernstein, A. B., E. Hing, A. J. Moss, K. J. Allen, A. B. Siller, and R. B. Tiggle. "Health care in America: Trends in utilization." *US Department of Health and Human Services*, 2003. Accessed March 4, 2017. https://www.cdc.gov/nchs/data/misc/healthcare.pdf.

[51] Thomas P. Conklin. "Health Care in the United States: An Evolving System." Michigan Family Review. January 01, 2002. Accessed March 8, 2017. https://quod.lib.umich.edu/m/mfr/4919087.0007.102/--health-care-in-the-united-states-an-evolving-system?rgn=main%3Bview.

1982	• Medicare hospice benefits added on a temporary basis.
1983	• Change from "reasonable cost" to prospective payment system based on diagnosis-related groups for hospital inpatient services begins under Medicare.
1985	• Medicare coverage mandated for newly hired State and local government employees. • Emergency Medical Treatment and Labor Act (EMTALA) passed as part of the Consolidated Omnibus Reconciliation Act (COBRA) of 1985 to address the problem of "patient dumping" from emergency departments. • The Consolidated Omnibus Budget Reconciliation Act of 1985 (COBRA) requires most employers who provide employees with group health plans to offer to continue that coverage under certain circumstances.
1986	• Medicare hospice benefits become permanent.
1987	• Federal Nursing Home Reform Act (part of the Omnibus Budget Reconciliation Act) passed, which creates a set of national minimum standards of care and rights for people living in certified nursing facilities.
1988	• Major overhaul of Medicare benefits is enacted, aimed at providing coverage for catastrophic illness and prescription drugs. • Medicare adds coverage for routine mammography.
1989	• Medicare catastrophic coverage and prescription drug coverage are repealed. • Medicare coverage is added for pap smears.
1992	• Medicare physician services payments are based on fee schedule (Resource Based Relative Value Scale, or RBRVS).
1993	• Under Medicaid, States are required to provide additional assistance to low-income Medicare beneficiaries under the State Children's Health Insurance Program (SCHIP).
1996	• Health Insurance Portability and Accountability Act (HIPAA) enacted to provide health insurance protection for people leaving employment.
1997	• The Balanced Budget Act of 1997 (BBA) creates a new program (SCHIP) and funding source for States to provide health insurance to children. • Medicare+Choice is enacted under the BBA. Major payment adjustments are proposed for nursing homes, home health care, and other covered services. • The BBA also mandates changes in payment to nursing homes, home health agencies, and hospital outpatient departments. • FDA relaxes its rules on mass media advertising for prescription drugs.
1999	• Prospective payment for skilled nursing homes under Medicare (passed with the BBA of 1997) enacted.
2000	• Medicare+Choice Final Rule takes effect. • Prospective payment systems for outpatient services and home health agencies take effect.

Figure 1: "Selected major Federal policy initiative affecting health care utilization"[52].

In terms of access to healthcare and the overall quality, United States shows a very mixed array. The global scale views the United States to have one of the most advanced forms of quality healthcare. However, through an in-depth observation of the quality of healthcare, it is evident that the United States provides both overuse and underuse of medicine and medical

[52] Ibid.

attention.[53] The primary issue of overuse is concerning antibiotic prescription, for which Americans are making themselves more vulnerable to disease and infection.[54] The chief concerns of underuse relate to both patients refusing medical care for fear of costs and hospitals discharging patients quickly to free space.[55] Therefore, while United States healthcare is often regarded as high quality, it faces inequities and lack of quality in several aspects.

The United States: Major shifts in education policy post-independence

Comparable to healthcare, the government significant adjusted policies of education throughout the course of history since independence. The education system is also an issue of debate, like healthcare, considering differing views on the focus of funding. The United States government contributes ten percent of schools' funding, while the rest of the funding is a responsibility of the state and local governments, with most public schools relying primarily on housing taxes. This reliance on taxes causes an enormous level of inequality in quality and resources since funding is dependent on the wealth of an area.[56] Additionally, the compulsory of education is determined by the state government, with most states requiring formal education up to age 16 but some states enforcing compulsory education through age 18. In all states, public education is available for ages four through eighteen, along with other educational providers such as Catholic and private schools. The educational system follows a state-established

[53] Schuster, Mark A., Elizabeth A. McGlynn, and Robert H. Brook. "How Good Is the Quality of Health Care in the United States?" *The Milbank Quarterly*. Blackwell Publishing, Inc., Dec. 2005. Web. 12 Mar. 2017.

[54] Ibid.
[55] Ibid.
[56] Corsi-Bunker, Antonella. "Guide to the Education System in the United States." International Student and Scholar Services. 2. Accessed March 18, 2017. https://isss.umn.edu/publications/USEducation/2.pdf.

structure that outline the curriculum for each grade.[57] Therefore, the educational system in the United States is theoretically accessible and affordable for all, but resources and quality of education may vary based on socioeconomic status.

Correlations between Education and Healthcare Policies in Kenya, India, and the United States

At risk of oversimplifying, both the education and healthcare systems in India and Kenya are relatively insufficient, and both systems of the United States are lacking in several aspects. While many private hospitals throughout the country of Kenya provide quality healthcare, the overall system has issues of affordability with user fees at public hospitals and the inability of most the population to pay for private insurance. Kenya's education system presents different challenges. While education is affordable for all students through the free public education system through twelfth grade, many children from areas of poverty lack the accessibility of school because of both physical distance for those in rural areas as well as the means of attending school rather than working and providing financial assistance to their families. India faces similar struggles in the healthcare system compared to Kenya's healthcare with issues in patient affordability. Thus, most individuals in India are without any medical attention despite the incredible quality of India's healthcare that attracts medical tourism internationally. The education system in India also faces similar challenges to Kenya, with public education available through the secondary level but students being unable to attend because a need to work at home, or never attending school because of physical distance and a variety of other possible challenges. In the United States, both the healthcare and education systems are considered high quality and

[57] Ibid. 4

overall accessible. However, the healthcare system is lacking in affordable for those who are underinsured or uninsured, which effects many people and particularly those of the marginalized populations such as the uneducated.

However, the two systems could be further evaluated as to conclude if the lack of one is due to the lack of the other. In other words, does insufficient healthcare result in a poor education system? Or do issues in the education system cause problems with healthcare policy? Or do both problems continually lead to the worsening of the other? Various scholars argue for all three options.

Problems with Healthcare Creating Challenges for Education

Inadequate healthcare creates challenges in pursing an education. For example, poor health and malnutrition account as a major reason for children to miss school and to struggle academically.[58] Various disease and nutritional concerns result in deficiencies in physical and cognitive development that could have lasting impacts on a student's ability to learn and focus, creating issues in the classroom and other challenges to the educational system.[59] A statistical summary of attendance proves the direct impact of healthcare on education, stating that "the equivalent of more than 200 million school years are lost each year in low income countries as a result of ill health, and the impact on learning and cognition is equivalent to a deficit of more than 630 million IQ points."[60] Therefore, if children lack the healthcare to overcome illness and attend school regularly, a significant number of children will continue to miss school and the

[58] "Impact of Health on Education." Schools and Health. 2017. Accessed February 10, 2017. http://www.schoolsandhealth.org/Pages/AnthropometricStatusGrowth.aspx.

[59] Ibid.
[60] Ibid.

educational system could struggle with the lack of attendance. The healthcare induced challenges as well as other socioeconomic factors could lead the education system to contribute to the further development of concerns within the healthcare system.

Problems with Education Creating Challenges for Healthcare

Education highly influences the occurrence of disease, the approaches and effectiveness of treatment, and the overall morbidity and mortality. Education is defined both in terms of formal education dictating literacy and income levels, as well as health education relating to understanding of a disease and methods of prevention and treatment. This trend of education impacting population health is further explored "in the context of a socioecological model of health."[61] This model recognizes that a great deal of health problems as well as outcomes are the direct result of factors additional to challenges within the healthcare system, particularly the lack of a formal education.[62] One major instance in which problem in the education system is creating issues for the healthcare system is concerning the shortage of healthcare workers, particularly in developing nations.[63] Fifty-seven countries are experiencing an extreme shortage of doctors and nurses, resulting in 1.3% of healthcare provides care for 25% of the world's disease burden.[64] Along with issues of migration and "brain drain" in which intelligent and educated individuals move from less developed home nations to more developed host nations for educational and

[61] Emily B. Zimmerman, Steven H. Woolf, and Amber Haley. "Population Health: Behavioral and Social Science Insights." AHRQ--Agency for Healthcare Research and Quality: Advancing Excellence in Health Care. July 30, 2015. Accessed April 4, 2017. https://www.ahrq.gov/professionals/education/curriculum-tools/population-health/index.html.

[62] Ibid.

[63] S. Naicker, J. Plange-Rhule, R. C. Tutt, and J. B. Eastwood. "Shortage of healthcare workers in developing countries--Africa." Ethnicity & disease. 2009. Accessed April 4, 2017. https://www.ncbi.nlm.nih.gov/pubmed/19484878.

[64] Ibid.

career opportunities, a large portion of the shortage could be blamed on issues of the educational system. If such a small percentage of the overall population completes higher level education in countries such as Kenya and India, then there are few educated individuals entering the workforce, and even fewer qualified specifically in medicine, resulting in a shortage of healthcare providers and further issues within the healthcare system.

Additionally, another aspect of educational inequality contributing to challenges in healthcare policy relates to patient understanding. If a patient lacks basic educational skills, especially literacy, he will struggle to seek out health care and information.[65] Therefore, healthcare providers never have the opportunity to treat these patients who have not sought medical attention, creating issues in population health and healthcare statistics. Additionally, if an individual receives healthcare but he lacks the education to understand the furthering of treatments and be attentive to the doctors' advice and the medication, then this lack of education poses a large threat to healthcare. The challenges that education, and the lack thereof, presents to healthcare could equate the challenges that healthcare brings to education, showing the possibility of a cyclic trend.

Cycle of Healthcare and Education Creating Challenges for One Another

An additional viewpoint of the correlation between the healthcare and education systems is not a matter of one system solely influencing the other through challenges and issues, but the

[65] Robert John Adams. "Improving health outcomes with better patient understanding and education." Risk Management and Healthcare Policy. October 14, 2010. Accessed March 14, 2017. https://www.dovepress.com/improving-health-outcomes-with-better-patient-understanding-and-educat-peer-reviewed-article-RMHP.

idea that the two systems function as a cycle, and the problems of one lead to the difficulties of the other which then continues to create new complications for the first. An illustration of the cycle and potential benefits provided by education and health for the other system is shown in Figure 2.[66]

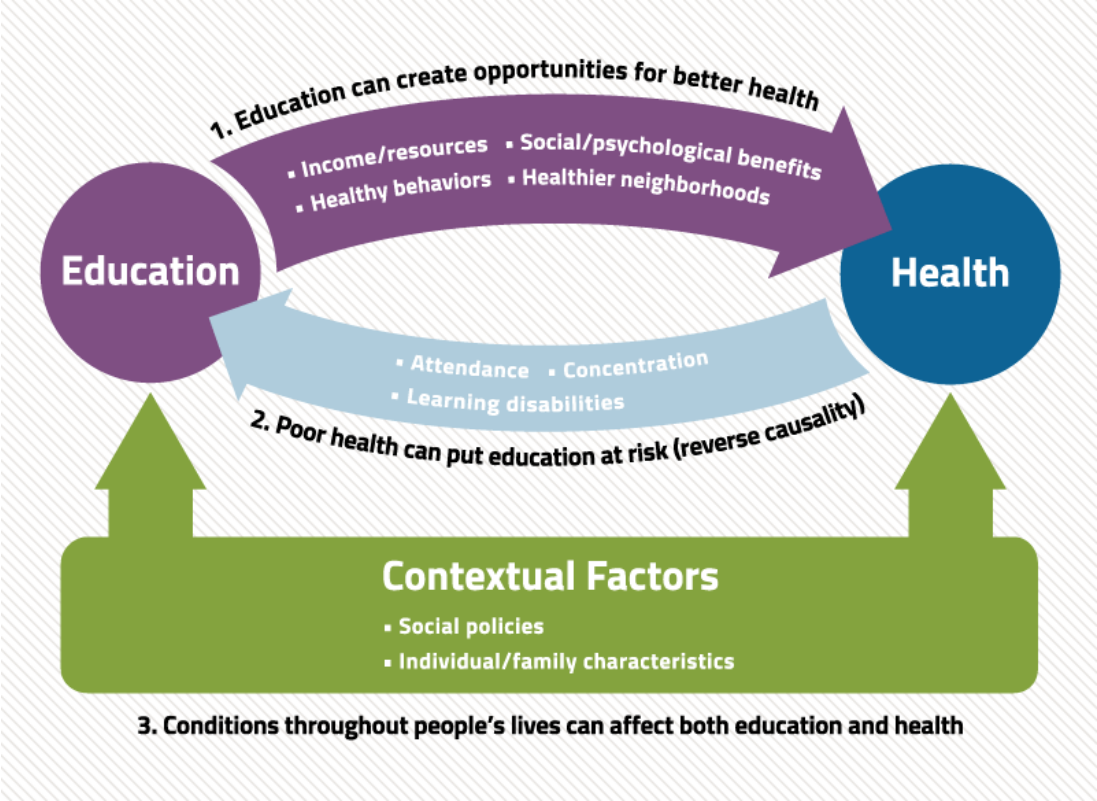

Figure 2: Opportunities provided by education and health and the continuous cycle of the two concepts[67].

The cycle begins with the idea that education provides individuals with the knowledge to make decisions that will benefit their health, and having good health provides for the effective

[66] "Why Education Matters to Health: Exploring the Causes." Center on Society and Health. February 13, 2015. Accessed April 3, 2017. http://societyhealth.vcu.edu/work/the-projects/why-education-matters-to-health-exploring-the-causes.html.
[67] Ibid.

furthering of one's education.[68] However, if there is a threat to one of these qualities, then the other would suffer accordingly. As shown in Figure 2, this idea of the cycle also accounts for outside threats, or contextual factors, that harm the cycle through other influence.[69] Therefore, the cycle avoids assumption that all educated people are healthy and all healthy people are education, and other false generalizations. Considering the relationships between the systems of healthcare and education and the influence they have on one another, further study shows the more specific and complex role that education plays in healthcare. Education impacts not only the quality of healthcare, but also the patient understanding of the care that he receives.

Impact of Formal Education on Healthcare

The rates of the occurrence of disease depends on many socioeconomic factors, with the level of formal education having a large influence. Disease occurrence and morbidity is significantly higher in areas of lower education and lower income level. The most direct correlation in which education, and by default the lack of, impacts health is through the understanding of risks of predispositions of disease.[70] Many schools offer various lessons in nutrition, sexual and reproductive health, and other forms of understanding disease and how to protect oneself.[71] However, beyond the basic health lessons, the even more fundamental lessons of education such as reading comprehension and basic math is necessary for health literacy and effective healthcare.[72] Health literacy is strengthened through education to prepare individuals

[68] Ibid.
[69] Ibid.
[70] Emily B. Zimmerman, Steven H. Woolf, and Amber Haley. "Population Health: Behavioral and Social Science Insights." AHRQ--Agency for Healthcare Research and Quality: Advancing Excellence in Health Care. July 30, 2015. Accessed April 4, 2017. https://www.ahrq.gov/professionals/education/curriculum-tools/population-health/index.html.
[71] Ibid.
[72] Ibid.

"to absorb messages about important lifestyle choices to prevent or manage diseases."[73] A study of health literacy and education shows that "individuals with lower health literacy had poorer health-related knowledge and comprehension, ability to demonstrate taking medications properly, and ability to interpret medication labels and health messages."[74]

Additionally, beyond the direct knowledge that a student obtains through a formal education, level of education directly affects personal health behaviors.[75] For example, individuals with higher level of education are less likely to participate in risky behaviors with the National Survey on Drug Use and Health showing that "35 percent of adults who did not graduate high school were smokers, compared to 30 percent of high school graduates and 13 percent of college graduates."[76] Also, educated individuals are more likely to exercise regularly and have a healthy diet than those without education because of an understanding of nutrients and heart health.[77] Furthermore, higher education is directly correlated to financial stability,[78] Educated individuals avoid the stress and health harms associated with economic deprivation.[79] Although higher education has a high influence on health and healthcare in several aspects, further arguments concerning the patient's understanding of an illness and treatment and other forms of patient education is debatably a responsibility of the healthcare provider and a public health concern that relates more closely to healthcare than education.[80]

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[73] Ibid.
[74] Ibid.
[75] Ibid.
[76] Ibid.
[77] Ibid.
[78] Ibid.
[79] Ibid.
[80] Robert John Adams. "Improving health outcomes with better patient understanding and education." Risk Management and Healthcare Policy. October 14, 2010. Accessed March 14, 2017. https://www.dovepress.com/improving-health-outcomes-with-better-patient-understanding-and-educat-peer-reviewed-article-RMHP.

Impact of Patient Education on Healthcare

Patient education by healthcare providers concerning the prevention and treatment of disease is argued to be the most influential aspect of education on the overall quality of healthcare. Medical professional issued education is especially significant in the fact that health education is a basic right of a patient, making it a major responsibility of a healthcare provider.[81] This focus of education is of interest of the field of modern medicine, which is transitioning from a disease-centered model to a patient-centered model.[82] This new approach results in a higher level of care and more positive outcomes of patients' conditions.[83] An example of a situation in which patient education plays a key role in the bettering of health conditions is chronic illness. Patients that require lifelong care for a chronic disease show that healthcare can be costly, and diseases can be difficult to manage if a patient lacks in understanding.[84] Therefore, the affordability of treatment and the quality of care depend on the education of patient about the illness. Also, a portion of patient education relates to the psychological benefits of patient understanding, meaning that the understanding of a patient will make the individual feel more motivated to comply with treatment plans and follow medication rules despite the side-effects or the time requirements of treatment.[85]

Additionally, a considerable setback recognized in the socioeconomic model of health that creates challenges in navigating healthcare and requires additional attention and education

[81] Olga Dreeben. "Significance of Patient Education for Health Care and Rehabilitation." In *Patient Education in Rehabilitation*, 3. Sudbury, MA: Jones and Bartlett Publishers, 2010.

[82] Ibid. 5
[83] Ibid. 5
[84] Ibid.
[85] Ibid.

by medical professionals is language barrier, particularly among immigrant populations.[86] While these individuals may be extremely well-educated, the lack of knowledge of English serves as a sizable blockage to healthcare education. The language barrier could greatly restrict access to healthcare if only a limited number of medical providers know the patient's native language. Language also serves a particular challenge in the medical field because the names of diseases and medications are typically beyond common knowledge even for native speakers, so communication between the healthcare provider and patient could be insufficient. Therefore, it becomes the responsibility of a healthcare provider to ensure that the patient understands the terminology used and connects the patient with resources to make this understanding possible. Patient education makes a considerable difference not only in treatment of disease but in the individual's understanding of and actions toward disease prevention for future health and wellness.

Vaccinations and Disease Prevention

Education, both that provided by formal schooling as well as medical professionals, plays a major role in the understanding of disease and many health benefits in prevention and treatment. Prevention of disease directly relates to the patient understanding of the medical and health concerns.[87] There are various forms of disease prevention in addition to vaccinations, such as care for sanitary conditions and attention to nutrition. In each country of study, the challenges

[86] Emily B. Zimmerman, Steven H. Woolf, and Amber Haley. "Population Health: Behavioral and Social Science Insights." AHRQ--Agency for Healthcare Research and Quality: Advancing Excellence in Health Care. July 30, 2015. Accessed April 4, 2017. https://www.ahrq.gov/professionals/education/curriculum-tools/population-health/index.html.

[87] Robert John Adams. "Improving health outcomes with better patient understanding and education." Risk Management and Healthcare Policy. October 14, 2010. Accessed March 14, 2017. https://www.dovepress.com/improving-health-outcomes-with-better-patient-understanding-and-educat-peer-reviewed-article-RMHP.

of disease prevention reflect highly on potential issues in the nation's healthcare and education systems.

In Kenya, inequalities in access to vaccinations is apparent in the disease rates and occurrence of preventable illness. For example, polio remains to be a public health concern, with hopes that Kenya will be polio-free by 2018.[88] The campaign to eradicate polio from Kenya and several other developing countries focuses on delivering vaccines to "unreached children," most commonly under the age of five years.[89] The label of these children as unreached indicates a lack of access to healthcare and vaccinations. There are many possible reasons for this lack of access, such as the shortage of healthcare providers and the cost of medical care. However, other likely reasons are related to health education, such as a parent making minimal effort to vaccinate their children or refusing vaccinations if they do not understand what exactly is a vaccine, the importance of vaccines, and the spread of disease and polio.

Additionally, Kenyans suffer from preventable disease not only for a lack vaccination use but also preventions beyond medical services. For instance, the number one cause of death in Kenya is HIV/AIDS, responsible for the death of fifteen percent of the population.[90] While there is no marketed vaccination to prevent HIV/AIDS, various other preventions and precautions can greatly decrease the spread of the virus, such as safe sexual practices, proper treatment of newborns whose mother have HIV/AIDS, and avoidance of sharing interveinal needles. Additionally, the mortality of the virus could be further prevented by treatments to control HIV

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[88] Vivian Jebet. "Kenya set to be declared polio free in 2018 if no case reported." *Daily Nation*, January 18, 2017. Accessed February 21, 2017. http://www.nation.co.ke/counties/Isiolo/Polio-free-Kenya-2018/1183266-3521366-format-xhtml-14nq59z/index.html.

[89] Ibid.

[90] "Global Health - Kenya." Centers for Disease Control and Prevention. October 26, 2016. Accessed March 21, 2017. https://www.cdc.gov/globalhealth/countries/kenya/.

and slow or prevent the development of AIDS. These methods of prevention are relatively simple and could be accessible to everyone, but the knowledge of disease spread and control of HIV/AIDS is a matter of education. Therefore, the spread of this disease and the difficulties faced in prevention are reflective of the insufficiencies of education.

In India, a serious cause of preventable diseases such as diarrhea and hepatitis relates to the public health problem of public defecation.[91] Forty-eight percent of the Indian population lives in conditions lacking access to proper sanitation such as toilets and running water, leaving the people with no choice but to defecate openly.[92] The problem of public defecation is even more systemic than the lack of toilets, as the behavior has become a cultural norm in some areas.[93] Since so many people have been raised and taught to think that public defecation is harmless since it is so widely practiced in certain slums and areas of poverty, the act is continued even in areas where running water and toilets have become accessible.[94] The solution to this issue has proven to be more than simply providing people with access to toilets, but the necessity of providing people with access to education. Due to the lack of education for individuals to connect the issues of public defecation to diseases, people are continuing to suffer from these preventable illnesses.

Moreover, malnutrition serves as a source of disease in India. Vitamin A deficiency (VAD) leading to blindness and severe visual impairment (SVI) affects a 18.6% of children in

[91] Dinnoo, Shannti. "Why do millions of Indians defecate in the open?" BBC News. June 17, 2014. Accessed April 6, 2017. http://www.bbc.com/news/world-asia-india-27775327.

[92] Ibid.
[93] Ibid.
[94] Ibid.

India.[95] The prominence of VAD blindness throughout the country varies within regions, with the percentage of affected children being much higher in rural and impoverished areas compared to the capital and large cities.[96] While food access and other socioeconomic factors related to food insecurity and hunger hold a fair blame for this problem, another contributing issue relates to education. If people are uneducated, in school or by medical providers, about the importance of a well-balanced diet and the role that vitamin A plays in the proper functioning of the eye, then they lack the essential tools to effectively prevent a variety of diseases caused by malnutrition. Understanding nutrition is crucial for disease prevention, and the lack of education only increases the risk of developing diseases and health complications.

In the United States, nutritional concerns also serve as a primary worry of preventative disease, with heart disease being the leading cause of death, responsible for one of every four deaths in the country.[97] While some factors contributing to heart disease relate to race, gender, and genetic factors, the main sources of this disease are lifestyle choices. Individuals who smoke, have poor diets, have high cholesterol, have high blood pressure, exhibit low levels of physical activity, have diabetes, and overuse of alcohol are all at risk for heart disease.[98] Through education of these risk factors and preventative measures to lower risk of disease, people could obtain the necessary knowledge to improve one's lifestyle and choices and decrease the risks of heart disease, making the disease far less prominent and deadly.

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[95] Rahi, J. S., S. Sripathi, C. E. Gilbert, and A. Foster. "Childhood blindness due to vitamin A deficiency in India: regional variations." Archives of Disease in Childhood. April 1995. Accessed April 10, 2017. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1511233/.

[96] Ibid.

[97] "Heart Disease Facts." Centers for Disease Control and Prevention. August 10, 2015. Accessed April 2, 2017. https://www.cdc.gov/heartdisease/facts.htm.

[98] Ibid.

Morbidity and Mortality

Not only do the systems of education and healthcare affect a person or population in disease prevention, but the systems also play a major role in the rates of morbidity and mortality due to disease. Mortality statistics indicate the access and effectiveness of medical treatment. The challenges and successes that Kenya, India, and the United States face in delivering accessible, affordable, and quality healthcare and quality education are reflected statistically in the life expectancy in each country. The life expectancy in Kenya is 61 years for males and 66 years for females, in India is 67 years for males and 70 years for females, and in the United States is 77 for males and 82 for females.[99, 100, 101] Lower ages of average mortality often translate to greater impact of disease and death by disease, even though there are many causes of death other than disease because various diseases are the major causes of death internationally. In the previous evaluations of each nation's accessibility, affordability, and quality of healthcare, the mortality rates seem to match the systems policies and implementations and the problems of each country. Kenya and India face several more challenges in their healthcare and education systems than the systems of the United States, and the mortality rates correlate to that observation.

Traditional Medical Practices

Traditional medical practices play a large role in the development and views of modern medicine. These traditional practices hold both positive and negative effects on the healthcare of

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[99] "Kenya." World Health Organization. 2017. Accessed April 12, 2017. http://www.who.int/countries/ken/en/.

[100] "India." World Health Organization. 2017. Accessed April 12, 2017. http://www.who.int/countries/ind/en/.

[101] "United States of America." World Health Organization. 2016. Accessed April 12, 2017. http://www.who.int/countries/usa/en/.

a nation. Traditional medicine is beneficial in the fact that many practices are effective and affordable. However, these practices may be centered around superstitions, may use outdated methods, and often prevent the acceptance of modern medicine. Therefore, understanding the history of medical practices and the current use of traditional medicine is valuable in understanding the receptiveness and effectiveness of modern healthcare in each of the countries of study.

The many Kenyan tribes each hold unique traditions and beliefs dating back to the origin of the tribes. Different traditional medical practices have been, and currently are still, practiced throughout the country.[102] Traditional medicine in Kenya relies heavily on herbal medicines, such as "indigenous drugs derived from plants and animals."[103] Herbal medicines are used to treat a variety of aliments including allergies, joint aches, family planning, malaria, pneumonia, typhoid, STDs, diabetes, and cancer.[104]

In India, Ayurvedic medicine is still practiced today, and it is one of the oldest forms of medicine in the world dating back 3,000 years.[105] The main concepts include interconnectedness, the composition of the body, and the forces of life.[106] Practitioners make individual treatments that include herbs, exercise, and diet and lifestyle adjustments.[107] Products have the potential to be toxic, so the herbs and drugs are not used unless suggested by a trained practitioner, who is

[102] Kigen, Gabriel K., Hillary K. Ronoh, Wilson K. Kipkore, and Josephy K. Rotich. "Current trends of Traditional Herbal Medicine Practice in Kenya: A review." *African Journal of Pharmacology and Therapeutics* 2, no. 1 (2013): 33. Accessed February 7, 2017. file:///C:/Users/Anna/Downloads/1106-3996-1-PB%20(1).pdf.

[103] Ibid. 32
[104] Ibid.
[105] "Ayurvedic Medicine: In Depth." National Institutes of Health. April 07, 2016. Accessed March 12, 2017. https://nccih.nih.gov/health/ayurveda/introduction.htm.
[106] Ibid.
[107] Ibid.

an individual that attended Ayurvedic school and obtained a license.[108] Other methods of traditional medicine in India include herbs, yoga, and acupuncture.[109] These various forms of traditional medicine are considered effective in both prevention and treatment of a great number of disease.

In the United States, Native American traditions of healing are the traditional medical practices of the nation. Specifics of the practices vary amongst tribes, but many beliefs and practices are true throughout Native American history, "including a health promotion foundation that embraces bio-psycho-socio-spiritual approaches and traditions."[110] The three primary foci are herbal medicines, ceremonies, and allopathic medicine centered on respecting the body and the blessings of nature.[111] In most Native American tribes, there is a tribe elder who is the medicine man or woman, who holds the knowledge of the herbal remedies as well as the ceremonial traditions.[112] Beyond Native American healing, modern medicine has been widely used for a great deal of time in the United States. Thus, with both modern medicine as well as the traditional practices in the U.S. as well as Kenya and India, the demographics of the medical providers also plays a role in the accessibility of healthcare.

Population of Healthcare Providers

Considering the emphasis of traditional practices of each nation, it is understandable as to why there may be some overall distrust of providers of modern medicine because of cultural

[108] Ibid.
[109] Ibid.
[110] Mary Koithan and Cynthia Farrell. "Indigenous Native American Healing Traditions." The journal for nurse practitioners: JNP. June 01, 2010. Accessed April 2, 2017. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2913884/.

[111] Ibid.
[112] Ibid.

views. As the various challenges in the healthcare system relate to the shortages of medical providers, a large number of the population of healthcare workers are often different ethnicity and cultural background than the population of patients. In view of the struggles of Kenya and India in acquiring independence and the great possibility of post-colonial resentment toward Britain and allied nations, the population of healthcare providers plays an interesting role in the system of healthcare in each nation.

Kenya suffers from a shortage of healthcare workers, with rural areas experiencing the greatest effects.[113] Most Kenyan doctors work in the private sector, or are occupied by the "brain drain," of educated individual migrating to more developed nations for better employment and research opportunities.[114] Due to this medical shortage as well as other socioeconomic issues demanding attention and assistance, Kenya is one of the largest areas in Africa to attract NGOs and other volunteer organizations for all fields including medicine.[115] Also, volunteers are quick to respond to the need in Kenya because of the attraction of the warm climate, fascinating culture, and the fact that the county is English-speaking.[116] However, Kenyans frequently view this foreign aid as a problem more than a solution, with the government recently criticizing the NGO community for taking jobs from native workers and paying international employees more than Kenyans.[117] Forty-two percent of the population of Kenya lives below the international

[113] "Kenyan Healthcare Sector." *Embassy of the Kingdom of the Netherlands in Nairobi*, September 2016, 7. September 2016. Accessed March 21, 2017. https://www.rvo.nl/sites/default/files/2016/10/2016_Kenyan_Healthcare_Sector_Report_Compleet.pdf.

[114] Ibid.

[115] Lily Kuo. "Kenya is pressuring thousands of expat NGO workers and volunteers to go home." Quartz. July 18, 2016. Accessed April 5, 2017. https://qz.com/716518/kenya-is-pressuring-thousands-of-expat-ngo-workers-and-volunteers-to-go-home/.

[116] Ibid.

[117] Ibid.

poverty line, and one of five people are unemployed.[118] The international NGO community is taking middle class jobs from natives, making people believe that the shortage of healthcare workers is not necessarily from the brain drain, but potentially from volunteers taking jobs.[119] While the government and middle class Kenyans who feel their jobs are being compromised have negative opinions of "white saviors" and NGOs, rural and impoverished areas of the country are generally receptive and appreciative of the volunteer presence.[120]

In India, the shortage of medical professionals is considered the greatest threat to the common good of healthcare in the country, with the "ratio of 0.7 doctors and 1.5 nurses per 1,000 people."[121] Of this small number of medical professionals, a majority work in an urban setting, where only thirty percent of India's population lives.[122] Therefore, most of the population who live in rural areas lack access to healthcare providers or receive medical care from nonprofessionals.[123] India is one of the most popular nations for NGOs to visit, partially because of the great healthcare shortage. However, it is often considered that NGOs are doing more harm than good. In India, and many developing nations for that matter, the language barriers serve as a threat to the good of NGOs, preventing healthcare providers and medical volunteers from communicating and giving sufficient patient education. Additionally, despite the positive intention of the volunteers, they are often following direct instructions from international overseers.[124] Since the heads of the organizations have a set agenda, they often fail to respond to

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[118] Ibid.
[119] Ibid.
[120] Ibid.
[121] Atul Dhawan. "2015 Health Care Outlook: India." Deloitte. 2015. Accessed March 8, 2017. https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Life-Sciences-Health-Care/gx-lshc-2015-health-care-outlook-india.pdf.

[122] Ibid.
[123] Ibid.
[124] Ibid.

the direct needs and requests of the community.[125] This language barrier and inflexibility of volunteers in communicating directly with the community also contributes to insufficiency of patient education and continuation of problems of education and healthcare.

In Kenya and India where shortages of healthcare professionals are harmful to the overall system, the rise of NGOs and volunteer medical professionals may be detrimental as well. Considering the struggles of each country to gain independence and to learn to run an effective government after so much time under oppressive control, it is understandable that Kenyans and Indians have a distrust and resentment of foreign aid. Additionally, the requirements to qualify an individual to be an international medical volunteer is far lesser than the requirements to be a healthcare provider in a developed country, indicating that many of these volunteers may be underqualified and potentially harmful to the health of patients due to a lack of medical knowledge. Therefore, in addition to post-colonial distrust, natives would have reason to doubt the effectiveness of the healthcare provided by volunteers. The distrust of NGOs and medical providers for a variety of reasons is one aspect of several ethical dilemmas related to healthcare and education.

Ethical Dilemmas Associated with Issues of Healthcare and Education

While healthcare and education are two correlated issues that provide benefits and challenges to one another, the two topics also relate in the fact that education, and the lack thereof, causes ethical dilemmas when associated to healthcare. These ethical issues are a highly

[125] Jessica Maltha. "NGOs in Primary Healthcare: A benefit or a threat?" *Global Medicine* 7 (2009): 6. Accessed April 2, 2017. http://globalmedicine.nl/issues/gm7/article2.pdf.

debated in the fields of bioethics and medical ethics. And often, the people of developing nations such as Kenya and India suffer as the test subjects. A largely debated topic of healthcare with insufficient education is the idea of edible vaccines. Vaccines are responsible for the eradication of several diseases such as smallpox and nearly polio, and the control of several more.[126] However, the inequities of the global healthcare system leave a tremendous gap, with twenty percent of children missing the vaccinations "against diphtheria, pertussis (whooping cough), polio, measles, tetanus and tuberculosis [which] account for about two million unnecessary deaths a year, especially in the most remote and impoverished parts of the globe."[127] Therefore, scientists are advancing progress to create edible vaccines. To make an edible vaccine, an bacterium *Agrobacterium tumefaciens*, which contains an antigen gene and antibiotic-resistance gene, is introduced into a plant by exposing a cut leaf through a bacterial suspension.[128] Through gene transfer, the bacterium delivers genes into the DNA of the plant cell.[129] The leaf then needs to be exposed to an antibiotic that will kill the cells that do not contain the antibiotic-resistance gene, so that the only living cells are the ones whose DNA contain a vector of the plasmid with the antigen gene.[130] These cells then multiply and form a callus, which sprouts a plant that can be rooted and grown.[131] After the plant grows and produces fruits, the products are edible vaccines.[132]

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[126] Langringe, William H.R.""Edible Vaccines." *Scientific American*, December 1, 2006. Accessed January 29, 2017. https://www.scientificamerican.com/article/edible-vaccines-2006-12/.

[127] Ibid.
[128] Ibid.
[129] Ibid.
[130] Ibid.
[131] Ibid.
[132] Ibid.

The motive behind edible vaccines is the idea that "regardless of how vaccines for infectious diseases are delivered, they all have the same aim: priming the immune system to swiftly destroy specific disease-causing agents, or pathogens, before the agents can multiply enough to cause symptoms."[133] However, the delivery of vaccines should be discussed when it involves the lack of education. In the case of edible vaccines, they could be successful in providing life-saving immunizations to people who typically would refuse them because of disbelief in modern medicine, distrust of medical providers, dislike of needles and drugs, and/or a misunderstanding of what exactly a vaccine is and does. Therefore, the edible version would lead an individual to believe he is simply eating a banana or tomato, and to be saved of health threats to his own health and the public health. However, does an individual have the right to know of the medical care he or she is being given? Should resources be spent on extreme measures to provide people with vaccinations, or should they be spent on educating people on vaccinations and disease prevention? Or should the delivery of vaccinations be left out of discussion since the intention is to prevent illness, an edible vaccine could do that more effectively than underused traditional vaccines? This ethical debate concerning the development of technology and education of healthcare is developing and could lead to many further topics of debate in future years.

Conclusions

Healthcare and education are highly related topics through the various impacts that they have on one another and on overall global health. Through the evaluation of the acquiring of independence and the systems of healthcare and education in each country, the similarities and

[133] Ibid.

differences of each nation allowed for further conclusions to be drawn. The fact that Kenya and India are both relatively young countries compared to the United States in their time as independent nations could relate to many of the challenges that they are facing in the healthcare and education systems. Both Kenya and India acquired independence in the twentieth century after a long struggle, leaving them with a resentment toward the British and great difficulties in creating and implementing policies. Kenya and India are both challenged by the fact that healthcare lacks in accessibility and affordability for a great deal of the population, particularly those living in rural areas and in extreme poverty. While the education in Kenya and India are affordable since free schooling is offered through grade twelve, many students lack accessibility because of distance to school, inability to go to school rather than working, or other potential socioeconomic challenges.

The relationship between healthcare and education is further evaluated in the effects that they have on one another. A lacking healthcare system causes education to fail in that students cannot attend school regularly. A failing education system harms healthcare since patients would lack a basic understanding of medical practices and preventative methods, and would be less likely to comply with their treatments, if they seek medical assistance at all. For these reasons and the further impacts that the challenges of each system present for one another, healthcare and education could also be viewed as a cycle. Further, the role of education in healthcare can be better understood in the context of the two different types of education. Education can be defined both in terms of a formal classroom education as well as patient education in which a medical provider explains the healthcare to the patient. Both forms of education play a crucial role to the proper functioning of the healthcare system. A basic education is necessary for patients to obtain the most benefits from their healthcare through literacy and other skills to understand treatment.

Also, educated individuals are shown to exhibit healthier lifestyles through nutrition and exercise and avoiding risky behavior to prevent disease and death. Additionally, the education of a patient by a healthcare provider is necessary for patient compliance and the avoidance of disease reoccurrence and morbidity and mortality. The education of a patient is both senses is also necessary for not only compliance of treatment, but for disease prevention through vaccinations and other methods. These practices of disease prevention can only be adopted through the understanding of the spread of disease and the necessary measures to keep oneself safe.

Additionally, the mortality rates of Kenya, India, and the United States of study reflect the healthcare and education systems, with people in the United States living far longer than those in Kenya and India. The population of each nation, however, may have hesitance in practicing and trusting modern medicine due to the prevalence of traditional medical practices in each culture. There may be even further distrust in observation of the demographics of medical providers, especially considering the post-colonization resentment that still exists today. Furthermore, the distrust of medicine may be further seen in evaluation of the ethical dilemmas that exist in situations where the relationship between healthcare and education is overlooked and medical attention is provided without proper education and individuals. Most often these ethical debates involved populations of lower socioeconomic standing like many people in Kenya and India, and they are left to suffer. Therefore, the many challenges seen on an international scale in the systems of healthcare and education are greatly related and directly impact individuals globally.

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