HUMAN CAPITAL IN THE KNOWLEDGE ECONOMY

A 3-COUNTRY CASE STUDY IN HEALTHCARE

by
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ABSTRACT

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During the present knowledge economy there appear to be labor shortages at the same time and in the same regions in which there is an excess of labor supply. Such a pattern would run counter to previous major economic disruptions, as well as questioning traditional free market economic theory of supply and demand principles. Implications for policy where there are global labor shortages along with surplus labor availability in a market economy, are significant. It will likely indicate a drag on economic growth for business sectors, for regions and perhaps globally. It would indicate an accompanying growing disparity of income. Work is important, if not central to human well-being. Changes to economic thinking, and to economic growth pertaining to work and the labor force, would change the way we look at the world. Labor market change would be a warning that political and social response is needed to address the imbalance of supply and demand. A labor supply gap is researched in healthcare occupations for India, Poland, and the U.S for a global perspective and to suggest policy implications.

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Chapter 1 Introduction

Globalization

"Globalization was a deep trend pushed by technology and right ideas, as much as anything else." - Jeffrey Sachs

Globalization can be considered on different levels. It may encompass education, the economy, technology, language, and migratory patterns. As such, it has different meaning to different people. Globalization has been given much of the credit for expanding economies. The competitive marketplace throughout the world has meant the need to understand other markets, and thus other people. The term globalization, attributed to Theodore Levitt in 1983, was used to describe terms in the evolving economy with trade, investments, and technology (Levitt, 1983). F. Gerard Adams (2011) defines globalization as referring to a growing integration of the world. He calls it an ongoing process that links together what had been independent activity centers throughout the world. Friedman (2005) referred to this in his classic text The World is Flat as a smaller world with greater interaction due to the global supply chain for services and manufacturing.

Globalization has been used as a concept to include a single world marketplace with free trade among nations at its core. Other features of globalization include the flow of information, a reduction in national boundaries, and greater intercommunications among people. Four main forces have been identified as referencing globalization: technology, travel, trade, and television (Marquardt, 2003).

Different fields define globalization in various manners, and thus provide a source for continuous research possibilities of globalization and international business

(Palasca and Enea, 2012). In this paper, globalization is analyzed as it relates and reacts to public policy, and especially that which impacts employment and economic growth. During the current period of technology innovation, in a wave that can be referred to as the Knowledge Economy, it is crucial to have a better understanding of workplace changes that are taking place and its influence on changes of the labor force. The study in this paper will take into consideration economic disruptions in the knowledge economy that are taking place along with a look at the various public policies present in each of the case studies.

In assessing public policy, globalization begins in the home region. With respect to viewing external factors in business literature related to the technology revolution in globalization, Matsuyama, Sushko, & Gardini, (2015) discuss innovation cycles and their synchronization relationship due to globalization. They write that most research looks at globalization by assuming productivity movements in a country are driven by "some exogenous processes." Instead, they find, globalization may be the cause rather than the result. Globalization itself can impact productivity rates of a country. In an earlier paper, Matsuyama (2007) had concluded that exporting requires a different type of skilled labor with specific international expertise, and this in turn creates the possibility of increased globalization. Thus, innovative technology may have an influence on the entire global economy and upon globalization. This leads to the conclusion that the less researched aspect of globalization, and of the knowledge economy, may be driven by policy decisions within regions or countries.

There have been several defined major economic shifts in the global economy. It was Alvin Toffler (1980) who first wrote of the three-major economic

globalization/economic waves of development. He cited the first major change as the Neolithic Era. It was a period in which civilization moved to where agriculture with growing and storage of crops, animal husbandry, the making of clothes occurred. This led to a specialization where people could trade their goods for those of others. Changes occurred as land ownership had higher value. Governing systems responded to recognize this change with a greater level of social complexity. Economic disparity grew between those who controlled production and labor and those without capital or control.

The second revolutionary change was the Industrial Revolution in which manufacturing along with steam engines led to factories and a shift in the way work was accomplished. Society changed with money playing a larger role in economic transactions which allowed greater transferability and mobility for the population. Capital became increasingly important and created disparities between those who had it and those who worked for those who had it. With a new change in economic structures there was the creation of new social institutions.

The third wave, according to Toffler, is a post-industrial society of which the Information Era plays a key role in the economy and in society. In this period people are expected to change jobs often, goods become outdated rapidly, and there is greater population movement due to job searching. As with the first and second waves, the third wave displays patterns of inequality when the value of economic resources change. And again, there are social changes that lead to change in social institutions. Disparity and the accompanying social changes are negative issues for concern in society.

Differing from Toffler's framework, Rifkin suggests we are in a third Industrial Revolution, influenced by different forces. He writes economic revolutions occur "when new communication technologies converge with new energy systems" (Rifkin, 2011, p.1). According to him, this third revolution is the convergence of internet technology and renewable energies that will create an entirely new infrastructure that will change the world.

Recently a number of authors and programs have begun discussion on a fourth cycle of globalization. According to Schwab (2017) we are experiencing a fourth cycle or wave where information technology is fundamentally transforming the world in entirely different ways.

In this vein, the Davos World Economic Forum of 2016 considered a distinguishing point between a third and a fourth wave. The Forum discussed this fourth wave as consisting of disruptive technologies that are mixing the physical, digital, and biological which is transforming business, government, and society in major ways. In a similar way, Sachs (2017) views the new globalization as the mobile internet and more powerful sensors, along with artificial intelligence and machine learning, to be transforming the global economy, jobs, and society.

The first three waves saw an overall improvement in the way society functioned. All of them had considerable displacement for individuals, and a form of economic inequality, but the quality of life improved for the overall global population. In the new globalization, there are warnings from technologists, economists, policymakers, employers, and academics of a potential negative impact on society. While advances in artificial intelligence, computing power, nanotechnology, and greater access to the

internet via mobile devices are designed to make life easier, there is a concern that people will be left farther behind if they lack access to the knowledge economy (Winthrop and McGivney, 2016).

During this period in which the world is experiencing major economic and political disruptions and social instability, there is great concern that the impact of the knowledge economy could make matters even worse. For example, Martin Ford (2015) presents a scenario of long-term unemployment and under-employment produced by the increasing use of robotics and automation. A McKenzie report in 2017 projecting the job market to 2030 warns that 60 percent of occupations could be affected through automation, with one-third of the work activities being susceptible to automation. According to the report, this implies "substantial workplace transformations and changes for all workers" (Manyika, et.al., 2017, 1).

But is the impact of this fourth wave really different regarding job creation than innovative waves that have preceded? And if so, how is it different? For some people, there are labor shortages in certain industries while at the same time there are a large number of unemployed workers. Gafni, (2016) writes that the fourth industrial revolution is just beginning but signs of it are emerging everywhere, from changes in the workforce to advances in sustainable development and shifts in the global economy. Policymakers must prepare for the changes that are already occurring. These changes in society are of major relevance to policy makers, and an understanding of these issues is important in order to formulate policies. Without accurate information, there is higher potential for social unrest due to job losses.

Kiessling (2004) tries to get at this issue when writing that “the researcher's challenge is to understand precisely how an innovation invokes and exploits institutionally shaped understandings” (p.87). He adds that the need is to not only recognize the threat of economic inequality, but to suggest public policy options to alleviate social threats. Moreover, Das (2016) challenges the assumption that job losses will be matched by the creation of new jobs that have occurred. He also doubts the ability of political leaders to enact necessary policy changes to address this economic and social issue.

The Global Knowledge Economy and Disruption: Economic growth and Jobs

“*Productivity isn’t everything, but in the long run it is almost everything. A country’s ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker*.” – Paul Krugman

The evolution of the Fourth Wave will be measured in terms of what technology does to productivity and jobs and their impact upon people. “Productivity is a gift for rising living standards, perhaps the greatest gift,” says Bank of England Chief Economist Andrew Haldane. “It is not, however, one that always keeps on giving, as recent events attest. Whether in supporting living standards, or in shrinking their distribution, tackling the global productivity puzzle is among the most pressing public policy issues today” (from Wessel UK speech, 2017; Wessel, 2017).

A number of studies describe factors leading to a decline in productivity. An OECD report notes that the developed countries are experiencing slowing rates of productivity growth (OECD, 2018). Levinson (2017) cites this report and adds that the same trend is underway in less affluent countries as well. He adds that weak productivity growth across the world since 1973 has created political consequences as signified by the rise of populist or nationalistic movements.

Disruptive Technology: What It Means to Productivity and Growth in the Economy

Disruptive technology can be defined as "…*a technology that changes the bases of competition by changing the performance metrics along which firms compete*" (Bower and Christenson, 1995; Daniels, 2004; cited from Li, Porter & Suominen, 2018, p. 285). And while the concept of disruptive technology was introduced in the late 1990's by Clayton Christensen, the origins of theory of innovation disrupting a marketplace must include the works of Schumpeter (1942). Schumpeter gave the name "creative destruction" to the process by which new and innovative firms displace those that have matured, thereby driving long-run economic growth.

While there has been a mingling of the term's disruptive technology and disruptive innovation, it is difficult to distinguish between the two in literature. Markides (2006) points out that there is a need for better theory as different types of innovations impact the market in different fashion and that Christensen's disruptive innovations may be different for established firms. Therefore, research needs to break down the disruptive innovations into finer categories to better understand them, a point also made by Autor and Salomons (2018) when they note the tension between microeconomic variation for identification while addressing macroeconomic outcomes. The Autor and

Salomons study does address variations, noting that different sectors use different technologies. For example, manufacturing may use robotic assembly whereas medical services are establishing new means of treatment. Nevertheless, the results show a similarity by sector, with labor share in manufacturing and low-tech services being most sensitive to technology replacing jobs, and the least sensitive being in health and education.

Research that undertakes the impact of technology on the economy and of occupations must recognize the role of innovation that derives from technology. In the present economic wave, the innovations are generally considered technological. These technological innovations are disruptive within the economy, including employees and their work. At the same time, innovation has been viewed as a key economic indicator for productivity growth. Therefore, it is perplexing that business start-ups and innovation are producing at lower-than-expected level of economic growth. Jorgenson (2011) finds that a large proportion of economic growth in the U.S. is due to replication of existing technologies. While Jorgenson adds that innovation is only a modest portion of growth, this contribution is vital to gains in the standard of living. New jobs and growth result from the innovations that are taking place. Technological change acts as the driver of productivity and growth, though it may destroy some existing jobs as it creates new ones (Qureshi, 2017).

Among some economists there is concern that we may be experiencing a permanent return to low growth in the global economy. OECD researchers Andrews, Criscuolo, and Gal (2015) show that beneath the stagnation lies a deeper pattern: rising productivity from those at the forefront, and a widening gap between the leaders and the

laggards. They use a new model in which global companies continue to grow, and to grow across boundaries while there is a lack of growth in start-ups. (The Great Divergence, November 12, 2016).

This would indicate that technology in some cases may in fact be contributing to a restraint on new firm growth. Thus, Schumpeter is followed, but the entrepreneurial model imagined in the 1930's may have been altered by a globally hypercompetitive environment in technology (Kiessling, 2004).

Moreover, a global, long term labor gap would, on the surface, run counter to labor supply and demand theory. There are those that point out "This outcome is a far cry from what many political leaders, technology entrepreneurs and economists predicted about a generation ago" (Hilsenrath and Davis, Oct. 12, 2016).

The Knowledge Economy and Theory of Labor Supply

While the discussion on the overall impact of technology continues, there is consensus that a number of firms will be driving economic growth. The consequences of this may lead to a situation where certain economic sectors experience a shortage of skilled workers while other sectors may experience a large number of unemployed workers.

The Knowledge Economy is projected to require more skilled labor in the U.S. than is available, thus constraining overall economic growth (Timiraos, 2016; District, 2014). The issue is global in nature as it is predicted there will be a "significant risk of labor shortages" to the world's advanced economies in coming years (Coy, 2014). The

shortages of skilled labor will impact economic growth in developed and developing economies alike (Rutkowski, 2007; Manpower, 2015; Ferry, 2018).

The above studies suggest a very different picture from simply having a future where technology *replaces* human labor. It may be the case with job losses in specific occupations while creating labor shortages in other sectors. Thus, a more accurate depiction would be that technology *displaces* human labor in various ways.

The implications for a changing labor supply are immense. The nature of labor supply and demand may be transforming under the present global economic context fueled by technology and the knowledge economy. In a contradictory way, this economic context has three main features of technological change: 1) lower than expected growth in productivity, 2) increasing inequalities, and 3) declining innovation. Each of these conditions are often cited as important factors sharing the future growth of economies, of the labor market, and ultimately of human well-being. They are all interrelated and deemed important to growth.

The focus of this paper encompasses all of the above issues. Human resources are an important determinant of economic growth. A shortage of skilled labor hinders the growth of an economy. A surplus of labor (either unemployed or underemployed) will harm human well-being. Human well-being needs to be considered in public policy. The human resources of a country need to be in balance with the required skills and education to achieve economic growth (Deterministic Economic Growth, accessed July 2018).

The Knowledge Economy and Education

"Education then, beyond all other devices of human origin, is the great equalizer of the conditions of men, the balance-wheel of the social machinery."

- The Father of American Education, Horace Mann

Since the innovation economy plays a key role in the new globalization, it is important to have a good understanding of the role that education plays in this process. As such, it is important to know whether an equal access to education or access to the right type of education may increase economic inequalities in society. Similarly, it is important to know how educational systems throughout the world are changing (or not changing) to meet the pressing challenges of globalization.

While there may be debate regarding the net gain or loss of jobs in the world economy due to technology, there is little disagreement with the fact that a shift of occupations is taking place. An economy does not remain static, and the changes occurring during this global phase are rapid. It is important for policy makers to understand where these changes are occurring. An understanding is needed in order to best prepare people for the new opportunities being created.

It has been pointed out where technology and innovations are expected to eliminate jobs. A point of research in this paper is that there is simultaneously a shortage of appropriate employees in certain fields. Shortages of labor have been reported in business sectors ranging from health care to technology, to construction and agriculture. These areas may vary for each country as will be described in the literature review. In the global picture, the innovation economy will require skilled workers. As

Tyson and Lund (2018) point out, globalization has been good for the world, but countries are now rethinking the “terms of engagement in global trade”. Specifically, “This new form of digital globalization is more knowledge-intensive than capital- or labor-intensive” (p. 30).

Education for Jobs

There are two major growth areas in which new occupations will likely exist in the knowledge economy. The first consists of areas in science, technology, engineering, and mathematics (STEM). The other area has little research pertaining to it. They are the jobs that do not exist yet but may be created due to innovation.

Besides STEM fields, the U.S. Labor Department projects growth in the following occupations during the 2016-26 time period: marketing, public relations and fundraising, and financial managers. Other growth areas include the higher education sector (teaching, health and science related fields), technology related services, and health care related occupations (from psychologists to mental health, dentists, doctors, and related occupations). Also showing projected labor shortages are occupations in the construction related sector (such as laborers, masons’ tile and marble setters, equipment operators, plumbers), and includes some areas related to personal care (barbers, manicurists, trainers) (O*Net source data).

The growing need for workers with backgrounds in STEM fields is evident from the 10.5% growth, or 817,260 more jobs, added between May 2009 and May 2016. Other STEM jobs projected to have growth of 28 % from 2014-2024 are in mathematical science occupations (Fayer, S., Lacey, A., & Watson, A.,2017).

Non-STEM occupations growth was 5.2 percent in the same period. Computer related occupations and engineers were those of highest job gains with computer occupations increasing by 700,000 jobs in that 2009-2016 period.

A McKinsey Global Institute study in 2012 showed similar global trends. In advanced economies, hiring was particularly strong in knowledge intensive sectors including business services and finance, and in the construction sector. The report also cites rapid growth in interaction work which requires face to face contact (professions and business management), half of which require college degrees. A later report identifies occupations with highest growth potential as being in health care, engineering, scientist, IT and technology specialists, educators, builders and related professions, and manual and service jobs in unpredictable environments (How work will change in the next economy, October 2016,

A global point of concern is that developing countries may struggle more in a knowledge economy. Their present advantage of providing low-cost labor may disappear with a decline of low skilled jobs. Under this scenario there will be a shifting to high skilled jobs. In the knowledge economy, India and other developing countries may face serious challenges considering having 45 million workers without a secondary school education (Dobbs, et al. 2012). Thus, the impact of the knowledge economy in job creation and destruction has important implications for low- and middle-income countries.

The impact of the knowledge economy is also of great relevance for the labor force of the United States and other advanced economies. For example, America is expected to need 1.4 million new skilled workers in the computing and engineering

fields by 2020. A recent survey by the Enterprise Strategy Group reports that 51% of companies were short of workers with cyber-security skills, a number that more than doubled since 2014 (More staff training, 2018). Similarly, a European Commission report found that 15% of workers lacked even basic digital skills, and that 88% of companies contacted had done nothing to deal with the problem. The Association of International Certified Professional Accountants found in their British surveys that a quarter of workers had received no in-work training in the previous 12 months (referenced from James, 2012). The data from countries with advanced economies and developing countries indicate that governments have to restructure their educational institutions to meet the opportunities and challenges of the knowledge economy.

Education and policy in a diverging society

In the United States the relationship of public policy and education is magnified when looking at the shortage of labor in the rapidly growing occupations. Ninety-three out of 100 STEM occupations have wages above the national average of wages for non-STEM fields. To a large extent this is the result when occupations with shortages receive higher salaries than those with a surplus supply. The national average wage for all U.S. STEM occupations is $87,570, nearly double the national average wage for non-STEM fields of $45,700 (Faver, Lacey, and Watson, 2017).

The bifurcation of American society into haves and have-nots, skilled and unskilled, and hopefuls and the hopeless is a major challenge. To those at the top of the American economic pyramid, the standby phrase of “get a degree to get a job, get a better degree to get a better job” is more important than ever. For those getting left

behind or at the bottom of the economic pyramid, more technical and social skills training will be needed to stem the numbers of people on welfare, living in their parent's basements, and other alternative living arrangements. For many at the bottom getting a postsecondary degree is impractical or unrealizable. Earning a high school degree no longer guarantees a livable wage or viable career. (Workforce Education/Training Challenge, 2016).

In a diverging economy, educators and business leaders have expressed the need for changes in education and skill training to meet needs of the knowledge economy. Northeastern University President Joseph Aoun among others, calls for a dramatic realignment in higher education. He believes that new skills include will include data literacy to manage big data, technological literacy to understand how machines work, and human literacy (such as the humanities, communication, and design to function as humans). Aoun (2017) and others call for life-long learning. The new workforce needs to be adaptable and capable of functioning in various activities.

Other educational proposals call for stronger vocational training programs that meet the needs of the environment and foment development. In addition, these programs promote a flexible and adaptable workforce; increase national capacities with an emphasis on scientific education and training, and to facilitate the transfer and assimilation of technology and know-how (Marquardt, M., 2003).

At the same time, there are others who warn of attempts to increase the number of formal qualifications needed by the workforce. Wolf (2002, 2004) finds that increasing skill levels does not necessarily result in increased productivity, competitive advantage, or growth. Similarly, Keep and Mayhew (2009) state that wholesale up-skilling may

result in an over-supply of skilled workers (UKCES, 2009). And while rising educational attainment during the 20th century was one of the drivers of productivity growth, this situation slowed considerably after 1980. Also, the cost-benefit of attending college for the individual and for society has changed as the demand for different skills increases while the cost of traditional 4-year degree continues to climb. Student indebtedness may be harmful in that it begets a lower rate of new business formation and delays household formation (Gordon, 2018).

As discussed above, the impact of the knowledge economy as a driver for economic growth may have a differential impact on various economic and population sectors. As such, policymakers need to consider the differential impact of the knowledge economy within and between countries in order to develop better programs to support those being left behind while simultaneously reforming the education system to prepare the labor force for the new economy.

Labor Factors in Health Care Globalization

Health related occupations play a significant role in the global study of a knowledge economy. Questions regarding the adequacy of skilled labor for growing populations need to be addressed. For example, in developing economies there may be public expectations for improved health care. Changes in population demographics may also lead to a greater need for health care. Meanwhile there may be concerns with respect to the accessibility of health care in terms of equity and cost.

Many of these issues also appear in advanced economies. Equality of access to health care, cost of services, and responsibility for cost have become important in public

policy. As important as health care may be in global policy, there have been few studies that look at these issues from a more holistic perspective. Health care economics generally has been discussed separately in the economics discipline. This makes the impact of the knowledge economy upon health care an important global policy issue. Hwang and Christensen point out that while innovation has brought affordability and convenience to customers in many industries, that of health care remains expensive and inaccessible to many people. They attribute this situation to a health care model that operates differently from other industries. In part this may be due to the fact that a business-model innovation is not present in health care. It is therefore of research interest to understand how health care manpower, education and training are being affected by changes in technology in the knowledge economy. (Hwang & Christensen, 2008).

Looking at the health care industry in different countries may provide an indication of how jobs are affected by the transition to the global knowledge economy. Personal stories provide a viewpoint of those going through the changes. There may be indicators of technology displacing people. There will be insights on the role of government policy and of market factors upon the labor force. The labor force make-up, including the impact of population movement may impact the job supply. Education and training are perhaps a major factor in the labor supply. There may be other factors that play into the role of technology and jobs.

There are indications of general health care labor shortages throughout the world. With this it becomes important to understand why, and to look for policy implications. A labor shortage spills into the education sector with a shortage of

instructors. The implications are large with changing world demographics. Globalization plays a role through education, spread of technology, and into global migration tendencies. Walter-Roberts looks at this in calling for a global political economy (GPE) perspective to understand how these are all linked. The conclusion reached in the Walter-Roberts study is that this global orientation of education systems is “increasingly central to comprehending the place of health workers in the global and Asian rise in migration.” (Pinar, 2015, p.1859). The call is then to recognize different content-delivery techniques. It is also to look at outcomes based not on just knowledge from education, but on performance improvement. Goodman reinforces this call for education and training changes while adding an observation that health care students of today do not receive adequate training in the use of technology (Goodman, 2010).

In keeping with the trend seen in other occupations, there is a call to train health care professionals in areas for occupational flexibility. An ability to change occupations becomes an economic asset. As well, there are those advocating educational skills for health care professionals in entrepreneurship, something that has not heretofore been considered. Salminen, et. al. (2014) cite studies which identify a number of obstacles which in turn create a lack of competence in entrepreneurship amongst nurses.

If there are shortcomings in the traditional health care education through university settings, the market would normally create other options for the demand of workers with higher or more relevant skill sets. Education and training will change because it must change to address needs in the new economy. As in other areas where status quo resists change, it is suspected the medical community and the present education systems which have operated under a financially stable model, a model that

has served the health care system for a long period of time, will find themselves under increasing pressure to change. The research elaborated in this paper intends to fill the gap in understanding the health care labor market and public policy associated with it.

Globalization, Innovation, and the New Economy: A Case Study in Health Care from Three Different National Sites

As discussed above, a number of people postulate that we are living in a period referred to as Globalization Phase 4 or the New Globalization.

To better understand the impact of the new economy on economic growth, job creation, uneven employment rates, and labor worker skill mismatches, this study will focus exclusively on the health care field in India, Poland, and the United States. This study will investigate the impact of the knowledge economy and its effects on the creation and elimination of jobs alongside any resulting labor shortages and an excess of labor supply. The findings from this case study will provide insights of the impact of globalization and the new economy in three different parts of the world in the health care sector. It may also inform policymakers in ways for preparing its populations for these economic changes, at least with respect to health care.

While all three case studies are considered democratic political systems and free market economic systems, there may be significant differences in the way these systems operate along with differences in the way training and education take place. There may also be differences in government attitudes towards occupational change, labor skill mismatches, and priorities in their health care systems. Findings from this

study may be useful to government officials in the design of their economic, educational, and health policies.

As mentioned above, the knowledge economy may have skilled labor shortages at the same time in which there is excess labor supply. There are predictions of machines and technology replacing many of today's jobs, creating less demand for workers and a greater income disparity in society. Yet debate has centered on whether the labor shortage truly exists, whether it is just regional, and if it does exist if it is long term. There has been a shortage of research into the underlying explanation, or the understanding, of a global impact that technology has upon jobs. Findings from this research may provide policy insights for decisionmakers in education and skill training, resources devoted to adjusting to growing employment sectors, and means of addressing concerns of those being left behind and thus more likely to create social problems. To conduct this study, the author will rely on three types of data collection for analysis, that of (1) government/other national and international data sets; (2) surveys; and (3) personal interviews.

Chapter 2 provides a literature review of present global labor patterns, both generally and then more specific to the health care industry. The review focuses on the three case study countries of Poland, India, and the U.S. It sets the stage for a study of labor patterns in the health care sector examining differences and similarities in these countries.

Chapter 2 Literature Review

This chapter will include a literature review on key topics to research regarding the Knowledge Economy towards work (health care occupations) and the relationship of public policy in the same area. The review is parallel to sections in Chapter I and leads to the research questions being tested.

The first section, Globalization, reviews literature in the current economic wave and interest in how public policy addresses disruptions in the labor market. This section identifies the debate on work itself. Does it make any difference if jobs disappear? How important is the issue of jobs and work?

Section Global Knowledge Economy and Disruption will review other research on economic growth and jobs with a focus on technology disruption. It notes diametrically opposing viewpoints on the future of work as well as conflicting research on the impact of technology upon productivity. All of this is important because it points out the relevance of a potential gap, or an imbalance between workers and jobs.

Section Education reviews education as a major factor effecting a possible worker gap in the present economy. Present public policy to spur economic growth, to address economic disparity, and to address social issues is often directed towards the education component.

The section on Labor Supply/Demand looks at other labor factors and how they may impact jobs. This section will cite other academic work on potential labor factors in the economy. It will provide a base understanding of global implications of these factors.

Globalization

Globalization in present economy

The World Economic Forum of 2016, a gathering of global leaders in Davos, Switzerland, focused on globalization during the 4th Wave economy. The basic premise was that the global economy, jobs, and society are being transformed in this economic period (World Economic Forum, 2018). Chapter 1 discussed the meaning of globalization as influenced by technology, leaving unresolved the impact of globalization on local policy, and how policy can impact workforce changes. These factors become important in understanding a possible work gap created by an imbalance of workers and available jobs in the labor market.

Maxim and Muro (2019) took the policy issue to a deeper level by suggesting that technology should not be the key. They pointed out that there is not a problem because of a new phenomenon or because the pace of technological change may be getting faster. “Instead, automation is a problem because our policy infrastructure is no longer equipped to handle significant, economy-wide workforce transitions that result from these displacements” (par.3). They did note that automation isn’t the only trend affecting workers, but this is no reason to ignore the threat.

The transition due to job displacement may look different for various jobs, and thus policy may reflect an attempt to address specific labor market gap disparities. That the issue of work and jobs in society is of high concern to decision makers becomes evident. The importance and the need for research is very important in the healthcare sector as pointed out by McKinsey consulting firm leaders. In a podcast they state

> To organize healthcare is one of the hottest political issues of our time. Every country is struggling to find the right balance between social provision and market forces, to find the optimal number of payers and providers, and to figure out how all the different pieces should fit together. Stepping back, we see that health systems in every country, at least in developed economies, face common challenges. Populations are aging, the burden of disease is shifting from infectious diseases to long-term chronic conditions, and then there's the onward march of technology. Not only the eye-catching clinical technologies but also information technology that could make health systems orders of magnitude more efficient… (McKinsey podcast, October 2019).

The Importance of Jobs and Work

Work is considered a basic human issue. It often defines a person, is needed for society to function, and for a person to survive, and provides a social connection (Blustein, 2006; Budd, 2011; Juntunen, 2006; Richardson 1993, 2012). Lack of meaningful work is a problem because it may lead to lower satisfaction, higher mental depression, and potential marital, family, and social relationship issues (Swanson, 2012; Feldman, 1996; Swanson & Fouad, 2014). From the business perspective it becomes a drag on growth. From a societal perspective there is a less satisfied population with accompanying compounding problems, an underutilization of human resources and a lower economic growth rate. Wars and civil disruptions have been found to be directly related to lack of work opportunity (Clifton, 2011; Sachs, 2005; Blustein, 2013, p.3).

Frank Parsons stated the importance of studying work when writing “no step-in life, unless it be the choice of a husband or wife, is more important than the choice of a vocation” (Parsons, 1909, p.3). The author and pioneer in career counseling used the importance of work to cite the need for an appropriate match between a person and their work, which leads to personal well-being and ultimately economic development linked to a satisfying job.

Jobs, or work, are in the foundation of modern psychology. The father of modern psychology, Sigmund Freud, was said to have equated mental health with the capacity to love and to *work* (Lent and Brown, 2013). Abraham Maslow (1943) devised the Maslow hierarchy which remains a pillar in psychological study to this day. The hierarchy is a testament to the value placed on work. And while there have been criticisms of the Maslow hierarchy (Wahba & Bridwell, 1973; Wahba & Bridwell, 1976) work research outside the Maslow hierarchy indicates that even if work where to be questionable in its centrality to well-being, it does have at least a strong influence upon human well-being.

The absence of appropriate work opportunity shows up in ways that deeply impact public policy. The economic turmoil in European countries, for instance, has created an increase on the rate of depression, divorce, etc. (Iravani, et. al., 2012). An unstable market influences other domain of life. In this view, unemployment and low wage work are a link between the economic and social domain. Marie Constantinescu (2015) noted in a paper for the Journal of Defense Resources that “Even in developed countries these two phenomena create big tensions which are exported to the entire world “(p.1). Her paper emphasized “the link among unemployment, low wage work

and national security taking into consideration the challenges of economic globalization, deregulation and technological change" (p.1).

A study of the economic crisis in the 1980's pointed out that most Asian countries were not prepared for changes in the job market. "The predictable result is social and political turmoil - of the sort that can bring down regimes and has already led to changes in government in Thailand, Indonesia, South Korea, Japan and the Philippines. (Hill, 1999, p.25). Mark Viso, CEO of the international nonprofit Pact, reflected on global adjustment to the Knowledge Economy stating, "We're missing how the emergence and convergence of these technologies affect our work," (Cheney, 2018, par.5).

There are studies of what may happen to jobs due to technology. The continuing thread now running through research on human need of work for well-being is fear that robots and Artificial Intelligence (AI) will take jobs and throw millions of people into poverty. A Pew Research Center study asked 1,896 experts about the impact of emerging technologies and found "half of these experts (48 percent) envision a future in which robots and digital agents [will] have displaced significant numbers of both blue- and white-collar workers—with many expressing concerns that this will lead to vast increases in income inequality, masses of people who are effectively unemployable, and breakdowns in the social order" (Smith & Anderson, 2014, p.2).

These fears have been echoed by detailed analyses showing anywhere from a 14 to 54 percent automation impact on jobs. For example, an analysis of European jobs found that "54% of EU jobs [are] at risk of computerization." Using European data, job losses are likely to be significant and people should prepare for large-scale disruption (Bowles, 2014, headline). U.S. data provided a similar conclusion. Oxford

University researchers Carl Frey and Michael Osborne (2013) claim that technology will transform many sectors of life. They found around 47 percent of U.S. workers have a high probability of seeing their jobs automated over the next 20 years.

A McKinsey Global Institute study of 750 jobs found that “45% of paid activities could be automated using ‘currently demonstrated technologies’ and . . . 60% of occupations could have 30% or more of their processes automated” (Chui, et. al., 2015, par.4). Another McKinsey report, “Jobs Lost, Jobs Gained,” found that 30 percent of “work activities” could be automated by 2030 and up to 375 million workers worldwide could be affected by emerging technologies (Manyika,et al, 2017, as cited in West, 2018).

Whether jobs are lost or gained, it is clear there will be significant workplace disruption. Darrell West (2018) from the Brookings Institute has done extensive research in this area. He believes if the employment impact just falls in the 38 percent mean of the forecasts, Western democracies could turn to authoritarianism to maintain social order, and that even in the U.S. the wealthy elites would need to have security guards and gated communities for protection similar to poor countries with high inequality. An International Labor office paper predicts the U.S. would devolve to social violence such as in countries like Syria and Iraq. In these areas of high unemployment, income disparity, and little hope for young men they turn to violence for survival.

As discussed above, much has been written on the importance of work to the well-being of people and society. Presently, the mere existence of work is being challenged in the knowledge economy. Andy Beckett (2018) writes that “Work has ruled our lives for centuries, and it does so today more than ever.” Recognizing the

current changes, he goes on to say, “But a new generation of thinkers insists there is an alternative” (par.1).

Among those who challenge the present work culture, James Livingston (2016) proposes that man and machine have approached equal value, and machine is winning. He believes that this indicates we are now at the end of the capitalism era. Elizabeth Anderson (2017) philosophizes that the present work system is far removed from the intent of the ideals of a free market.

Business journals have picked up on the work crisis. Ryan Avent (2016), a columnist with the Economist magazine, wrote that automation would create tremendous political change leading into a new type of social system. Work has become a central piece in the modern world. For most people, it is impossible to imagine society without it. It dominates and pervades everyday life. Yet as a means of livelihood “work is now insufficient for whole social classes” (Becket, 2018, par.4).

Work, according to Hunnicutt, is failing to provide the needed self-worth. It is no longer a source of social mobility. And this failure is growing to groups that used to rely on work to move ahead, specifically those that have become the most educated. In 2017, half of recent UK graduates were officially classified as “working in a non-graduate role”. In the US, “belief in work is crumbling among people in their 20s and 30s”, according to Hunnicutt. “They are not looking to their job for satisfaction or social advancement.” (Hunnicutt, as cited in Beckett, 2018, par. 5)

Keynes (1930) wrote a futuristic paper predicting advances in technology would lead to an “age of leisure and abundance” (par.21), and people would have a 15-hour work week, or 3-hour shifts at work. French social and economic theorist André Gorz

(1997) declared: “The abolition of work is a process already underway and likely to accelerate. The manner in which [it] is to be managed … constitutes the central political issue of the coming decades” (pgs.3-4).

Since the early 2010s, the crisis of work has become increasingly noticed in the US and the UK. Those involved in counter- establishment movements such as David Graeber in his book Bullshit Jobs: A Theory discuss sectors that he referred to as basically make-work. The occupations include newer industries such as financial services and telemarketing, and the expansion of sectors like corporate law, academic and health administration, human resources and public relations (Graber 2018; Beckett, 2018). A whole new anti-work movement has taken shape (Beckett, 2018).

Graeber, Hester, Srnicek, Hunnicutt, Fleming and others are part of a larger network of those who believe there will be a markedly different future for economies and societies. They call this future “post-work” (Beckett, 2018). These post-workists believe the change is reality. “Either automation or the environment, or both, will force the way society thinks about work to change,” David Frayne says in his 2015 book The Refusal of Work “So, are we the utopians? Or are the utopians the people who think work is going to carry on as it is?” (Frayne, 2015; as cited in Beckett, 2018, par. 20; also see Frayne, 2016).

The challenge in addressing this change, according to economist Brian Arthur (2017) “will not be an economic one but a political one” (Subtitle Realities…, par. 6). It is how the spoils of technology will be distributed that will provide answers. Thus, the crucial importance of research in this paper will be in providing practical application to public policy. As noted in the literature review, there are differing viewpoints, but most

point to social turmoil and political unrest unless policy adequately addresses issues such as hopelessness and inequality that seem to be growing in the present economic period. “History suggests that concentration of wealth in too few hands leads to social pressures that will either be addressed through politics or violence or both (Wolcott, 2018, par. 3).

If technology is going to benefit society, if it does increase productivity, what will be the future role of work? Or as it was put by Robert Wolcott (2018) “When technology can do nearly anything, what should I do, and why” (par. 4).

Particularly since the Industrial Revolution, technology has transitioned a widening portion of humanity away from the production of life essentials and into more consumer goods, and now into entertainment items. While there are many in the world still trying to survive each day, that number is shrinking. As Artificial Intelligence and robotic systems become far more capable and committed, work will increasingly develop, perhaps achieving what Keynes (1930) described as *technological unemployment*, in which technology replaces human labor faster than we discover new jobs. Keynes predicted this would only be “a temporary phase of maladjustment” (par.15), and that within a century, humankind might overcome its fundamental economic challenge and be freed from the necessity of working to survive.

This is an immensely hopeful vision, but also a winding, perilous path. Keynes cautioned, “If the economic problem is solved, mankind will be deprived of its traditional purpose… Yet there is no country and no people, I think, who can look forward to the age of leisure and of abundance without a dread” (par. 21).

With trepidation, Keynes wondered how people would focus their attentions, interests and fears when absolved from making a living. As we depart from traditional pursuits, what will replace them, and how do we get there? How will we define our own sense of purpose, meaning, and value?

The research in this paper necessarily includes these questions. It is the only manner in which policy makers can devise effective and humanly sensitive decisions in a cold, technology driven change of life.

Historian and philosopher, Hannah Arendt, in The Human Condition (2013), describes three levels of human condition. Labor generates the necessities such as food that sustain human life. Work creates the physical attributes of the world, including infrastructure, homes, goods, works of art. And Action is the communicative activities between humans. In Action we express our distinctiveness as humans.

We may be entering a stage in which technology is becoming more dominant in labor and work, allowing humans to focus more on expressing distinctiveness (Wolcott, 2018).

The Great Recession was an excuse for difficult transitions. But many of those left behind have failed to recover. Even worse, there seems to be less hope for those left behind. The escape valve of frustration may be a venting against globalization, or against outsiders, but the most important force shaping the labor market and income inequality is technological change. The economic transition towards a knowledge economy will spread towards other countries (Hu & Spence, 2017). The information technology industry is more widespread globally and in impact upon occupations. It cannot be defined by a single company or a single sector in the global economy.

(Altieri, et al; from Department of Commerce, 2002, Ch.3). There is no resolution in the economics field over which industries ought to be considered as knowledge intensive, and then how much they contribute to growth in productivity (Brynjolfsson & Hitt, 2000; Gordon, 2000). Despite the importance of these issues, the number of new types of jobs and their relationship to technology and the knowledge economy is not clear and is subject to on-going debate (Kochan & Barley 1999; Powell & Snellman, 2004).

Improvement in living standards over time is not inevitable or automatic. It will likely be influenced by public policy decisions. Some call for large investments, and possible institutional reform. Others look at specific issues identified above such as business start-ups, innovation, inequality, and education, and offer recommendations (Shambaugh, et. al., 2017; Hu & Spence, 2017; Dervis, 2017; Das, 2015).

While the call is for greater understanding of policy on what technology is doing to the labor market, there is wide diversity on the direction the market is now going. This leads to a review of labor supply research in the following section.

The Global Knowledge Economy and Disruption: Economic growth and Jobs

Literature review has generally concurred on the importance of work in society, and the effect work has upon public policy, while questioning the future of work. In this section we find a large difference in research in the actual impact of technology upon jobs, or even in the future of work in the Knowledge Economy. The area of agreement appears to be in the need for more research on public policy towards work.

Labor Supply and Labor Shortage

There are two predominant strains of literature on the future of work in the knowledge economy, a dearth of jobs, or a shortage of workers. In the extreme, either of these two would be suggesting an imbalance – a large gap – between those not working and a growing economy in need of employees.

A central proposition of this research is that there is a labor shortage in specific occupations during a period in which there is a significant unutilized labor pool. It is therefore important to establish what is meant by labor supply or shortage. This is more difficult in that there is no universally agreed upon definition of labor shortage. "It sometimes refers to a shortfall in the total number of individuals in the labor force and sometimes denotes the possible mismatch between workers and jobs in the economy." (Barnow, et. al., 2013, p. 4). Barnow uses the definition of labor shortage as "a sustained market disequilibrium condition where the amount of labor that workers are willing to supply is less than employers are willing to buy at the prevailing wage" (p. 4).

While this is an acceptable definition, it neglects to define "sustained" market disequilibrium. This point is important in looking at both migratory patterns, and training programs, particularly in this paper as government and private sector policy may address what would have been a sustained disequilibrium. Further, while the authors recognized that a market economy can better adjust to address disequilibrium, there is often both a lag, and a lack of information to the target labor pool in a market economy.

Blank and Stigler (1957) more simply defined a labor shortage as occurring when "the number of workers available increases less rapidly than the number demanded at the salaries paid in the recent past" (p. 24). Arrow and Capron (1959) used time in their

explanation of existing labor shortages with the definition that “a steady upward shift in the demand curve over a period of time will produce a shortage” (p. 301). Harrington and Sum (2010) critique the “Rate of return model” based on rate of return to alternative occupations would then be occupations with shortages are defined as those with higher-than-average rates of return. Harrington and Sum find issues with this model of labor shortages as it relies on historical data and gives a misleading picture.

Butz et al. (2003) provide five possible meanings, deriving from the cause of an occupational shortage: 1. production is lower than in the recent past; 2. competitors’ share of total production is growing; 3. production is lower than what people doing the producing would like; 4. less is produced than the nation is deemed to need; and 5. production is not meeting market demand, as indicated by a rising price.

Barnow, Trutko and Schede (Barnow, et al., 2013) discuss what are often cited as labor shortages in the U.S. Specifically named are demographics, skill gaps, and shortages for specific occupations. There can be labor shortages in areas considered to be of higher social value than market value. Health care, under study in this paper, could be considered as social demand.

Barnow (2013) wrote that there is no real way to objectively determine the optimal number of workers in some professions. In sum,” labor markets do not always operate smoothly with supply and demand being equal at a given time” (pg.11). In other words, economic theory is created for a perfect market. This perfect market may not exist. Or perhaps the Knowledge Economy has created a different market economy in practice from historical patterns from which theory has derived.

The result of employer-employee transactions in the labor market is, of course, the placement of people in jobs at certain rates of pay. This allocation of labor serves not only the personal needs of individuals but the needs of the larger society as well. Through the labor market, our most important national resource – labor – is allocated to firms, industries, occupations and regions (Ehrenberg & Smith, 2016).

It will satisfy this work to know that "Shortages occur in a market economy when the demand for workers for a particular occupation is greater than the supply of workers who are qualified, available, and willing to do that job" (Veneri, 1999, p. 15). Veneri also identifies shortcomings of the definition noting that the term of labor shortage describes a variety of situations, some of which economists do not usually consider as actual shortages. The Veneri definition meets our needs as it encompasses policy implications included in this paper, though we also consider an imbalance gap to exist, a "shortage" to occur, if there are too many workers and not enough jobs, and a shortage would be if a person is capable of doing the job. Specifically, this paper will look at the possibility that many available workers and open jobs exist simultaneously.

Measuring Employment and Labor Supply

Literature indicates a decline in labor's share of national income in specific countries. Such research shows the labor share decline becoming apparent in the early 2000's. (Elsby, et al., 2013; Karabarbounis & Neiman, 2013). The reduced pricing of investment goods due to information and technology and the computer age – the lower cost of machinery versus that of labor – has incented companies to move from labor to capital. The lower price of investment goods explains roughly half of the observed decline in the labor share, even considering other factors such as increasing profits,

capital-augmenting technology growth, and the changing skill composition of the labor force. Karabarbounis and Neiman (2014) argue that labor's falling share is due to a steep drop in the quality-adjusted equipment prices of Information and Communication Technologies (ICT) relative to labor (also see Karabarbounis & Neiman, 2013; Autor & Salomons, 2017).

Labor markets haven't kept up with rapid changes in workplace requirements, and machinery has been able to complete human tasks at a lower cost and higher efficiency. Millions of people cannot find work "even as sectors from technology to healthcare struggle to fill open positions" (Mainyika, et al., par.1). There are hundreds of millions of people around the world who are unemployed and discouraged.

Underemployment or unemployment now potentially reaches 30-45 percent of the working-age population. The McKinsey Global Institute (Mainyika, et al., 2015) reported that demand for high-skill labor is growing faster than supply, and demand for low-skill labor remains weak. McKinsey also points to growing income inequality and stagnating wages. It predicts the problem will grow and spread to China and other developing economies even as the world labor force grows. Based on current trends the global economy will include: 38-50 million fewer workers with college or postgraduate degrees than the economy will need; a shortage of 45 million workers with secondary education in developing economies; and 90-95 million more low-skill workers than employers will need, an 11 percent oversupply of such workers (Dobbs, et al., 2012). At the same time the use of technology will continue to grow with declining computing costs, and expansion of computer related skills (Autor & Dorn, 2013).

A key indicator of the labor market for policy makers would be more accurately reflected through other statistics. While most media attention – and political attention – is directed at the unemployment rate, this paper will utilize the number of working age people that are employed as a more valid indicator of economic health. Unemployment figures provided by governments do not provide a standard measurement between countries. They can more easily be manipulated for political reasons, and they reflect only those measured as in the government system actively seeking work within a specified time period.

As a better indicator of potentially disenfranchised citizens, this paper refers to the labor force participation rate among those of prime working age. This rate has not fully recovered since the Great Depression. Americans between 25 and 54 increased 0.6 percentage points in the one-year period November 2015 to November 2016, reaching 81.4 percent. Put another way, there would be unemployment of 18.6 of the working age population in America while there are shortages of labor in certain occupations. While many of those that have dropped out of the labor market include populations with barriers like ex-offenders, those with disabilities, and those in nontraditional occupations. This certainly includes a sizeable educable or trainable population. Furthermore, it appears to be a long-range trend. The President's Council of Economic Advisors notes that most of the participation decline since 2007 has been concentrated among men, with other rich countries having experienced a similar trend. These numbers translate to about 7 million American men outside of the employment system, added to another 2 million looking for work but not able to find it. That is about 15% of working age men, compared to numbers of about 5 percent of eligible men

unemployed 50 years ago. Men outside of the workforce in the 1960's comprised 2.7% of the prime working age group. In November 2016 the number was 11.5% (Burtless, 2016; Wessel, 2016; Zumbrun, 2016).

Abraham and Kearney (2018) found the same age group to be driving the non-working population numbers. They found that the 4.5% decline of employment-to-population ration between 1999 and 2016 occurs mostly within the 16-54-year-old age group. This accounts for 80% of the decline in eligible workforce percentage actually working. They directly attributed increased trade and advances in technology as the most important drivers for the decline.

The labor force participation rate has been falling steadily since 1999. Economists find it a disturbing trend as the statistic is an indicator of household living standards and economic vitality. In 2016 over one-third (37.2 percent) of U.S. adults were not even in the workforce (Schanzenback, et al., 2017).

It is a trend found in other countries. Research showed UK unemployment as three times higher than the official count (Sheffield Hallam University, 2017). The International Monetary Fund reported that several advanced economies had higher post-crisis rates of involuntary part-time employment and temporary employment demonstrating the official unemployment rate is not as good a measure of slack as it used to be (Bodewig & Ridao-Cano, 2018).

The studies cited provide urgency towards public policy response if this dissertation research indeed finds perceptions of occupation labor shortages concurrent with a large unutilized and available labor supply.

The true policy implications of the sizable numbers outside of the workforce are magnified when combined with the accompanying wage stagnation of those still working. Bell and Blanchflower (2018) attribute the slow wage growth to the growth of underemployment. They reported that the unemployment rate does not provide a true picture, that those working part-time would prefer to be full time, and that overall workers want to increase their number of employment hours.

Varying Research Conclusions

As noted from literature, there are varying studies and explanations for a technology impact upon the economy, and upon jobs in the knowledge economy. A constant in considering the technology impact is that economic growth is desirable and should be one of the eventual outcomes from technology. "Economic growth stems from two main sources: putting more people to work or enabling workers to operate more efficiently (i.e., better productivity)" (Working hard for the money, 2016, par. 1). So how do we account for a reduced productivity, and an increase of potential workers getting left out of the workplace?

Byrnjolfsson, Rock and Syverson (2017) note official statistics indicate a slowing productivity rate over the past decade. They argued that the numbers are reflecting a process using examples of historical innovation and productivity trends. They also shared the viewpoint with others that there is an increase in new jobs that have not yet been identified, that building the stock of new technology to a sufficient size to have an aggregate effect and discovering, developing, and implementing the complementary innovations necessary to obtain the full benefit of the AI will take substantial time (p. 10).

Slower productivity with technology is explained by Baily and Montalbano (2016) as being due to a lag of managers and workers assimilating and working with the knowledge provided by information technology.

Studies that show the employment rate has not recovered from the Great Recession of 2009 use that as a sign of changes due to the knowledge economy. Others have suggested that the recession was the reason that low employment took so long time to recover. Danny Yagan of the University of California-Berkeley found that the greater the depth of the recession in a community, the lower the rate of employment among working-age people in 2015. The conclusion is that the Great recession can account for 76 percent of the decline in working-age employment in the years between 2007 and 2015 (Holzer & Baum, 2017).

Despite research in some countries cited earlier, the decline in US. Labor force participation ages 25 to 54 may not be occurring in all other industrialized countries. A U.S. Federal Reserve economic letter shows a divergence in numbers between the U.S. and Canada. The researchers found that U.S. prime-age workers have steadily withdrawn from the labor force, while labor force participation in Canada has gradually increased. These divergent trends have resulted in a substantial difference in the share of prime-age workers working or looking for work in the two countries. In 2017, 87% of prime-age workers in Canada participated in the labor market, compared with 81.7% in the United States, a 5.3 percentage point gap (Daly, et al., 2018). This difference, and that in case studies in this paper, will be looked at in terms of policy factors.

There can also be a different take on what technology is doing in terms of human well-being versus the economic numbers we use in most reports. One can argue that

technology has enhanced daily living from unmeasurable devices such as mobile access to the internet, GPS systems, transportation, and elsewhere. This would be implying that economic measurements are being outdated. As Feldstein (2017) points out, most households' take-home cash has been rising very slowly for decades. Their standard of living is increasing more rapidly because those wages can now buy new and better products at little or no extra cost. The government's measure of real incomes gives too little weight to this increase in what take-home pay can buy.

Inequality also has a counter viewpoint. Costs of business have come down and market barriers have been lowered. Digital platforms for transportation such as Uber, retail such as Amazon and now Walmart, hotels with Airbnb have lowered barriers to those who are self-employed and have created pricing competition for established businesses. This has been to the benefit of the less skilled workers (Dervis & Chandy, 2016). Piketty may have been driving the inequality argument, but this paper is intended to carry the results over to public policy. Even economists with left of center viewpoints will point out discrepancies in the Piketty research. Heather Boushey, J. Bradford DeLong, and Marshall Steinbaum—have responded to Piketty's work. They critique assumptions underlying Piketty's predictions, historical accounts of the role of slavery and gender in capitalist systems, and considerations of the relationship between concentrated wealth and political power. They conclude Piketty's arguments have omissions that call into question his book's most dire predictions (Kearney, 2017).

Technology is rarely a complete bane or blessing. The printing press created new work for the wood engravers in Augsburg, but they quickly discovered that jobs had become much more repetitive. Similar trade-offs are likely in the future (Artificial

intelligence will create new kinds of work, 2017). It is incumbent to better understand the changes, or, as Kearny (2017, p.133) wrote in a book review "Policymakers would be able to make better decisions about "soaking the rich" if they had a clearer sense of the tradeoffs involved." The Economist Magazine (Nov. 30, 2019, pg. 13) referred to this common belief of growing disparity in the Knowledge Economy in a cover story on "Inequality Illusions." In short, they wrote that "some economists have re-crunched the numbers and concluded that the income share of the top 1% in America may have been little changed since as long ago as 1960" as well as mishandling or neglecting other information.

Education

The single greatest factor limiting employment opportunities for people is lacking a college degree or some other type of postsecondary education. The U.S. Bureau of Labor Statistics show that all net new jobs created over the last decade can be attributed to Americans with a college degree. On the other hand, employment has fallen by 2,995,000 for those with a high school degree or less (Shapiro, 2018). As such, many individuals are pursuing a college education in order to reap its financial benefit. Nevertheless, overall completion rates remain low for a segment of the population (Holzer & Baum, 2017). In addition, many students that do complete degrees do so in areas that have low demand or low compensation (West & Allen, 2018).

> The relationship between education, employment, and job skills is complex: For one thing, while employers complain a great deal about their inability to recruit and retain skilled workers, their willingness to train workers has been weak and declining over time. When talent was in

> shorter supply, as it is now, developing people became a greater concern – and organizations had to find new ways of meeting that need (Cappelli & Travis, 2016, par. 9).

There are sometimes good reasons for this (Holzer, 2016). Currently, tight labor markets are beginning to raise training and pay rates, though they are still too slow to make up for a decades-long stagnation or declines experienced by non-college educated workers (West & Allen, 2018).

The worker training may not only be slow, it may also be underfunded or even realizing a reduction in investment. "Our spending on active labor market policies (i.e., retraining and job matching) are at an all-time low relative to the size of the economy" (Maxim & Muro, Aug.21, 2019, par. 5). The importance of this has surfaced in public policy debate, notably in Democrat Presidential Debates (Maxim & Muro, 2019, par. 1). A Brookings Institute study elaborated on the need for a training focus with recommendations for a "constant learning mindset" which included greater investment in reskilling workers, making training more affordable, and expanding certification programming. (Muro, et. al., 2019, p. 8; Maxim & Muro, Feb. 25, 2019).

The global issue was made a priority for the first time by the Group of Twenty (G20), an organization comprised by the world's leading economies. This organization held a forum in late 2018 specifically to collaborate on the use of education in the "transformation nations are experiencing due to globalization, digitalization, and more and complex and diverse societies" (Education Diplomacy Takes Center-Stage Among the World's Leading Economies, Page 73). The G20 conclusion cited the need to better educate children, young people, and adults for the technology economy throughout the

world, and called for increased investment directed at the tie-in between education and employment.

Others have pointed out global changes in the innovation economy that count on education taking place in an internet fashion. Watkins (2019) pointed out that sources such as You Tube, Kickstarter and other social media are allowing people to create start-up business and new jobs due to technology.

Literature from Poland, India, and the U.S. found an important role of education towards health care in each country. Poland, for example, has gone through a restructuring of health education in the nursing occupations, adjusting to having a uniform standard of curriculum and tying these standards to those of the European Union (Sztembis, 2006). Similar changes came about in other areas of medical occupations (Janczukowicz, 2013).

In India "it becomes mandatory to integrate medical education with health-care delivery systems in the country" (Negandhi, et. al.,2012, p. 12). Here, as elsewhere, the moot question in looking at supply of health service workers is to who produces these workers.

> Traditionally, in India, medical colleges were the hubs for creating the public health professionals. The last two decades saw a sea change in the way public health professionals are trained in the country. There is a conscious shift toward the creation of public health schools outside the corridors of medical colleges, thereby opening the doors for nonmedical personnel to acquire academic competencies in public health disciplines. These new institutions reflect a change in the way public health

> professionals in India will be produced and lead India in the 21st century. However, there is inadequate information detailing the origin, evolution, and the current status of public health education in India (Negandhi, et. al., 2012, p. 12).

As health education evolves in India, there are calls for integrating medical education with the health-care delivery system for competency-based learning (Lal, 2018).

In the United States health care occupations in the technology economy are resulting in calls for adjusting the education for providers to include programs teaching soft skills such as instilling trust between patient and provider – something that has declined in the past 10 years. "This could include the admissions and selection system for medical school and residency; assessment, promotions, and remediation systems; supervision and feedback in the clinical environment; patient safety, communications, and quality improvement; or continuing professional development and maintenance of certification" (Sklar, 2018, p. 1749); or educating to recognize how to problem solve in communities inclusive of working with other professionals (Dow & Thibault, 2017).

While literature indicates education to be a prime factor in the knowledge economy supply of labor, and in health care labor in this economy, Annelies Goger (October 15, 2019) of the Brookings Institute finds there to be at least four major problems with focusing policy **solutions only on an academic route to opportunity:**

The college-for-all strategy isn't working for most people.

The college-for-all approach assumes that skills can only be taught in the classroom.

Focusing on a single college-prep pathway does not actually address the tracking problem. A strong vocational pathway may provide a counterbalance to college prep. But there is a confusing array of credentials, especially with the advent of online programming.

The rapid pace of technological change will require ongoing re-skilling and more agile companies and workers. The future of work is changing the structure, organization, and level of digital integration in the workplace. If the lessons from previous industrial revolutions and Schumpeterian patterns of creative destruction still hold true, some jobs will go away, many will shift in their task orientation, and new jobs will be created.

Labor Supply/Demand Factors

Migratory Patterns (global, regional, urban-rural)

There is evidence of a global market in the health care industry. It will be important to understand migratory patterns as medical practitioners and nurses migrating from developing countries may significantly impact the health delivery system in less developed, lower income regions, and at the same time serve to depress wages in more desirable locations (Stilwell, et. al., 2004). Labor shortages may be mitigated or exasperated due to migration. While shortages of skilled labor impact economic growth in developed and developing economies alike (Rutkowski, 2007), there are studies that show dislocation of employees does not translate to a quick adjustment in the labor pool across firms, industries, and regions. This is particularly the case in metro areas. Research has found that “switching costs and other frictions” hinder movement of the

labor force and create market dislocations (Muro, 2016). In effect, the supply chain of trained labor is being restricted. Restriction, of course, may be a result of public policy, and migration may still be playing a significant role in addressing labor pools in respective countries.

In the larger economic picture, solutions such as migration are unlikely to alter the present trend line (Choi, et al, 2000). There are studies that indicate that migration does not lead to economic development in the sending countries and is just a short-term solution for the recipient countries (Papadimitriou, 1991). Migration where worker out-migration has typically been a major part of labor market adjustment has not been acting in this adjustment capacity since the economic slowdown globally. In reality, few people have been migrating from mass layoff events (Muro, 2016).

Migration should also be thought of in terms of movement from rural to urban areas. This is of interest in terms of the knowledge economy, and in terms of health care. In both cases there is a growing separation of urban-rural benefits, and the larger picture shows a major migratory pattern. This leads to a heightened interest from public policy makers in most countries.

Beyond the large rural to urban migration, there appears to be a large transformation occurring between metro areas. While we're engaging in a new assessment of technology's labor market impacts, no one should leave aside tech's most physically enormous influence: its big role in reshaping a nation's urban geography. Scholars have suggested for some time that technology will have a significant impact on city make-up. Most notably, Beaudry, Doms, and Lewis (2006) showed more than a decade ago that the cities that adopted personal computers

earliest and fastest saw their relative wages increase the quickest. They also found that technology may be attracted first by low-cost labor or an available skilled labor force. This can also be evidenced by the high-profile technology headquarter and manufacturing location siting's in the U.S. (recently Amazon, Google, and Foxconn.) This serves to create a cycle of virtue where there is further skill training, thus attracting suppliers and more technology jobs (Beaudry, et. al., 2010).

Elise Giannone (2017) found that the divergence of cities' wages since 1980—after decades of convergence—reflects a mix of technology's increased rewards to highly skilled tech workers and local industry clustering (Muro, et. al., 2018; Abraham & Kearney, 2018). She tied these wage divergencies to a growing inequity which matches with similar research (Card & DiNardo 2002; Levy and Murnane, 1992; Bound and Freeman, 1992). This is an important economic measurement as noted in this paper since it directly impacts public policy.

The geographic changes translate to both economic impact and directly to policy implications. Since 2014, the 53 largest metro areas in the U.S. which comprise 56 percent of the total population have accounted for 96.4 percent of the total national population growth. They have also created two-thirds of the output growth and 73 percent of employment growth between 2010 and 2016 and since 2014 have climbed to 74%.

Smaller metropolitan areas considered fewer than 250,000 population, represent 9 percent of the U.S. population. These communities combined have contributed -6.5 percent to national growth, and employment growth of less than 5 percent of the national total. Numbers for rural areas are even worse (Abraham & Kearney, 2018).

This divergence is demonstrated as well in a study by the nonprofit Economic Innovation Group (EIG website). This study looked at disparity in U.S. communities and found that 17 percent of the U.S. population lived in highly distressed communities. The top tier comprised 27 percent of the American population. The numbers show a large growing difference in indicators including education, poverty rates, median income ratios, and mobility (change in employment and in housing).

The EIG study included employment numbers deemed important in this paper, notably that of prime age adults not working. The five-tiered ranking of communities has the top, or prosperous tier, showing 20.8% of prime age adults not working. This increased steadily to the distressed tier of communities with a staggering 41.8% of prime age adults not at work.

Ron Brownstein (2018) pointed out that the divergence is attributable to job opportunities due to digital technologies in the metro areas, whereas smaller communities are reliant on resource extraction, manufacturing and agriculture which have not grown as rapidly.

Despite this data showing a consistent social issue, there has been no clear policy to address it. There are predictions that the tension and the political dynamic will get worse with these trends (Brownstein, 2018). The roll of public policy was stressed by Muro and Whitten (2018) in that “none of us is under any illusion that more and bolder responses—from government, the private sector, and philanthropy—are anything but imperative…” And they added that “it doesn’t seem right that a great nation would leave the shape of its long-term economic geography entirely to the vagaries of today’s tech-fueled market” (par.11).

International migration shouldn't be neglected as it also plays a large role in the labor force. In the U.S. about 17% of the labor force is foreign born (Hutchins Roundup, 2018). Globally the number of migrants has tripled in the past 40 years. Almost 250 million people are working outside of their country of birth, the vast majority for economic reasons. The McKinsey Global Institute puts the migrant economic value to the world economy at an annual $67 trillion and adds that this is roughly $3 trillion more than they would have produced had they not migrated (Lund & Tyson, 2018).

Demographic Patterns (aging)

Due to a declining birthrate, some analysts are concerned that there will simply be too few workers to maintain growth in the American economy (Levitan & Gallo, 1989). This concern may not be unique to the American economy. The problem is projected to grow globally due to demographic issues. There is an aging population, a declining number of people in the workforce, and an increasing demand for specific occupations which require a trained set of employees. The demographic issue is global in nature as it is predicted there will be a "significant risk of labor shortages" to the world's advanced economies in coming years based on demographics and market trends (Coy, 2014).

The rapid trend towards digitalization has demographic implications elsewhere. Middle- aged workers tend to be in the blue-collar jobs most vulnerable to automation and robotics. Using data from 52 countries from 1993 to 2014, Acemoglu and Restrepo show that the more rapidly growing countries are faster to adjust and use robots. They find this to be true within U.S. regions as well. Further, countries with these stronger

demographic trends produce more robot-related patents and export more automation technologies (Brookings Hutchins Center blog, March 22, 2018).

Special Groups (women, disabilities, unemployable)

A target population that would be available to address labor shortages will likely include those presently unemployed. It behooves us to have a sense of this population.

The largest portion of unemployed working age is women. Women represent roughly three-quarters of many of the mid-level digital occupations such as health care, office administration, and education. Women are now ahead of men in digital skills for employment including high- and low-end jobs (Muro, et al., 2017). And while it has been noted that the overall portion of working- age people working has been in decline for decades, more recently the labor force participation rate for women has also gone into decline. It is also noted that there is a smaller but similar trend for women in the last 15 years with the share of women outside the labor force moving from a couple of percentage points to 25.3% by the end of 2016.

The U.S. Federal Reserve forecast the rates to continue to drop (Crow, 2017). The reduction of paid work for U.S. women exceeded that of other advanced nations to a point that Krause and Reeves (2018) believe getting more women into the labor market should be a higher priority than raising the male rates.

The American Community Surveys reported almost 8% of the U.S. population with work-limited disability. The same survey reports an employment rate for this group at about 2%. In a study on accuracy of these numbers, Webber and Bjelland (2015) found that disability may actually be underestimated in its impact on the labor force. They estimate that reporting a disability “lowers the probability of being in the labor force

by" at least 40 percentage points for men and at least 25 percentage points for women" (par. 6).

Economists have not agreed on why the disability employment rate does not move. In the U.S. about 70% of those with disabilities such mobility, speech, hearing, and sight are not working (Shapiro, 2000). The overlooked labor force of Disabled workers find `help wanted' signs aren't meant for them.

Poland data displays similar disproportioned unemployment of those with disabilities, along with the added increase for women with disabilities. Poland, in a 2013 released study, had the labor force participation for men with disabilities at 29.4% and women at 14.7%. At the same time the general population unemployment rate was 16.1% for men and 17.2% for women (Pawłowska-Cyprysiak & Konarska, 2013).

There is a direct correlation between poverty and disability globally. With an estimated one billion people with disabilities globally, 80% live in low and middle-income countries. A review of literature found no research on special concerns regarding women in the workforce, though an early paper did note differences in Poland from Hungary and Romania case studies which looked at welfare state benefits as factors in employment (Fodor, et. al., 2002).

In the third case country for this research, a study covering India found that those with disabilities were "substantially less likely to have engaged in work" (Mactaggart ,et al., 2018).

The female employment rate in India, like the U.S. rate, has declined from 2005 to now. The numbers are dismal and in cases are being cited as restraining economic growth. The International Monetary Fund estimated India would be 27% richer with

larger numbers of women in the workforce growth (The Times of India, par.1). The employment rate for women has dropped from 35% in 2005 to just 26% now. To put this number in perspective during a period in which the economy has doubled and the number of working-age women has increased by a quarter to 470 million, there are still fewer than 10 million women in jobs.

This paper will look at these numbers with respect to the health industry labor pool. In doing so, it is helpful to know that there may presently be a lack of employment opportunities for women in India. Mechanization has reduced employees in one of the main female occupations, that of farming. There may also be cultural barriers to tapping into this labor market.

Chapter 3 Methods

Questions to be Addressed

The central question identified but not resolved in the first two chapters pertains to the impact of technology upon jobs. Are there a high number of capable individuals not working at the same time there are shortages of labor?

This would run counter to economic theory, and to previous major economic shifts. While there have been arguments that such shortages may occur in limited areas and for limited periods of time, this paper will investigate the present economy on perceptions of such shortages, the global extent of perceptions, and whether they are perceived to be a concern throughout the world in the foreseeable future.

The work looks specifically at health care occupations. It should be noted there are other occupations that can be studied. Literature pertaining to shortages globally in the construction industry, in the agriculture industry, the airline industry, and especially in occupations related to technology have been referenced in the literature review.

General research question:

What is the adequacy of skilled worker supply in the knowledge economy?

In this information economy, or technological revolution with a changing work market, research will center on the size of a gap between a potential worker that is not working and a job that is suitable for this worker. This is depicted in diagram 1 below.

Figure 1

Labor Gap

Note. The demand/supply gap for labor

Traditional economic theory would suggest a marketplace balancing work seeker with jobs. This paper looks at an economy with a potential imbalance. In other words, idle potential workers, and a high number of available but unfilled jobs.

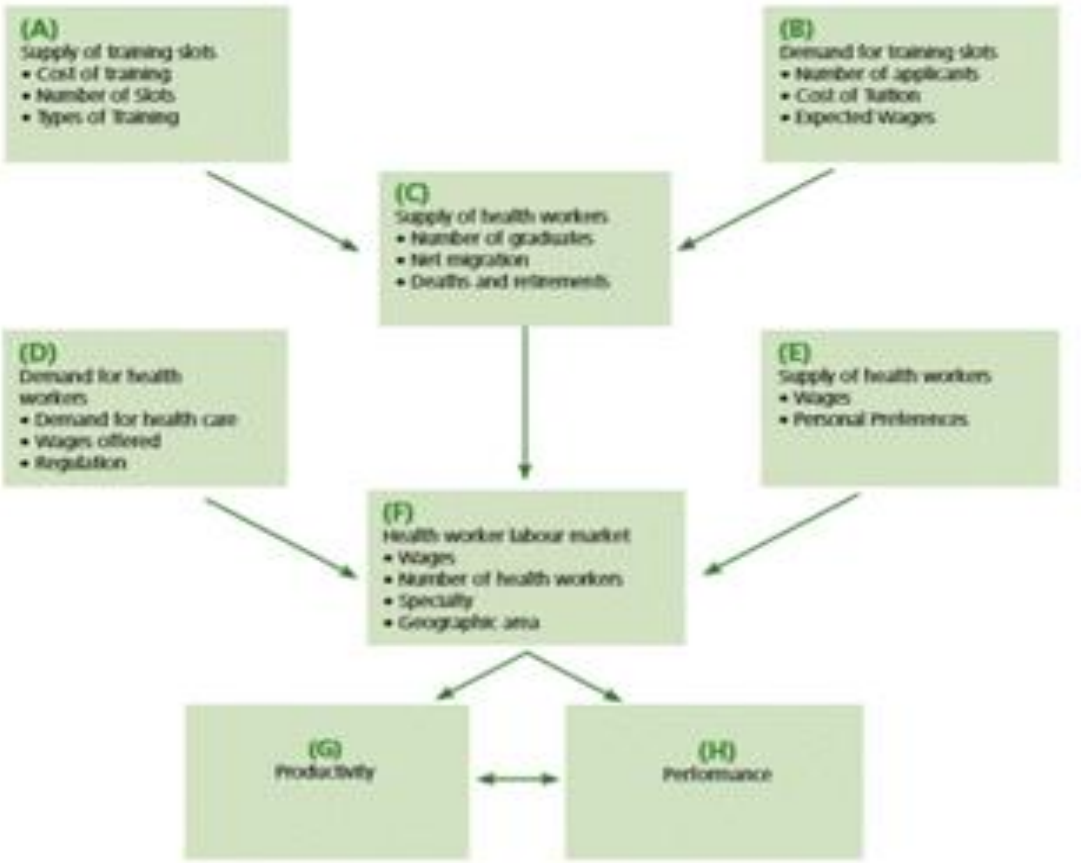
Health Worker Economic Model

A study with similar goals to this dissertation can be found in health worker labor market Diagram 2. Chapter 1 noted the economic revolution presently underway. The key interest is what happens to jobs, when factors like productivity, education, and policy decisions, impact the workforce. The basis for this has been outlined in Chapter 2 on the section of economic theory. Diagram 2 below was done for a three-country case study of health care in Thailand, Kenya, and Rwanda (Scheffler, 2012, also see Soucat, 2013). The diagram is useful in visualizing the questions to be answered in this research, specifically those related to a potential gap in the health care labor market. While covering each of the factors listed in Diagram 2 is beyond the scope of this research, it provides a schematic economic model of understanding the health worker labor market. The labor Gap cited in this paper and depicted in Diagram 1 would be found in Diagram 2 as the Health Worker Labor Market (F). Factors impacting this Box,

and the size of a Gap, are the interactions of Supply (C) and (E) with Demand (D). In particular, this study intends to gain a deeper understanding of how Demand (D) is influenced by the use of technology in the health care sector, and what that implies for the health worker labor market Gap (F).

Figure 2

Health Worker Labor Market (Scheffler, 2012).



Note. Displays input and output variables for the health worker labor market

As proposed in Chapter 1, and following literature review in Chapter 2 on the subject, this Chapter outlines a means of gaining answers and understanding to the main question through investigation of the following sub-questions:

1) *What is anticipated regarding the health occupation labor supply in the future?*
2) *How do national differences account for labor supply variations?*
3) *How do variations in the economic system of the three sites play a difference in labor supply?*
4) *What role do training and education programs have upon health labor supply?*
5) *What is the effect and projected effect of technology regarding healthcare labor supply?*

Analysis of the data from these questions can be used to suggest potential public policy or integrated technology solutions to identify gaps in surplus labor (those that are unemployed) and in the labor deficit occupations. These solutions can be suggested as support mechanisms that will allow a greater efficiency in an open market economy - for example, solutions that increase information flow and greater productivity. In order to do this, we will look at the following questions:

1) *How can technology solutions be utilized to match potential workers with occupations?*
2) *What policy considerations should administrators consider in addressing health care labor supply?*

Methods to Collect Data

Multiple methods will be used to collect data to begin to understand the main question on the adequacy of skilled worker supply in the knowledge economy along with

associated policy issues. Methods to collect data will be defined below for each of the three case studies of health care labor in Poland, India and the U.S.A. Detailed information on the process of data collection is discussed in Chapter 4.

The advantage of having a multi-country study is in generalizing the work to a global issue. This paper will take three different systems, in three different countries, with three different histories. The three countries are in separate continents. Moreover, they may have different perspectives on aging, healthcare, and medicine. In order to account for cross-cultural differences, this study borrows from Garcia and Gluesing (2013, p.423) where they use qualitative research in the study of organizations "for several areas of research, including theory development, theory testing, construct validation, and the uncovering of new, emerging phenomena. As organization studies and research have begun to include more sensitivity to and understanding of the need for nuanced investigations that consider multiple cultural influences and contexts." Others join Garcia in recognizing that research must bring a cultural focus on their subjects in areas such as international business and organizational behavior. (Batteau, 2000; D'Iribarne, 1997; Hamada, 1991; Reeves-Ellington, 1992; from Garcia & Gluesing, 2013). This is cited as a necessity to conduct research from the participants point of view in order in order to gain a deeper "understanding of the phenomena under study" (Hamada and Sibley, 1994; Garcia & Gluesing, 2013).

In order to provide a larger context from the findings from the qualitative work, national statistical data (where available) will be used. National statistical unemployment figures will be used along with those of independent research groups such as the Economist Intelligence Unit which includes Haver Analytics resources.

In addition, demographics and employment figures will be derived from international organizations such as the World Bank and the United Nations. These two, along with data from national organizations and the World Health Organization will be used to collect information on the health care sector. When appropriate, data from nonprofit organizations will be used as well.

Narrative data, as part of a qualitative approach, will be used extensively as it produces a "much more detailed information than what is available through a statistical analysis." And because "Advocates will also hold that while statistical methods might be able to deal with situations where behavior is homogeneous and routine, case studies are needed to deal with creativity, innovation, and context" (Becker, et.al., 1994-2012, Commentary on Case Studies, par. 2).

Narrative research is the most common method in the field of Integrated Communication Technology Development (ICTD). As such, this method is well suited for the understanding of perceptions of people on the healthcare industry as pointed out by Wells (2011).

Narrative inquiry is utilized as a strength in explaining relationships between economic, administrative, psychological, sociological, or historical frames of reference. It is stated that unlike other forms of analysis, the storied nature of data is retained, allowing for qualitative analysis of personal experience in relation to time, social condition, and place (see Wells, 2011; Ritchie, 2014). Furthermore, narrative inquiry is particularly effective in looking to "reveal qualities of group experience in a way that other forms of research cannot"; and to "help determine questions and types of follow-

up research" (Colorado State Guide, 1994-2020, Commentary on Ethnography, Observational Research, and Narrative Inquiry, par.2).

The disadvantages of narrative research include the potential for researcher bias. This can be through the manner of asking questions, or in this case from those being interviewed wanting to please the researcher. This is often true of research with the presence of the researcher as noted from the Heisenberg Uncertainty Principle in physics (Jha, 2013, par. 7). Bias may occur from those in the health care field expressing common refrains which are to the advantage of those in the profession; for example, there is a shortage of workers, and it is due to pay being too low. In order to reduce the possibility of research bias, work with the participants will be transparent and direct quotes will be provided. Input on surveys will be solicited from local health leaders. Participants will be assured of confidentially. In addition, the respondents will be allowed to provide as much information as they consider to be relevant to the questions.

Methodologies

Statistical Data Gathering

Type of Data Collected.

From the data sets mentioned above, an effort will be made to provide comparable national and regional statistics for the three sites. However, one of the major challenges is the lack of comprehensive statistics for different countries. Other research has noted that the absence of "documented processes for data collection, management, and use limits understanding of the availability and quality of information"

to make valid assumptions on health care employment strategies. (Riley, et.al., 2012, Abstract).

The first search will be of available official numbers of people working versus those that are not working. The need for doing this was discussed in Chapter 2…. looking at a better definition than just official unemployment numbers and instead identify the population of individuals not working and available to fill jobs. Statistics on unemployment, population of working age, disability numbers, education statistics, and breakdown of male and female employees will be sought. These statistics will be used to estimate the available labor pool for each country.

A point generally missed in the debate over a gap in employment supply and demand is that there may be a large pool of unemployed persons, but they may not be qualified to fill specific occupations. For example, not everyone would be capable of working as a nurse in health care. Education and training will be looked at as a means of addressing a labor gap. But there is also an inherent ability and/or interest of the individual that must be considered. No studies have been found which account for a potential health care ability grouping from the general population – or even those within the Gap. Personal work assessments have been used throughout the world. These assessments, described in Chapter 2, include ability testing and interest testing, which correlate highly with each other. Data from this testing is generally unavailable. However, research has obtained a global study by Psychometrics Canada. Their work has used a Norm Sample for the Occupational Area of Subjects sample n=7636 and provided data on general occupations. While done as a representative sample for those taking the test and not an indicator capability for outcome for occupation, one

would expect these numbers to be similar. It must also be kept in mind that the Holland Code assessment discussed in Chapter 2 includes several categories which may include health care occupations. It will also be understood that there are persons who may have overlapping abilities in several occupational sectors.

The importance of productivity and performance was discussed in the literature review. Those twin factors are important as the goal of healthcare systems and the need for health care workers - effected by technology - is ultimately reflected in productivity and performance represented in Diagram 2 as Productivity (G) and Performance (H). While this is outcome, and beyond the main goal of this paper, they nonetheless must be touched upon as they reflect the relevance of a Labor Gap. If technology is indeed increasing productivity and improving performance, there would likely be a combination of either lower need for as many employees, or an increase in the effectiveness of health care.

There are inherent flaws in data measuring productivity and performance in health care. A true test would be in recording health improvement for citizens. This paper will measure health improvement by life expectancy of a country's citizens, recognizing the inherent flaws from anomalies and the role of health care providers in prolonging life. For example, one could argue the measurement is not a true reflection of health providers when considering other factors such as an increase of opioid use, legislation, law enforcement, lifestyle, major natural disasters, political violence, war, etc. Understanding the flaws, the advantages of using this commonly measured statistic weigh heavily as an indicator of health care performance.

Use of Data.

Data will be used to measure the size of the Labor Gap (if any) in each of the three case studies. This Gap population will be measured from those of working age in each country and then accounting for those that are furthering their education or have disabilities preventing the occupations specified.

Process for Collecting Data.

The International Labor Organization (ILO) has set international standards for measurement of the workforce. The economically active population for labor supply has two components: those employed and those unemployed. The labor demand also has two components: "Jobs (filled posts) and job vacancies (unfilled posts)" (Hussmans, 2007, p.1). Most countries have better developed statistics on the demand side.

Persons employed are actively working. Persons unemployed are seeking work but not employed. Underemployed persons have fewer working hours than they desire and are available to work additional hours. "The result is a classification of the population into three mutually exclusive and exhaustive categories: employed persons, unemployed persons, and persons not in the labour force (or persons not currently active) (Hussmans, 2007, p.1).

India.

Data will be gathered for India on unemployment rates in years in which data exist. This data will be taken from the International Labour Organization and from the Economist Research Group. The Labour Bureau of the Government of India and the World Bank will be used for labor participation rates.

Health care labor counts are compiled from the World Bank indicator, World Health Organization Global Health Workforce Statistics, OECD, and supplemented by country data. There will be an attempt to gather data on physicians, nurses, and midwives.

Poland.

Data on unemployment rates will be collected from the Central Statistical Office, Office of Poland. Working age population numbers will come from the World Bank. Poland labor participation rates will be obtained from the Central Statistical Office of Poland.

Health care labor counts are compiled from the World Bank indicator, World Health Organization Global Health Workforce Statistics, OECD, and supplemented by country data. There will be an attempt to gather data on physicians, nurses, and midwives.

U.S.A.

U.S. unemployment rates will be gathered from the U.S. Bureau of Labor Statistics. The working age population will come from the World Bank. Participation rates will come from the U.S. Bureau of Labor Statistics.

The U.S. Labor Department O*Net will be used to determine job openings for specific occupations.

Nursing and Midwives data is obtained through the OECD Health Database. Physician counts are compiled from the World Band indicator, World Health

Organization Global Health Workforce Statistics, OECD, and supplemented by country data.

Surveys

Type of Data.

Survey for each of the countries will be the same. It will be a Likert scale to measure intensity of response toward the issue. There will be open ended questions to solicit further explanation or detail to an answer. Sample size will be a minimum of 9 responses for each country case. Survey's will be distributed through a medical organization or nonprofit with a health-related mission in each country. Participants targeted will be persons working in the health care system in each country.

Demographics are included for future research. There will be no identifying factors for respondents other than the demographic questions.

An example of the survey is shown below. This survey is translated into Polish for the Poland case study (with English version on reverse side).

Process for Collecting Data.

India.

Efforts to distribute and administer the surveys will be through the Association of Health Care Providers India and/or Association of Physicians India (APIINDIA) and/or ResponseNet India. All three are nonprofit organizations working in the health care area. The sample size obtained may be affected as there is often a cultural expectation of financial compensation in exchange for information. The survey in India is English only as it is a familiar language to most health care professionals. Hindi is the

predominant native language of the Delhi area, but most states have a different language.

Poland.

Surveys will be distributed under the administration of the Polish Hospital Association and/or the Poland Alliance for Innovation. This survey will be in Polish, and it will be based on the U.S. version. Translations from the Polish Hospital Association are used to create the Polish version. The Polish version is accompanied by English on the reverse side.

U.S.A.

The survey will be distributed through membership email lists or in person by the Wisconsin Hospital Association and/or the Wisconsin Medical Society and/or another health-related non-profit organization. Respondents will include hospital administrators and medical personnel.

An example of the survey is shown below.

Multinational Survey on Health Care Occupation

Please take a few minutes to answer this short survey. It is for a multinational research project on health care employment and education. There are no correct or incorrect answers. You do not identify yourself.

Demographics.

1. Age *(years):* A. 0-18 B. 19-23 C. 24-35 D. 36-60 E. 61 and over

2. Occupation: A. health care B. education C. government/regulator D. private business E. other

3. Position: A. administrator/manager B. educator C. student

D. direct patient care provider (dr., nurse, etc.) E. other

4. Your highest level of education: A. elementary/some school

B. high school/secondary school C. university/college D. graduate school E. professional degree/Ph.D./M.D./Attorney

Respond by circling the letter closest to your belief.

1. Do you think there are enough skilled health care employees in Wisconsin?

A. not at all a problem B. minor problem C. moderate problem D. serious problem

Why?

2. Do you believe there are shortages of health care workers?

A. very untrue of what I believe B. untrue of what I believe C. somewhat untrue D. neutral

E. somewhat true of what I believe F. true of what I believe G. very true of what I believe

Why?

3. How concerned are you about having enough skilled employees in the health care field in the next 5 years?

A. not at all concerned B. slightly concerned C. somewhat concerned

D. moderately concerned F. extremely concerned

Why?

4. Do you believe decision-makers in some other occupations such as construction or technology are concerned about finding skilled workers in their businesses?

A. very untrue of what I believe B. untrue of what I believe C. somewhat untrue D. neutral

E. somewhat true of what I believe F. true of what I believe G. very true of what I believe

Why?

5. How important is it to be able to have employees trained at a location close to where they work?

A. very undesirable B. undesirable C. neutral D. desirable E. very desirable

6. How do you rate the quality of preparation in your country for those going into health care jobs?

A. poor B. fair C. good D. very good E. excellent

Why?

7. How would you rate employees hired from schools in your local area compared to those hired from schools outside of the local area?

A. much worse B. somewhat worse C. about the same D. somewhat better E. much better

8. Are you comfortable using technology such as the internet, or a computer?

A. never B. rarely C. sometimes D. a moderate amount E. a great deal/almost always

Why?

9. Do you believe you can measure a person's likelihood of job success through testing?

A. very untrue of what I believe B. untrue of what I believe C. somewhat untrue D. neutral

E. somewhat true of what I believe F. true of what I believe G. very true of what I believe

Why?

10. If there were a technology that assessed applicant's abilities and interests and helped match them to the job openings, how probable is it that you would use it?

A. not probable B. somewhat improbable C. neutral D. somewhat probable E. very probable

Why?

11. Where do you believe most of your health care employees receive their education?

A. within the city area of employment B. outside the city, but in the same state of employment C. outside of the state, but within the country

D. outside of the country

12. How do most of your health care employees receive their health care training?

A. during their education B. in the workplace C. training outside of work setting D. some other way

Use of Survey Data.

Surveys will be distributed and collected to provide the framework for more in-depth information to be collected from the narratives. Cross-cultural differences in people's attitudes toward surveys will be taken into consideration to the extent possible.

Narrative/Interviews

Type of Data.

This study will strive for at least 3 current in-depth interviews for each country. Each initial interview takes roughly 15-45 minutes on the basic questions.

Process of Collecting Data.

India interviews done in person and via Skype. Each recorded for later transcription. Follow up will be done via Skype, phone, or in person.

Polish interviews done in person, or virtual meeting at various locations. Each recorded for later transcription. If necessary, follow up will be done in person or via Skype. There may be need for a translator in Polish interviews, and this will be identified as such in the raw data.

U.S. interviews done in person or virtual meetings at various locations. Each recorded for later transcription. Follow up will be done virtually or via phone.

There may be a series of follow-up interviews with several of the respondents to delve deeper into specific points that may arise, or to discern variations that may occur. Such follow up is directed at furthering knowledge as to the "why" of certain findings.

1. Role as researcher. Determine whether you will be obtrusive or unobtrusive, objective or involved.

The interview opens with an explanation and purpose of the research. There will be an attempt to remain neutral during the questioning and discussion. It is explained at the start that there are no correct or incorrect answers, and that research is geared towards the respondents' personal observations or perceptions.

2. Ethical implications of the study. Issues of confidentiality and sensitivity.

Respondents will be informed that the interview will be recorded, and their consent will be requested pending on the cultural context, verbal or signed consent will be requested from the participant. The data and the various positions held by respondents will be available to the committee for 6 months following submission.

3. Collect data.

I will be looking for patterns. There may be revealing information from responses to questions when follow up on reasons for the answer are obtained. This should allow for potential theory building.

4. Interpret data. Look for concepts and theories in what has been collected so far.

Narrative research is taken in conjunction with literature review and collaborating mass media reports. There will be discussion as to how results concur or run counter to both previous economic disruption as well as prevailing economic theory. Questions are devised to address the central problem and underlying causes.

5. Revise the research question if necessary and begin to form hypotheses.

If necessary, there will be a return to those interviewed for further elaboration, or additional research in new areas that come to light through the interviews.

6. Verify data. Complete conceptual and theoretical work to make findings.

7. Present findings.

8. Provide potential solutions to the problem

As this problem involves the impact of technology upon workers, there will be solutions offered in which technology can be used to address the problems which it has created. The strength of this narrative research should be to provide the stories, and to apply results.

Sample of Narrative questions:

Background of study provided: Research on skilled labor needs in the health care industry in Milwaukee/Warsaw/Delhi or in the country.

Labor Supply

1. *Do you personally think there is presently a shortage of skilled workers in the healthcare industry? Why?*
2. *Do you see a shortage occurring in the future? Why?*

3. *Do other leaders or decision makers see this as a problem? Why?*

Education/Training

1. *Do you see training as different than education? How?*
2. *Where does most of your training occur?*
3. *Where do your employees come from? OR Where do your students go to work?*
4. *How prepared are those in the Polish/India/American education system as they enter the workplace? Compared to other countries?*

Technology

1. *Do you or somebody in your office assess prospective employees/students for their interests or abilities? If not, how do you judge their competence?*
2. *What test do you use? Is it cost effective?*
3. *Please share what you have experienced in using or seeing the use of technology in finding and training employees.*

Interviews will be transcribed to hard copy. Transcriptions will be preserved for 3 months following submission of this research and are available to those reviewing the paper. Materials will be kept in a secure location. Respondents are not identifiable by name per IRB requirements.

Use of Narrative Data.

Narrative research should give deeper understanding of the issue, provide insights into public policy variables such as education, regulation, general trends of

technology, migratory trends, and expectations of the future. It will be useful to understand what is occurring to employment in health care. It may also provide insights for new theory development.

This is the only means of getting to potential cultural and economic system differences. There is high interest in health care and health care labor within each society, yet there is little work on looking across cultures, in looking at the national differences as they impact occupations and the health care system. Interviews will look at common perceptions of labor shortages, and a concern for the future. Knowledge gained will include that from looking at the labor issue in a global context. Boyacigiller and Adler (1991) observe that cross-culture studies in business is "neither an impressive showing nor a particularly favorable arbinger" (page 269). Reviews of methodological approaches used suggest that quantitative cross-cultural studies have yet to resolve issues (Adler, 1983; Sekaran, 1983). These concerns are consistent with issues raised by other researchers: Douglas and Craig (1983); Triandis, et. al. (1988); Zavalloni, 1980; and Feather (1975); and later by Cavusgil and Das (1997); Auklakh and Kotabe (1993); and Samiee and Jeong (1994). Narratives appear to provide the best method to find cultural differences in health care systems, and implications this has for labor in the health care field.

The approach is similar to that which attempts to describe European economic growth as culturally driven (Mokyr, J., 2016). While a book review points out that it is not a conventional economic history, with research including few numbers, "let alone regressions", since a focus on culture is not easy to quantify. The review concludes with the statement that "it is refreshing that an economist is taking seriously the idea that

ideas and culture make a difference to economic growth" (The Role of Ideas in the Great Divergence, 2016).

Most of the present research available looks at health care from a Western perspective. Yet Mills states that culture is something that is central to understanding a society (Mills, 1959; Hall, Neitz & Battani, 2003). Only through narrative research can there be a probing as to possible cultural, or other previously undetected differences having an impact upon labor supply theory.

Similarly, there may be important variations due to the type of economic system in which they are operating. This difference has not been looked at through such a lens. Important policy considerations may result from gaining knowledge on perceived impact of government as a factor. The historical patterns of an economy and a culture may be found to impact the labor market in health care. Research is scarce in looking at this as a cross cultural factor in the knowledge economy and labor supply.

From these perceptions and the stories related, future research, and indeed policymakers within those countries presently looking at health care, will be able to adjust policy to address obstacles in the marketplace. For example, something as simple as slightly altering the responsibilities of a specific occupation, and changing the occupation title, may open positions to a new pool of applicants.

Technology has shifted the economic structure. This study brings light to changes within an industry, and it provides theory and cultural insights that will bring a better understanding of the human factor in work for policy making.

There are similar initial questions for those interviewed. There is a probing for stories or deeper explanation of response. The number of interviews for this type of

research generally varies in range from one and higher. This paper will strive for at least 3 interviews for each country to build on previous research on the topic.

Narrative Cluster Tables

Tsoi, et al (2015, p.244) write in "Systematic narrative review of decision frameworks to select the appropriate modelling approaches for health economic evaluations" that "There is presently no universally-accepted framework for selecting an economic modeling approach". Indeed, there are a variety of suggested methodologies in narrative and economic modeling varying upon the project.

Several options were looked at as models. The research is considered within the ICTD field, with strong implications for public policy. This paper relies on construct structure from those in the public policy area. Eisenhardt (1989) has several models which are particularly appropriate for theory building. This will borrow from Eisenhardt as appropriate to building from case study. While Eisenhardt utilizes this method in organization research and usually will have more case studies, the cross- case study method of comparing results as one on one to look for patterns is deemed valuable for this work (Eisenhardt, 1989, p.540).

It should be important to note the Eisenhardt (1989, p.536) suggests early identification of the research question and constructs, but that they are tentative in this type of research – and that "the research question may shift during the research."

This dissertation takes best practices for narrative research and applies construct methods developed by Emery Roe for economic policy. Roe and Eisenhardt have similar approaches in that they "select categories or dimensions, and then look for within-group similarities coupled with intergroup differences" (Eisenhardt, 1989, pg.

540). Narrative responses will be placed in cluster tables to look for new assumptions to guide policymakers. The tables will describe dominant stories of response as well as the counter stories in arriving at our metanarratives, or our leading conclusions. This Roe methodology "applies contemporary literary theory to difficult policy issues. It emphasizes the role of narratives in public policy and allows one to reformulate intractable — i.e., complex, uncertain and polarized — policy problems to more amenable ones." (Roe 1992, 1994, and from Berg and Hukkinen, 2011, introduction). It is a better way of "managing or solving real policy problems" (Roe, 1994, pg. 9).

Eisenhardt is relevant in that her work focuses on similar research in a parallel issue of work and creative destruction through research on entrepreneurship. In a publication on organizations grown in technology she utilizes data to develop hypothesis (Eisenhardt, & Schoonhoven, 1990). Where she uses data, this paper will utilize narratives from those within the affected occupations. This is identified as a fruitful way in which to gather new information in broad, multidisciplinary and changing cases studies.

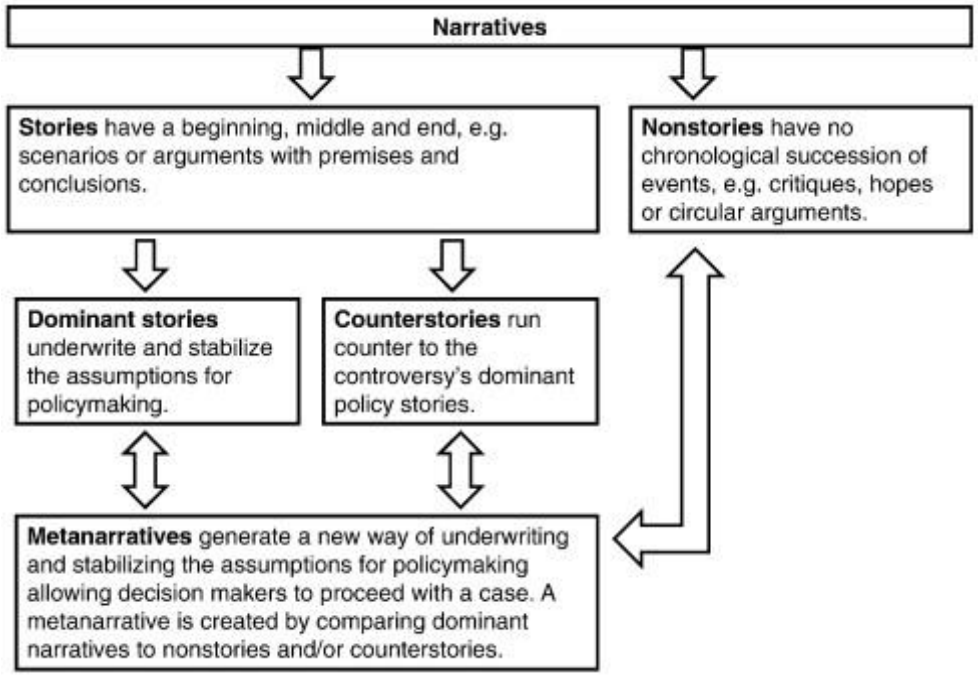
Research in theory building has likewise been done utilizing longitudinal data in institutional change. (Eberhart, 1990). This research will utilize longitudinal data to search for changing perceptions over a period of time. This issue being looked it is such that it falls under the qualitative multi-method policy research category identified by Damodoaran and Roe (1998) and Roe (1994) as "The interdisciplinarian model" where the individual researcher is interdisciplinary (Damodaran, & Roe, 1998).

The use of such tables in economic narrative probing can be seen in narrative research on the Finnish sustainable consumption and production debate (Berg &

Hukkinen, 2011) which used the Roe model. The Berg diagram below which will be used in this dissertation is a re-configured version applied to that in Roe method recommendations.

Figure 3.

Finnish economic model based on Roe (Berg & Hukkinen)



Note. Displays method of categorizing research responses

In this paper, the following will be used in categorizing responses to the research questions. The cluster tables from data gathered are listed as well.

Dominant Story: There are health care occupation shortages; labor supply is entering a new historical phase; traditional economic theory is not being followed in the knowledge economy.

Counter stories: The marketplace will work; traditional economic theory will hold; technology changes, and labor supply will follow the historical pattern, technology will solve labor problems through increased productivity or new jobs.

Nonstories: To be determined from research

Metanarratives: To be determined from research. For example, there must be accounting for factors such as the economic system, culture, training programs and policy decisions can be made accordingly.

Proposed Cluster Diagrams for Each Case

Diagrams will be designed for each case study country on the following:

(1) Perceptions on health care labor supply, (2) education and training, (3) impact of technology, and from these a table to look at (4) cultural and policy differences between countries.

Narrations from interviews, along with survey responses, will be broken into categories on tables for each of the three case studies. The results will be compared with each other to understand generizable patterns or potential new theory. This should also allow us to highlight unique attributes to a case study that could either hinder or promote alleviating potential labor problems in the health care field.

Conclusions

Research should provide patterns regarding perceptions of the labor market in the health care industry. This will be related to official data on occupation changes on the job market in the health care industry.

Is there really a shortage of labor? Where is the labor market going in the future? Research will probe the impact of technology in the workplace and what this means for finding employees.

Summary

Knowledge gained from this work is potentially groundbreaking in providing a global perspective of jobs in the knowledge economy. Further, it is anticipated that having a 3-case study with multiple interviews and open- ended survey will provide policy recommendations that may be unique to different countries. There may be similar steps that can be taken. There may be local, national, or even global barriers to providing better health care for people. There has been nothing found which comprises similar research.

It is anticipated that there will be interesting and unique policy options that will result from this work, several of which will be included as part of the conclusion. Such policy proposals are an important part of the paper - there are numerous academic pieces which suggest that policy must begin to be included in studies. Recommendations may include the use of technology to overcome changing labor patterns that are detrimental to social good as well as examples of technology which helps to highlight a factor in the labor market. An example of the first is technology to assess and match employees to the most appropriate education, training and occupation set. An example of the use of technology to understand labor market factors more easily may be of GIS mapping between health care facilities and institutions which educate health care workers. Much of this work is dependent upon the results of the research in identifying factors effecting the labor market for health care.

Chapter 4 will provide steps of data collection. Chapter 5 will provide the data and follow steps from Chapter 4. An analysis will be provided after computations are displayed for each country. This will give an understanding of the research issues for

each case. Chapter 6 Discussion will utilize the data and findings to respond to each of the research questions. Chapter 7 Conclusion will provide policy recommendations and suggestions for future research.

Chapter 4 Data Collection

This chapter details and explains the type of data collected to answer the main research question and the sub-questions; the nature, and sources of the data that was available, the specific steps taken, and the tools utilized to collect the data in order to determine if there is a gap in labor demand and supply in certain health care occupations within the knowledge economy. It is stressed that the data method to answer the research questions is qualitative data. Quantitative data is used as a supplementary form to the primary survey and interviews. With respect to quantitative data a number of challenges collecting secondary data will be noted. These challenges, especially of common data, restrict reliability of cross-country comparisons but do allow for estimates on a labor gap within each country.

To address the main research question as well as the sub-questions a survey was developed and administered to, and interviews conducted with, health care professionals in each country.

Labor Supply Calculations

Present Gap = Demand for Additional Workers – Supply of Participating Workforce

The Participating Workforce is the number of those working plus those considered unemployed. The data needed to determine the Present Gap is the participating and nonparticipating workforces in each country. Demand for workers is the number of workers needed to fill occupations.

This is one of the most common measurements used by media and understood by the public. It starts with the unemployment rate. The supply and demand of an economy are measured by the unemployment rate, a higher unemployment rate

indicating a greater supply of workers in the participating pool with a shortage of demand (jobs) for their labor. This research seeks to identify potential workers in the remaining pool of those outside of the presently defined participating workers and thus moves to the supply of participating working force. The overall labor market including all occupations can be seen from the first set of figures for this formula.

Revised Gap = Demand for Additional Workers – (Supply Participating Workforce + Adjusted Workers Available)

Available workers are identified in this study as the number of working age people minus the number of those who are incapable of participating in the workforce. Adjusted Available Labor (Participating Labor including those now defined as *capable* of working) will include those Nonparticipants considered employable. As such, Nonparticipant adjustments are made which exclude the two major categories of nonparticipants: students and those with a disability preventing participation in the labor force. Included are those with disabilities that can be considered employable. The population presently officially defined by international standards as being Nonparticipants otherwise restrained (i.e., social reasons such as life choices, discrimination, drug use) from participating are considered part of an Available workforce.

Data must include disability statistics for the working population, numbers of disabled in the workforce, disabled considered capable of working, and number of students of working age not participating in the workforce.

Disabled persons must be considered literate to be included in the Available workers population within this study which will require adjustments utilizing literacy

numbers for each country. In the case of the U.S. these numbers are estimated from disabled high school graduation and literacy rates of U.S. high school graduates.

Healthcare Gap = Demand for Additional Health Occupation Workers – Supply of Potential Healthcare Employees

Potential Healthcare Employees is the population of potential capable employees for specified Health Care occupations. This pool may not necessarily have the education and skills to immediately work in the occupation but must have a proclivity to achieve success in health care occupations. Occupation interest data is needed to determine this population.

Specific data does not exist for total job openings globally, nor in most countries. Demand for labor will be determined quantitatively through secondary sources on reaching recognizable averages of health care workers per population. In the case of Poland this number is computed using Poland data similar to computations made by the World Health Organization and used in cited secondary studies for India.

Data using Psychometrics Canada Norm Sample for Occupational Area of Subjects is used for the equation and ensuing diagram in each case study country. The norm sample shows that Healthcare Practitioners and Technicians represent 3.35 percent of the workforce population, Healthcare support occupations 1.44 percent, Personal Care and Services are 1.13 percent. Physicians and nurses/midwives would be included in these categories, and it is recognized that some other health occupations may also be included. These fields may have widely diverse education and training requirements. To reiterate, those available in the category show an interest and a correlating likelihood of having an ability to fulfil occupations. It does not mean the

education and training has taken place to immediately fill vacancies. Nevertheless, it provides an important indicator of what a true labor gap is within an industry and encompasses the occupations we have focused on. It also provides a base of those who would be likely candidates for occupations potentially replacing those presently within physician and nurse descriptions. Combined these occupations account for 5.92% of the reduced general labor pool, including available but not participating labor.

There is no formula to determine productivity changes in healthcare. Many other studies were reviewed which used both input factors such as expenditures in healthcare, hospital beds, and accessibility of providers as well as outputs such as maternity deaths, or specific survival rates by treatment. The ultimate output indicator for healthcare, that of average life span, is used in this study.

Type of data

Secondary data is the only data available for quantitative analysis in this type of study. It is used almost exclusively by researchers in many disciplines in social science (Cherlin, 1991). The social science disciplines in this research include economics, sociology, and work/I-O psychology. Shultz, et.al. (2005, p.31) refer to the use of archival data sets, secondary data, as an "underutilized tool to be added to current and future I-O psychologists' methodological toolbox." Research in this dissertation includes longitudinal data to determine changes in the knowledge economy. Shultz goes on to stress that longitudinal research in I-O psychology can be done by researchers obtaining archival data and supplementing it through interviews or collecting follow-up primary data. This research follows the model through interviews and primary survey data and supplements it with archival data.

Complexity in international research includes the lack of international data on occupations, particularly, as relevant here, for India and Poland. Secondary sources are noted for each country and cited as used. The general approach necessitated cases where quantitative data sources vary from country to country though the preference was to use common data as much as possible.

As discussed in Chapter 3, the first options for common data were international organizations such as the United Nation Statistics, World Bank, Organization of Economic Developed Countries (OEDC) and the World Health Organization. Government Labor and Health Departments/Ministries of the countries are also used. When necessary, statistics from nonprofit organizations are used as well. If available, data was used from independent research organizations as well as from academic publications. These sources, in turn, often utilized the same secondary sources used here. In many cases the data in international and government sources are identical for they cross-reference each other. WHO will use OECD figures which derive from government sources. An example of this is the Kaiser Family Foundation Health System Tracker which does an analysis of the OECD Health Statistics database which in turn has a disclaimer that most of their data is from administrative sources that come from national health reviews or country reports to WHO (Peterson-KFF Health System Tracker, 2020). When going to technical notes of WHO it states “The data presented in the Global Health Workforce Statistics database are compiled from several sources such as national population censuses, labour force and employment surveys, national statistical products, and routine administrative information systems. As a result, considerable variability remains across countries in the coverage, quality and reference

year of the original data" (Global Health Workforce Statistics Technical Notes, 2020). Research in this paper will cite various sources while having cross-checked, when possible, with World Health Statistics of the World Health Organization and the U.N. Population Prospects database.

Process of Data Gathering

Research will first determine a simple implied gap from reported supply shortages in labor sectors and the size of working age population that is available for work, demonstrated in the first formula. Statistics include unemployment and labor participation tables. "Taken together, the participation rate and the unemployment rate can provide a more comprehensive picture of the job market. A high participation rate combined with a low unemployment rate is a sure sign of a robust job market. During the late 1990s, the participation rate was 65%, while the unemployment rate hovered below 5%. Most economists agree this was one of the best periods in modern history for American jobs" (Investopedia, par 1, from U.S. Labor Department).

Adjustments seen in the second formula will be made to identify those available for working who are categorized in the unavailable worker category. Students and a percentage of those with disabilities considered unsuitable for the healthcare occupations will be excluded. Included as available for the workforce are those who have given up looking for a job, or don't want to work. It includes early retirees and homemakers. Persons who have been institutionalized are not considered as part of the participating workforce formula as defined in official statistics.

Those remaining in the unworking (officially nonparticipating) but now defined as Available pool are identified as possible employees in health care occupations. A

mismatch of possible employees and needed workers would display a disequilibrium, or gap of supply and demand for employees. This will provide a far more meaningful gap measurement than including the entire working age population.

Adjusting for Disabilities and Students

World Bank estimates 15 percent of the world's population lives with a disability (World Bank Disability data, 2020). The U.S. Census bureau puts American disability at 19% of the population (U.S. Census releases). The analysis of disability data is not considered highly reliable, especially noting the low percentage of disabled in India, the near 100% literacy rate for those with disabilities reported in Poland, and the wide range of estimates of disabled population in all three countries.

Definitions of a disability vary within a country as well as between countries. This paper uses data from the United Nations Statistical Division. Those disabled that are literate are used as a population able to Participate in the Labor force for the healthcare occupations under study with the understanding that there are possibly other occupations suitable for those that are illiterate and those presently not working given their disability. There are varying disability statistics found within all three case study countries.

Revisions are made to compensate for a proportion of the disabled population not working and qualified for the healthcare occupations in this study, defined as a person who has the equivalent of a high school degree and is literate. Computation for potential healthcare employees adjusts the gap from an available but nonparticipating labor pool. Thus, data is required to determine the proportion of disabled population capable of doing the health occupations, the number of working age students in each

country, and those in the nonparticipating workforce that would show an interest or capability of doing the healthcare occupations. To estimate the size of a gap it was necessary to determine the number of employees already within specific occupations along with the number that were either needed or were shown as vacant positions. While not readily accessible this archival data is a requirement to create a quantitative analysis. Qualitative data can answer the research question from a political/policy perspective which is the main research focus. It cannot quantify the gap size that is done with quantitative computations.

Productivity is measured using archival data for each country to compensate for the productivity that may be due to the knowledge economy/increased use of technology. Two major challenges exist which have hindered academic attempts to look at health care productivity. One is related to international work in that most countries with healthcare employee shortages do not report data on worker qualifications or credentialing (Information Systems on Human Resources for Health: A Global Review. 2012). The second major challenge is that there are inherent flaws in data measuring productivity and performance in health care. It is beyond the scope of this paper to design a productivity tool. Numerous papers have attempted to measured hospital efficiency, mainly using a technique known as data envelopment analysis (DEA). “A shortcoming of this technique is that the number of outputs for each hospital generally outstrips the number of hospitals.” (Smith, 1997, abstract). While measured productivity growth in the health care industry has been well below that of the general economy, “Many analysts attribute this low productivity growth to measurement problems. They argue that most of the productivity growth in health care has come in

the form of improved quality rather than lower cost." (Sheiner and Malinovskaya, 2016, introduction). It may also be that productivity has indeed lagged other sectors. An ultimate outcome of health improvement could broadly be determined through life expectancy of a country's citizens, recognizing the inherent flaws of anomalies and the role of health care providers in prolonging life. For example, one could argue the measurement is not a true reflection of health providers when considering other factors such as an increase of legislation, lifestyle, major natural disasters, political violence, war, etc. Nevertheless, this statistic is used as an indicator of health care performance as it is arguably the ultimate outcome factor.

Narrative and survey research were necessary to gain perceptions and new insights in the marketplace as well as providing the multiple methods approaches to analyzing the labor gap. These perceptions are important in policy formation. Further, there has been a swing back to cultural explanations by economists. Adam Smith, author of "The Wealth of Nations", looked at culture in impact upon capitalism. Karl Marx later looked at cultural differences regarding capitalism in Asia. Max Weber (1905) discussed the importance of religion in "The Protestant Ethic and the Spirit of Capitalism." (Economists are Turning to Culture to Explain Wealth and Poverty, 2020). This line of research declined as better data became available but is now making a return. In addition, "a growing band of economists is looking at Institutions", meaning "the legal system and regulations" (par 11). To gain a better understanding of the knowledge economy and policy implications on the workforce, it is an important method of research in this paper.

Data collection followed the IRB process. All potential human participants received a copy of the IRB approved cover letter. Steps had to be taken which required greater personal contact due to Covid-19 and the ensuing demand on time of health care workers. This possibility had been anticipated in the IRB. India and Poland had support leadership to personally contact the health organizations and to follow up with survey questions if necessary. Both the India and Poland directors had IRB materials and had been briefed in advance on process.

India

Process

There has been slow development of digital libraries in India compared to many of the different developed countries. This is due to social, political and economic factors. “These factors include Growing Population, Illiteracy, Low standard of living, less importance to telecommunication facilities, shortage in supply of Energy Sources, lower number of computer and Internet users” (Kumbargoudar, 2006). Despite the dramatic increased of mobile phones and internet in India this past decade, lack of reliable data continues to dampen academic research. It was known that quantitative data would be difficult to obtain and that statistics are unreliable. While lack of good data is often used as a reason for not studying India, the country of around one-fifth of the world’s population merits a deeper look. As well, even if data is secondary source or government “best available”, this research will provide insights that drive further knowledge.

Quantitative data were sought in government documents, international organizations, literature review, and through nonprofit organizations. The process was directed at labor and health data that would allow response to the research questions. The International Labor Organization Yearbook of Labour Statistics provides multinational information but does not include India in longitudinal studies. The Institute of Applied Manpower of India has support from the Indian government, but data provided only general information without appropriate data for the labor gap equations. Census data has not been gathered on a regular time schedule. Worker data covering the population was found in a McCann study (2018). This helped in looking nationally at the labor gap. It was not detailed enough to provide health care occupational data. Manpower estimates countries labor supply needs utilizing employer survey data on workers. Again, it was not occupation specific for health care.

India's National Centre for Promotion of Employment for Disabled People reports persons with disabilities at 5 to 6 per cent of the population, with 100,000 employed out of 70 million with disabilities in India. This is noted as an indication of obtaining precise statistics. Despite this appearing as a more realistic number than those of the United Nations taken from the India census, U.N. numbers were used to maintain a common source with other case countries.

The number of registered doctors and that of nurses and midwives is not precise for India with a disparate certification system. Almost one-third (31 per cent) of those who claimed to be allopathic doctors in 2001 were educated only up to the secondary school level and 57 percent did not have any medical qualification according to a 2016 WHO report, questioning the measurement of India's healthcare workforce (Bansal,

2016). The Medical Council of India and the Indian Nursing Council has provided information on numbers registered to the Indian Health Minister. The World Health Organization provides an estimate from government reports. The National Family Health Survey from the Government of India was used for background materials.

Qualitative data was expected to be particularly valuable with stories from workers within the healthcare system. From 15 years of working and traveling in India, the author was able to use personal resources for interviews, and to use various health organizations as contacts to distribute surveys. Due to Covid restrictions interviews were virtual discussion. The main support organization in arranging survey distribution and collection was with nonprofit ResponseNet based in Delhi, India. The director has worked with healthcare organizations. The IRB process was discussed in detail prior to going into the field. There were regular communications as to research progress and procedure. Potential respondents were planned on being identified by location through hospital associations and hospitals. This was realized with support from the India Medical Association and the Association of Nurses.

Interviews were done directly by the author as planned. The script of questions was aligned with research questions as well as with the survey. The script did not always follow the same pattern as various respondents may have had insights that needed to be pursued. This was particularly the case as with Covid-19 having a prevalent impact upon health occupations during the research phase.

Steps

Qualitative data for India on healthcare productivity is from United Nations statistics as reported in World Population Review World Population Review (2020).

India population is from the United Nations Population Division. This data is necessary to convert the rates of participation, unemployment, and available workforce to actual numbers. Available workers are from UNDP and cited from Tandon. These figures were needed as official statistics are often reported in percentages (i.e., the unemployment rate) and occupational vacancies students, and disabled are often reported in actual numbers thus requiring conversions for formula computation and diagram creation.

Labor participation and the unemployment rates relied upon data from the India Ministry of Statistics and Programme Implementation as displayed by Trade Economics. They are labeled unemployment rates and participating labor rates in Ch. 5 diagrams.

Healthcare occupation employment to measure labor supply came from the Ministry of Statistics and Programme of Implementation. Trend charts, using the same data, are attributed to Trading Economics (Economics, T.,2020). The diagrams with this material are labeled India Unemployment, India Participation Rates, India Physicians, and India Nurses and Midwives. Data on Physicians and Nurses and Midwives occupation needs derive from the World Health Organization, the World Bank, and from the Center for Disease Dynamics, Economics, and Policy (India facing shortage of 600,000 doctors, 2 million nurses: Study, 2019).

Disability statistics were from the India census and the same numbers which are published by the United Nations (United Nations Disabled Population, 2019). The United Nations obtained data from the 2011 and updated 2016 India census (United Nations Disabled Population, and Indiability).

Literacy numbers were found in a government report released 2017 and described in Scroll.India (Salve and Yadavar, 2017). Student figures had to be computed separately for India. While OECD has no figures for India school enrollment, others have estimated 40%. By taking the age breakdown of population using population figures and matching with percentages of those working by age group from World Bank Global Economy data (2018), there is an estimate of working age people who are in school. This figure is used to adjust the working age population available to work by subtracting those in school from being available.

The surveys were hand delivered to hospitals by ResponseNet. Upon completion they were retrieved, scanned, and emailed for compilation. All responses were done in English without interpretation in language or for questions or in responses. There were four different hospitals from which surveys were received.

There were 20 survey responses. The occupations represented are one administrator, one educator, four students in healthcare, nine doctors, four nurses, and one No Response to the occupation question.

Data from surveys were compiled on hard copy. All responses for India were coded and assigned to one of four diagrams based on the comments.

Narrative inquiries were conducted over Skype and WhatsApp. In-depth interviews were done separately with two administrators, one nurse, and one doctor. One administrator works with a variety of healthcare organizations in India, the other is founder and administrator of multiple healthcare centers throughout India. All were done in English. Interviews were transcribed from recorder to hard copy. Responses were then coded to one of four diagrams based on comments.

Comments under each diagram were reviewed as a group, then assigned to the appropriate heading of main story, non- story, dominant story, or counter story. The metanarrative was taken from reviewing material in the diagram headings. A sampling of each category of responses was taken as an indication of research responses used to reach conclusions. The sample responses provide a richness and understanding of the depth of data.

Survey responses on Likert scale were recorded. Answers to the first three questions were entered in Excel for bar graph diagrams addressing the main research question on perceptions of healthcare labor supply.

Poland

Process

Covid-19 created greater difficulty in receiving responses from health care personnel than had been anticipated. The designated support organization was the Alliance for Innovation, a nonprofit organization that has expertise in the healthcare sector.

Quantitative data was sought in government documents, international organizations, literature review, and through nonprofit organizations. The process was directed at labor and health data that would allow response to the research questions. Manpower reports from survey provide employer impressions at the macro labor level and are used for background but are not healthcare specific.

Disability figures were taken from the Poland Census of Population and Housing. Adjustments made for the literacy rate used Index Mundi Poland. Disability is

more prevalent in Poland than in any other country in the world, and the cost of the disability pension systems, and programs to encourage the employment of people with disabilities is among the highest in the world - over four percent of GDP. Too generous benefits, and lax enforcement, encourage abuse of the disability pension system. Again, indicating difficulty in precise statistics (World Bank, Disability and Work in Poland). School and literacy statistics were computed using data from Index Mundi (Index Mundi, Poland, 2019) and from the CIA World Factbook Literacy (CIA World Factbook, 2019). While the measurements maybe different, they do point out important policy considerations in that government policy may be influencing a labor gap and creating hidden costs in the process.

Within the labor market, human resources (physicians, and nurses and midwives) in health care are critically low (the ratio of health workers to population) compared to other EU countries (Szpakowski, et. al., 2019). There are issues of measurement in Poland as "there is no formal structure and no strategy regarding human resource planning or regular forecasts for the health workforce. In Poland, proper health workforce management and planning processes are sadly neglected…" (Domagala and Klich, 2018, p. 102). Nurses also need a tracking system in Poland as the system does not monitor the number of registered nurses (Haczynski, et. al. 2017). OECD has provided statistics for physicians and nurses and midwives displayed in diagram (Tradesource.com) that are used in determining a labor shortage based on reaching an average of providers per capita elsewhere in the European Union, similar to the method used by WHO in determining demand in India health occupations.

Qualitative data was expected to be particularly valuable with stories from workers within the healthcare system. With 31 years of working and traveling in Poland, the author was able to use personal resources for interviews, and to use various health organizations as contacts to distribute surveys.

Discussions were held with the nonprofit Alliance for Innovation based in Warsaw, Poland for research support. The director has worked for and with healthcare organizations. The IRB process and approach to gathering survey data was discussed, something the director is familiar with given his many years managing clinical trial testing.

Steps

Qualitative data for Poland on healthcare productivity is from United Nations statistics as reported in World Population Review World Population Review (2020).

Population figures are from the United Nations Population Division. Working age populations numbers are from UNDP as cited in Statistica (2020). This data is necessary to convert the rates of participation, unemployment, and available workforce to actual numbers.

Quantitative data was obtained on Poland employment from the Central Statistical Office of Poland. Trend charts, using the same data, are attributed to Trading Economics (Economics, T.,2020). Chapter 5 diagrams with this material are labeled Poland Unemployment, Poland Participation Rates, Poland Physicians, and Poland Nurses and Midwives.

Data used to compute a possible participating workforce from those classified as disabled were from the Poland Census of Population and Housing as

reported in the United Nations Statistical Division, Disability Statistics (United Nations Disabled Population, 2019). The literacy rate comes from Index Mundi Poland. Poland has 90% school population in ages 15-19 and 32% in ages 20-29. These numbers do not align with figures for workforce participation rates. In defining an estimate of this portion of the Labor Gap, a drop- off occurs for all countries of those attending school as they age from 16 to 26 years old, and then drop to low significant numbers of students not in the workforce thereafter. The midpoint percentage is used from the two age categories to calculate an estimated non-Gap qualifying number. For Poland this would be 61%, used to adjust for size of population in the respective age brackets. Poland has a smaller 15-24 age group at 10.34% total population of which 61% are in school, and age 15-64 comprise 68.42% of the population. Through matching school age population with those in school by age group we can obtain an estimate for Polish students of working age that should be considered outside of a participating or available workforce.

Contact was made, and endorsement for this research was received from the National Chamber of Physicians and the Polish Chamber of Nurses. Surveys along with the cover letter on confidentiality, were sent to the target respondents. There was no response initially, so the AFI Director did personal visits on location. Again, the confidentiality and cover letter were read. The cover and the survey were in both English and in Polish. The survey questions were in both languages allowing the respondent an option in for response. Responses in Polish were translated to English by the Alliance for Innovation and emailed to me as they came in. Responses were received from a mix of public and private hospitals: Warsaw Medical Center; Institute of

Geriatric and Rheumatology. Warsaw; Voivoidship Hospital in Olsztyn; and Regional Hospital in Paslek.

Survey responses were comprised of one administrator, one student, 3 doctors, and 3 nurses for 8 total returns.

Survey responses on Likert scale were recorded. Answers to the first three survey questions were entered in Excel to be displayed in bar graph diagrams to address the main research question on perceptions of healthcare labor supply. Data from surveys was compiled on hard copy. All responses for Poland were coded and assigned to one of four diagrams.

Narrative inquiries were conducted over Skype and WhatsApp. Three in-depth interviews were done separately with one nurse, one administrator, and one doctor. All were done in English. Interviews were transcribed from recorder to hard copy. Responses from survey and interview were then coded to one of four diagrams based on comments.

Comments under each diagram were reviewed as a group, then assigned to the appropriate heading of main story, non- story, dominant story, or counter story. The metanarrative was taken from reviewing material in the diagram headings.

A sampling of each category of responses was included in the summary as an indication of research responses used to reach conclusions.

U.S.A.

Process

There is a wealth of data for the U.S. This consists of private organizations such as consulting firms and job placement services as well as advanced government statistics.

Quantitative data have been searched through government documents, international organizations, literature review, and through nonprofit organizations. This process was directed at labor and health data that would allow response to the research questions. The U.S. Labor Department was relied upon heavily as their statistics are detailed and reliable for employment and occupations.

The Atlanta Federal Reserve provided an overall perspective of U.S. people above age 16 that were out of the workforce which was helpful in devising our gap formula (money.cnn, 2019). The Brookings Institute has also done work on the changing U.S. workforce which was useful (Bauer, Liu, and Shambaugh; 2019; Krause and Sawhill; 2017).

Calculations based on U.S. disabled outside the workforce that were literate were made to adjust for a potential workforce from those with disabilities. Disability statistics were looked at from various sources including Cornell University, the Kaiser Foundation, and People with Disability advocacy organizations. The U.S. Bureau of Labor Statistics provides background on deeper understanding of disabled participation in the labor force. The U.S. Census bureau reported almost 1 in 5 U.S. citizens as having a disability (Nearly 1 in 5 people have a disability in the U.S.: 2012). Statistics used in this study were those of the U.S. Census Bureau (2018) of 12.8%. Disabled

participating in the workforce are cited from U.S. Labor Department (2018). There were added complications in the U.S. due to a lack of matching literacy statistics. Therefore, in the U.S. an additional adjustment was needed to match work in India and Poland basing capable healthcare workers on being literate. With no literacy numbers in the U.S. matching reports for the other two case studies, high school graduation was used as the qualifier, with an additional adjustment required for those who graduated but were not literate.

There are other data sources for specific occupations in the U.S. For example, each of the occupation advocacy organizations have their own studies or have worked with independent researchers to devise estimated occupational trends concerning their members. In the U.S., the shortage of full-time equivalent registered nurses is expected to exceed 500,000-800,000 nurses by the year of 2020 (Biviano, et al. 2007; Owens, 2018), and the demand for registered nurses is projected to go up 12 percent annually from 2018 to 2028 (Bureau of Labor Statistics, May 19, 2020).

For physicians, “estimates are growing at an alarming rate. Last year’s projected estimate was that the country was short between 40,800 and 104,900 physicians” (Chiaravallot, 2018 blog). Similar numbers are reported by the American Association of Medical Colleges with projected shortfall of physicians from 46,900 to 121,900 physicians (New findings confirm predictions of physician shortage, 2019).

While these are cited as a resource to provide reinforcing data, U.S. Labor Department figures were used for computations. This number is matched with reported vacancies and shortages of workers in healthcare jobs to determine a potential labor gap.

Qualitative data was particularly valuable with stories from workers within the healthcare system. The expectation was to be able to the authors many years of working with state health associations for survey distribution and for interviews. The same contacts had been used for similar research a few years ago. It was much more difficult to obtain collaboration this time with an overwhelmed healthcare industry due to Covid-19.

Steps

Productivity data for the U.S. on healthcare productivity is from United Nations statistics as reported in World Population Review (2020).

Population data is from the U.S. Census bureau as reported in United Nations figures. Working population figures are from the St. Louis Federal Reserve (2020) which were also used by OECD. Population numbers were needed as official statistics are often reported in percentages (i.e., the unemployment rate) and occupational vacancies, students, and disabled are often reported in raw numbers thus requiring conversions for formula computation and diagram creation.

Quantitative data was obtained on U.S. employment from OECD and the U.S. Department of Labor. Trend charts, using the same data provided by the U.S. Department of Labor, are attributed to Trading Economics (Economics, T.,2020). Diagrams with this material are labeled U.S. Unemployment, U.S. Participation Rates, U.S. Physicians, and U.S. Nurses.

Disability statistics were gathered from several sources. Those used for computation were from the United Nations Statistical Division, Disability Statistics (United Nations Disabled Population, 2019). Total labor force numbers were found in

the U.S. Labor Department and Janco Associates (Janco Associates, 2020). Student enrollment for high school grads, dropouts, and for college enrollment and employment status for the U.S. is collected monthly in the Current Population nationwide survey of 60,000 households which was used as a resource. Literacy figures for high school graduates was found in Brandongaille.com. These were needed in the U.S. to adjust the computations for disabled students capable of working in healthcare occupations per our definition of literacy used in India and Poland.

Data used for computing occupation openings was taken from the U.S. Bureau of Labor Statistics (U.S. Bureau of Labor Statistics). Similar numbers are reported in other studies (Chiaravallot, 2018 blog; American Association of Medical Colleges report, 2019).

Research through survey and interview was more difficult than anticipated due to Covid response. Offices were closed, and health care workers stressed due to either overwork or having been furloughed. Still, the Wisconsin Hospital Association and the Leading-Edge Nursing Home Association were particularly helpful in obtaining several survey responses each. Survey responses were received by email directly to the author from three Administrators, four doctors, and four nurses for 11 total returns.

Survey responses on Likert scale were recorded. Answers to the first three survey questions were entered in Excel for bar graph diagrams addressing the main research question on perceptions of healthcare labor supply.

Data from surveys was compiled on hard copy. All open-ended responses for the U.S. were coded and assigned to one of four diagrams.

Narrative research was conducted over the phone. Three in-depth interviews were done separately with one nurse who has worked in several facilities, one nursing home administrator, and one doctor who practices and directs a clinic.

Interviews were transcribed from recorder to hard copy. Survey and interview responses were then coded to one of four diagrams based on comments.

Comments under each diagram were reviewed as a group and assigned to the appropriate heading of main story, non- story, dominant story, or counter story. The metanarrative was taken from reviewing material under the diagram headings.

A sampling of each category of responses is used as an indication of comments to reach table conclusions.

Chapter 5 Research and Analysis by Country

Data identified in Chapter 4 are applied in this chapter to answer research questions for each case study. The first equation identifies the present labor gap. The second, a revised labor gap, adjusts for those not participating in the workforce but capable of doing so. Results provide figures for the third equation determining a health care gap of workers needed to fill jobs in the present economy. An example of the first equation can be seen in a study by McCann (2018) which indicates demand creating a global talent shortage that is expected to get worse. In early 2020, the labor deficit was projected to be 3% of the workforce. By 2030, the gap is predicted to rise to 11%. If it's true that companies will be seeking locales with more plentiful talent, and the study data proves accurate, then India may be on track to becoming the world's most powerful business center. Among 20 countries included in the study, it is the only one expected to have a talent surplus — numbering 245 million workers — in 2030. The McCann study uses quantitative data which this dissertation finds incomplete for specific occupations and is flawed for policy decision-making.

In another of the case study countries, Poland, there is low unemployment and booming manufacturing production. Labor shortages are accelerating automation and increased use of robotics "not to replace people, but because there aren't enough of them to fill the factories" (McCann, 2018). Research in this paper will identify if such changes are taking place in healthcare and if verified, would be an indication that the knowledge economy rather than displacing workers and increasing unemployment is filling an unmet supply of workers.

Manpower (2019) reports more employers than ever are struggling to fill open jobs – 45% globally say they can't find the skills they need, up from 40% in 2017 and the highest in over a decade. For large organizations (250+ employees) it's even higher, with 67% reporting talent shortages in 2018. The surveys report 56% shortage in India, 51% in Poland, and 46% in the U.S. While Manpower comes to a different conclusion than McCann for India, and similar conclusions for Poland and the U.S., it does so through survey methods. Research in this paper goes beyond the approach on labor gaps shown in McCann, proceeds to create survey material such as Manpower, then goes further in depth with interview research on the same issue.

While there are surveys such as Manpower, and overall labor demand numbers such as McCann, none adjust for interest/ability of the available labor to preform specific occupations. To determine health care occupation gaps in each of the case study countries, quantitative research will estimate this number in the third equation as noted in Chapter 4. This paper also takes steps to approximate actual gap numbers involved in the healthcare labor market.

Qualitative data fills the Roe tables with responses of those in the healthcare field matching quantitative indicators, leading to conclusions on gap perceptions, causes and potential policy responses. Analysis of narrative is included in "metanarrative" at the end of each table.

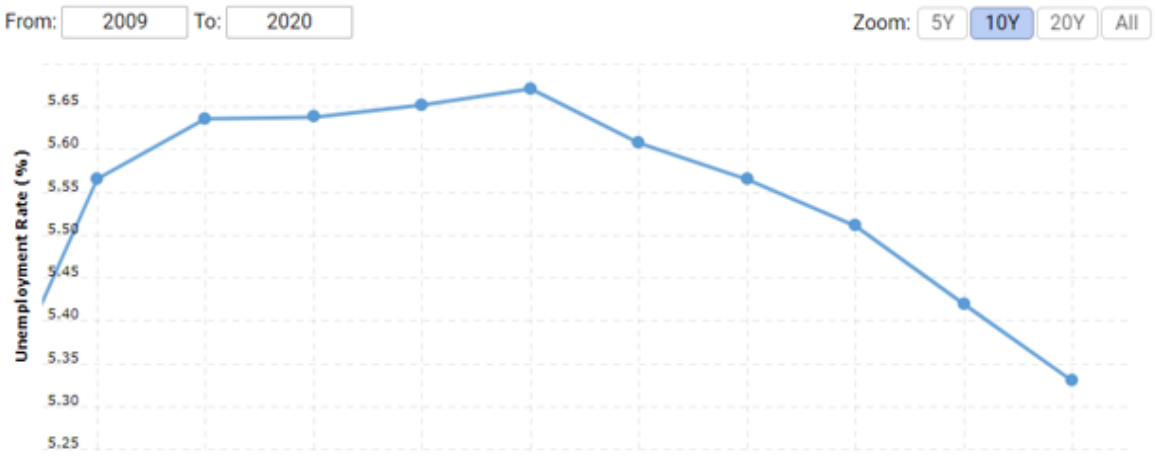
India

Present Gap = Demand for Additional Workers – Supply of Participating Workforce

The equation supply side is satisfied through unemployment rates and through participation rates. Demand side is cited in various studies, i.e. McCann (2018) and Manpower (2019).

Figure 4

India Unemployment Rate Trend



Note. Displays the India unemployment rate over 10 years.

Figure 5

India Participation Rates

Note. Displays India trend line of the labor participation rate

Labor 2018	Participation	Unemployment	Nonparticipation
India	49.8	5.3	50.2

Summary

India has a tightening labor market based on official statistics. There is a declining unemployment rate. There is also a declining labor participation rate which is now below 50 percent of working age people participating in the official labor market.

Revised Gap = Demand for Additional Workers – (Supply Participating Workforce + Adjusted Workers Available)

Adjust for Participation Rate + Available workers

Nonparticipation = disabled and students

Disabilities

India Disability 2.1% (India Census, accessed 2020, and World Bank based on India Census)

55% of those with disability are illiterate (Salve and Yadavar, 2017, note the 2017 government report is a repackaged version of government Report No. 485; 58/26/1 released 2002).

55% disabled literacy of 2.1% disabled = 1.1% of disabled are illiterate.

Using literacy standard, only 1.0% available labor pool increase from those with disabilities, unknown number in employed status, subtract 1.1 % disability from available (50.2%) to work.

Education

India has secondary school (grade 9-12) enrollment of 75.18%, and tertiary school enrollment (higher education) at 26.93%, a median of 51.1% (the global economy data from UNESCO, and World Bank, Participation in Education).

Of the total population, 17.79% are in the 15-24-year-old bracket, which is working age and the age of most students. 51% of the 17.79% age group are in school, or 9% of the total population (OECD, 2015).

66.23% of the population is working age (World Bank, Population Ages...., 2019).

17.79% population of those in the education age brackets is 12% of the total working age population (66.23%). Using global economy data as noted above with a

median estimate school enrollment of 51.1%, the availability pool of working age people in school, would be reduced 6% (51% in school of 12% working age population).

Participation Rate + available workers – adjusted disabled – students

(Available workers are nonparticipating workers -disabled percentage -students)

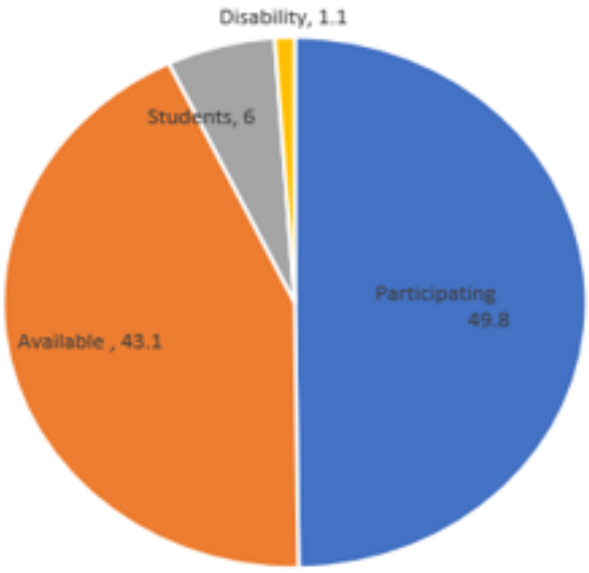
India Nonparticipating and Unavailable = (-1.1%) disabled (-6%) students = (-7.1%)

2018 India Available to work = Participating Rate (49.8%) + available workers (50.2%) – adjusted disabled (1.1%) – students (6.0%) = 43.1%

India available workers = 43.1% that are presently outside of the participating workforce.

Figure 6

Labor Supply – India



Note. Displays percentages of India labor available to work but not participating.

Summary

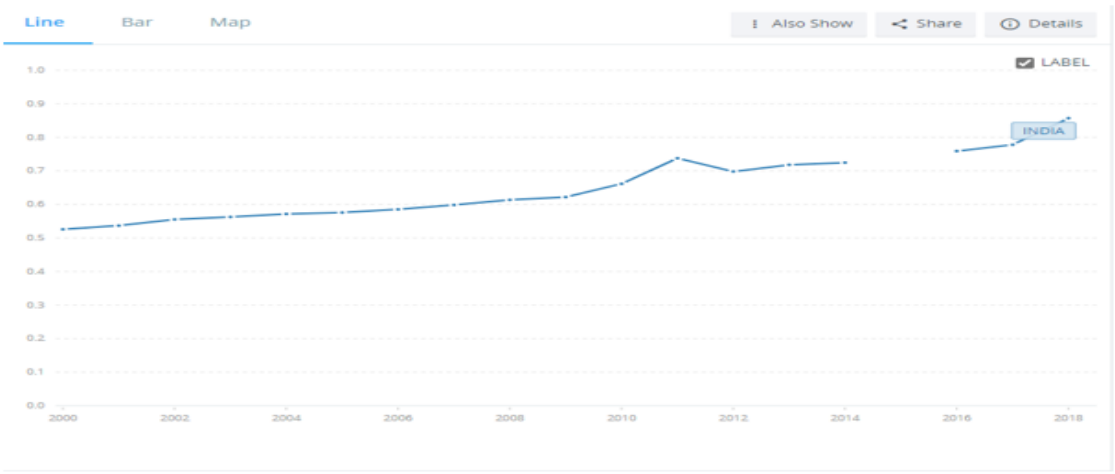
India unemployment has had a declining trend. This is favorable towards prospective employees as workers are in demand with fewer people in the job market. At the same time, the percentage of working age people participating in the workforce has been shrinking. Employers seeking workers are finding a shrinking available labor pool with a tightening labor market. There are increasing percentages of working age people no long seeking employment or participating in the labor market. This accounts for business reports of labor shortages. There is an available pool of potential workers

equal to 43.1% of all working age people. These workers are outside of the official labor market and may be interested/capable of filling a variety of occupations.

Health Care Labor Supply

Figure 7

India Physicians



Note. Trend of India Physicians per 1000 people

Figure 8

India Nurses and Midwives

Note. Trend of India Nurses and Midwives per 1000 people

2018	Physicians/1000	Nurses/Midwives	Total
India	0.86	1.73	2.59

Summary

There has been a gradual increase in the number of health care workers per capita over time which has reached 2.59 per thousand population. The World Health Organization recommends from 4.45 to 5.9 doctors and nurses per 1000. Health care productivity as measured through life expectancy has increased during this period.

Productivity

Life Expectancy in Years (World Bank, 2019)

	Life Expectancy in Years				
	1950-05	**1960-05**	**2016**	**2017**	**2019**
India					
Female			70.2		70.8
Male			67.1		67.6
Total			68.9		69.1

Health Care Labor Demand

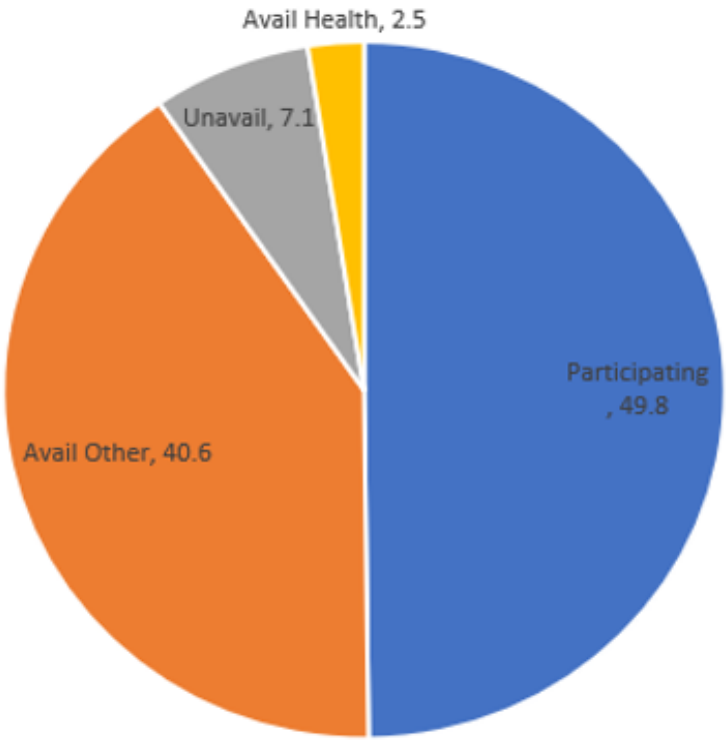
Health Care Gap = Demand for Additional Health occupations workers – Supply of Potential Health Care Employee

The Health Care Occupation Labor Gap

5.92% potential interest in target occupations x 43.1% pool of available but nonworking population = 2.5% available for target health occupations

Figure 9

Unutilized Health Labor-India



Note. India unutilized labor available for working in health care occupations, 2.5%

2.5% available healthcare workers x 860,000,000 working age population (UNDP cited in Tandon) = potential workers 21,500,000 to address shortages of 600,000 doctors and 2,000,000 nurses. (India facing shortage, 2019, study from Center for Disease Dynamics, Economics, and Policy, based on World Health Organization numbers). In India, there is one government doctor for every 10,189 people. The World Health Organization (WHO) recommends a ratio of 1:1,000, or a deficit of 600,000 doctors, and the nurse/patient ratio is 1:483, implying a shortage of two million nurses.

(World Health Organization Background Paper No. 1, 2011, updated 2019, also see Economic Times, India Times, 2019).

The WHO Background Paper No. 1 on Health Workforce Requirements for universal health coverage and the sustainable development goals has since increased the minimum worker density to 4.45 doctors, nurses and midwives per 1000 population. (16117-Health workforce requirements for universal health coverage and the Sustainable Development Goals, 2019, pg. 6, Web (who.int). There are variances within the World Health Organization as to a recommended density of health providers. Recommendations range from 2.1 and 3.4 providers/1000 during the period 2010 through 2017. The 2019 updates range from 4.45/1000 to 5.9/1000 (U.N. Ending Preventable Maternal Deaths Initiative, WHO Background Paper No. 1, pg. 14).

Summary

India has a supply of potential labor to fill a need for health care employees in the country. The growing population in India has a declining percentage of working age people participating in the labor market, measured at 49.8 percent in this study. When adjusted for nonparticipating but potential workers by discounting students and those not working with disabilities, 43.1 percent of working age people are found to be outside the labor market. Adjusting for those not working likely to have interest/ability as potential healthcare employees, research shows there to be a potential 21,500,000 workers to address shortages of 600,000 doctors and 2,000,000 nurses. A factor allowing an increased pool of actual participating workers is the population growth in India which had been at 2 percent until a recent gradual decline to 1 percent in 2020

(United Nations - World Population Prospects,

ref='https://www.macrotrends.net/countries/IND/india/population-growth-rate'>India

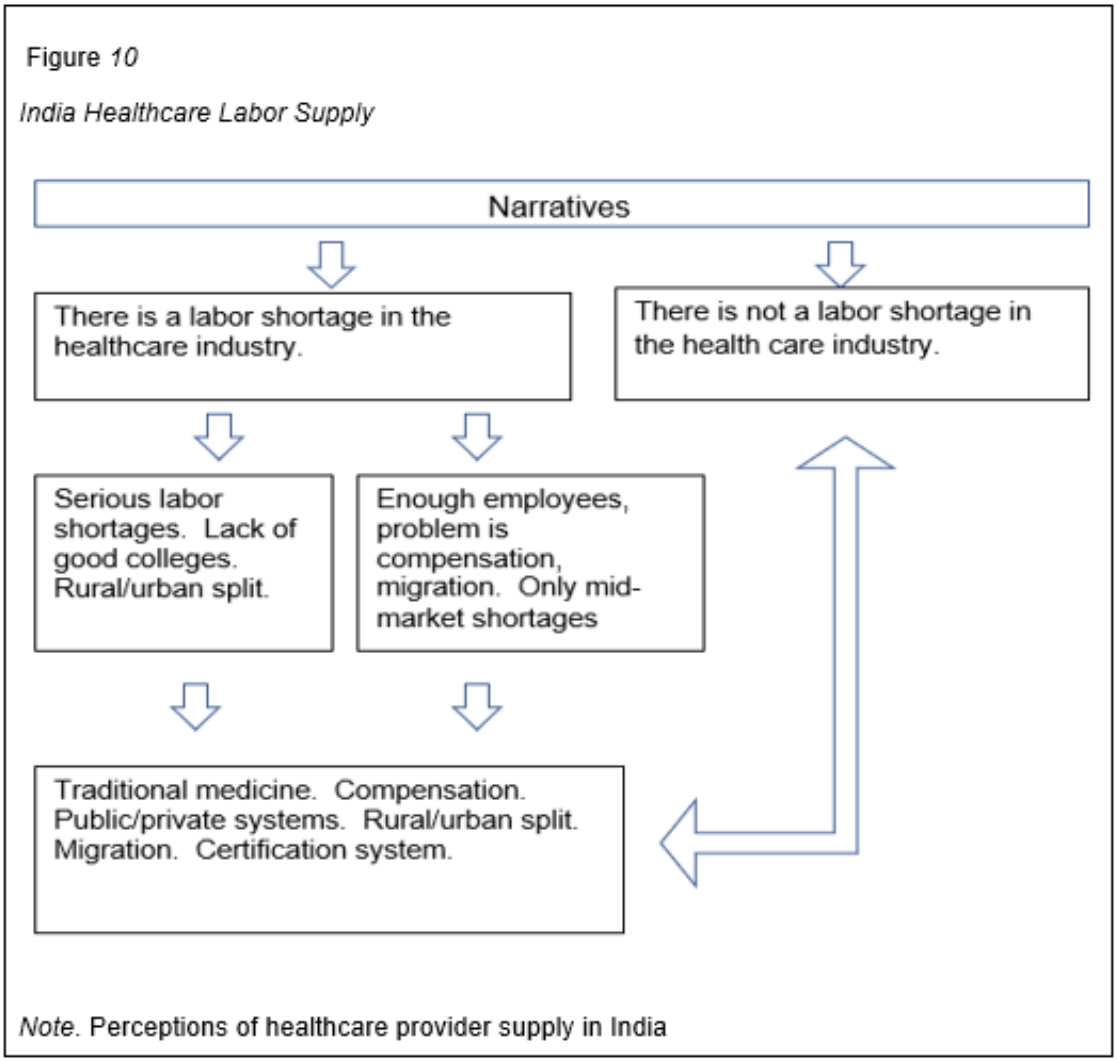
Population Growth Rate 1950-2021. www.macrotrends.net. Retrieved 2021-04-11).

Survey and Narrative Research

Diagram and commentary below are coded from interview excerpts. Survey results are included by topic relevant to the Poe diagram.

Figure *10*

India Healthcare Labor Supply



Note. Perceptions of healthcare provider supply in India

Figure 10 sample is 24 respondents: Administrator 4, Doctor 10, Nurse 6, Healthcare student 4

Story Box. There is a labor shortage: examples include 2 Administrator, 4 Doctor, 1 student

Non-Story Box. There is not a labor shortage: examples include 1 Administrator

Dominant Story Box. Serious Shortages: examples include 2 (+1) Administrator, 3 Doctor, 1 student, plus 1 similar response from multiple workers

Counter Story Box. Enough Employees: examples include 1 Administrator, 1 Doctor, 1 Student

Story: There is a labor shortage in the health care industry

“Availability of doctors and hospitals including alternative medicine is not enough as per the population to be attended” (Administrator).

“India is facing a serious problem in the form of inadequacy of public health infrastructure as well as manpower” (Doctor).

“Then I seriously believe there is a lack of skilled health care employees in India” (Doctor)

“Yes. Absolutely. We need an enormous number of them. We have nowhere near the need. Because I think I think we’re meeting the need maybe 20-25% at most.” (Doctor)

“Here we have problems, huge problem for us, is huge problem with technicians, huge problem with patient councilors, that kind of stuff. Any paramedics, in ophthalmology, we call mid-level atomic personnel, that comprises all these categories. There is a huge gap between need and supply.” (Administrator)

“I believe there are shortage of health care workers as many vacancies are not filled in hospitals

Absolutely there are shortages of health care workers in India.” (Doctor)

“... I believe there is a huge shortage of health care workers.” (Student)

Nonstory: There is not a labor shortage in the health care industry.

“There are many skilled health care employees in our country, but the problem is they are not employed. And even if they are employed, a large section of them is underpaid. That is why nurses flee abroad.” (Administrator)

Dominant Story: Number and quality of medical institutions, rural/urban split, migration

“Due to a lack of good institutes and teaching.” (Doctor)

“Limited number of government medical colleges.” (Administrator)

“The situation is very much worse in rural areas than in urban areas.” (Doctor)

Rural urban split. Shortage caused by low wages, *migration (*multiple respondents)

“Yes, there is shortage of healthcare workers in our country and in village or rural area it much more as compares to urban or metro city area.” (Doctor, similar comment from Administrator)

Quality of life for the people of India especially in the rural areas are pathetic. (student)

Counter story: not a labor shortage, created by other issues

“There are many skilled health care employees in our country, but the problem is they are not employed. And even if they are employed, a large section of them is underpaid. That is why nurses flee abroad.” (Doctor)

“There is a huge supply. If you look at the middle of the market, so to speak, in terms of doctors, there is a significant supply of good doctors, of quality doctors. India produces the largest number of doctors and engineers in the world. Every year. Universities are dodgy.” (Administrator)

“...people there are still getting treated by quacks, which is doing serious damage to their health. So, there should be a proper approach towards increase in skilled health care employees.” (Student)

Metanarratives of Figure 10: India Healthcare Labor Supply

Family facilities. Traditional medical system. Legitimacy of certification. Rural-urban. Wages and migration.

There is a split between the public and the private system with few people able to afford the private system.

India has a sizable traditional medical system, recognized by the government.

There is concern with the certification system – or at least with the qualifications of those professing to be qualified as health care providers.

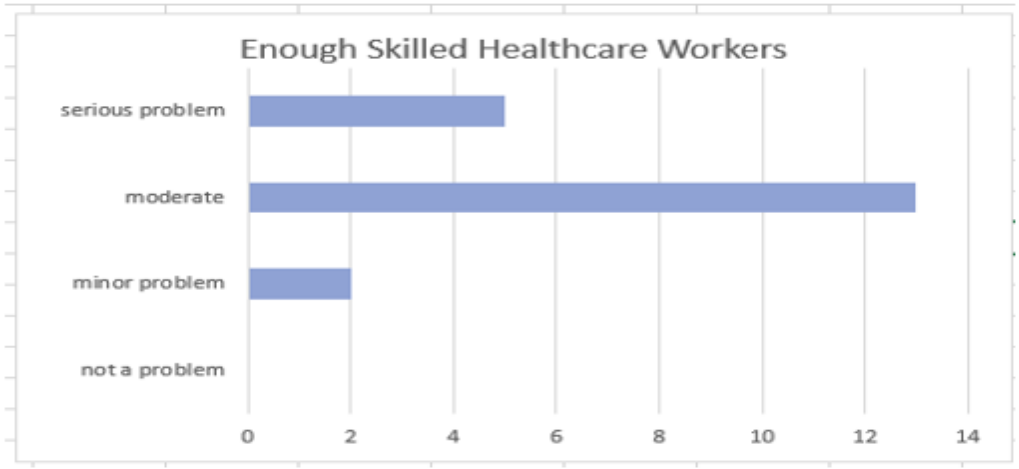
There is a wide concern over the rural-urban split for health care.

Concern over low wages which results in decline in qualified people in health care.

There is a sizable expression of concern with the migration of health care personnel to other countries.

Figure 11

Survey results Question 1 Do you think there are enough skilled healthcare employees in India?

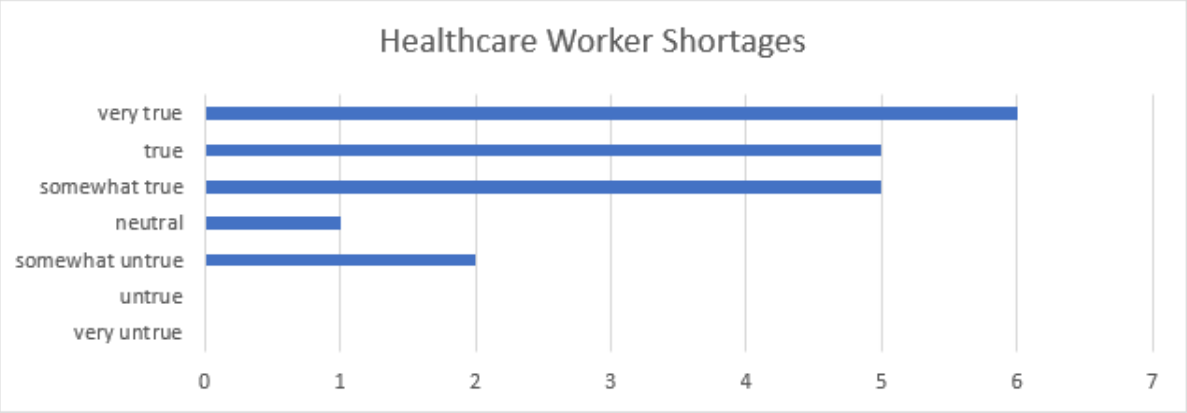


Note. Responses to survey question 1 on perceptions of enough skilled healthcare employees in India.

Figure 11 sample is 20 respondents: Administrator 2, Doctor 9, Nurse 5, Healthcare student 4

Figure 12

Survey Questions 2: Do you believe there are shortages of healthcare workers?

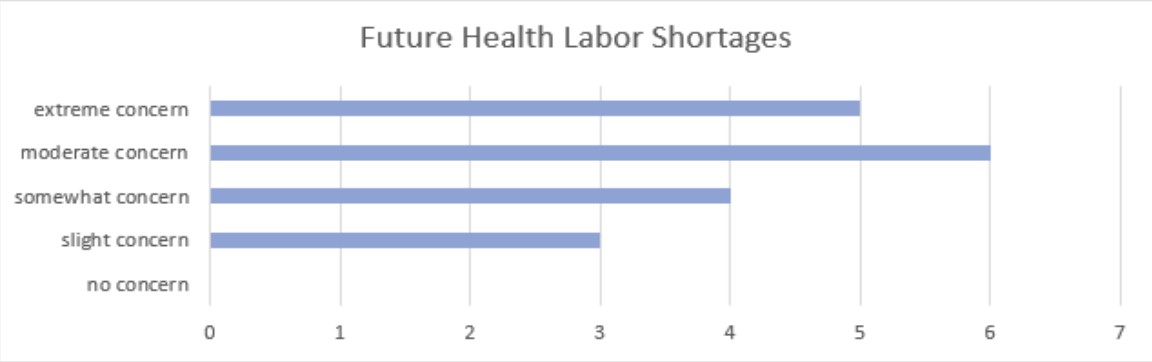


Note. Responses to survey question 2 on perceptions of healthcare worker shortages in India.

Figure 12 sample is 19 respondents: Administrator 2, Doctor 9, Nurse 5, Healthcare student 3

Figure 13

Survey Results Question 3. Future healthcare labor shortages



Note. Resposes to survey question 3 on perceptions of future health labor shortages in India.

Figure 14 sample is 18 respondents: Administrator 4, Doctor 10, Nurse 5, Healthcare student 2

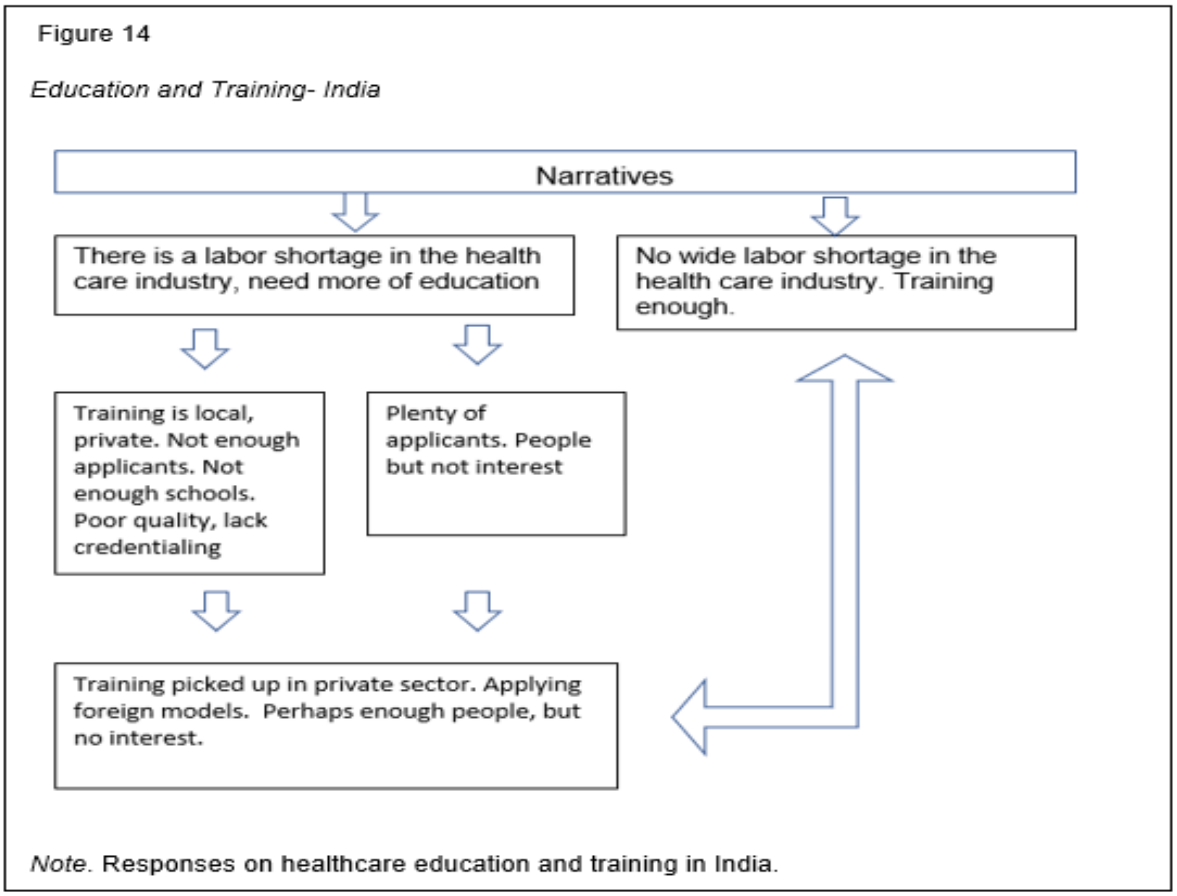


Figure 14 sample is 24 respondents: Administrator 4, Doctor 10, Nurse 6, Healthcare student 4

Story Box. There is a labor shortage, need more education: examples include 5 Doctor

Non-Story Box. There is not a labor shortage: examples include 0

Dominant Story Box. Serious Shortages: examples include 2 Administrator, 6 Doctor, 1 Nurse, 3 students, plus 1 similar response from multiple workers

Counter Story Box. Enough Employees: examples include 1 Administrator, 5 Doctor, 1 Student

Story: There is a labor shortage. Need more education.

“Good health care services are dependent on good facilities and protective equipment for healthcare professionals. They are to be treated as assets of the country who can save the health of the nation but unfortunately their facilities and working conditions are compromised.” (Doctor)

“But the number of healthcare workers in public domain very less. Those who working in public sectors are excellent interns of quality but poor in terms of number.” (Doctor)

“There is a lack of health care employees in our country.” (Doctor)

“Shortage of skilled health care workers.” (Doctor)

“Because in present time the ratio between patient and doctors not satisfying.” (Doctor)

Nonstory: No widespread labor shortage

Dominant Story: Need more education, better schools, more students, onsite training. Urban/rural differences and university location is important.

“We need excellent health care workers who can combat the upcoming challenges.” (Doctor)

“It depends not only the country but also on states. States government can do much better development projects for health care education.” (Student)

“They are not well prepared and trained. They lack knowledge.” (Doctor)

“There are enough health care workers in our country but most of them are saturated in the urban areas.” (Doctor, similar from Nurse).

“The first is in the number of quality colleges that are there. There are a number of private colleges, medical institutions, teaching institutions that have come up that are quite dodgy.” (Administrator, similar multiple respondents)

“But on the ground things are not moving at the speed to which they should. So, we try to, for our own needs, we try to develop our own human resources. We’ve started several types of training programs to meet that need. What we done is, ah, for the last nearly quarter of a century, so we have identified the need. And then we put out the competencies that are required to meet that need. And then we began to select people from different areas, different qualifications that are required for the task and then we started training ourselves. And it has done a lot of good for us. One is we were able to meet our need. And second is that we were also able to get people of quality that we really want. So that way it’s helped us to have our own training programs.” (Doctor)

Question: How to people get into the Institute, how are they accepted for education?

Answer: “It’s a very competitive exam. If I’m not wrong, there are about 300 seats every year. And I’m sure over 3 million people apply for it.” (student)

“There are lot of health education institutions in India. But quality of such institutions is doubtful. It will make difficult to make skilled health care employees.” (Student)

“There is shortages of health care workers and that is directly related to less number of medical school, nursing, institute, mainly at their location areas.” (Administrator)

“Quality of education is decreasing rapidly. College only gives you a degree not knowledge.” (Doctor)

Counter Story: Good schools, shortage of applicants. On-site training. Innovation in creating new occupations.

“I think it’s good. There is availability of quality institute in country to provide good health care preparation.” (Doctor)

“Because I think Indian doctors are the best to treat and they are the kindest.” (Student, similar from Doctor)

“Our education system is fair enough.” (Student)

“... we have a terrible problem at the start recruiting them and retaining them because they think it is not exciting. It’s just putting clothes on eye patient, cleaning the eye, cleaning the patient, so nothing exciting for the nurse. So, we asked ourselves, how do we address this? Then we decided these are the tasks that are to be done 90% of the time. We don’t really highly qualify the nurse so how do we meet the needs. So, we came up with this idea of a nurse assistant. Girls again from underprivileged families, mostly rural areas. Bring them and train them for a year, put them through an internship. 5 years down the line they are as good as anybody in the world. They can now recruit the University of Rochester School of Nursing. They come and help and joke with us we are going to steal your girls to work in Rochester.” (Doctor)

Question: Do you certify them – self-certify them? Answer: " Yeah. We certify them and then, d the University of Rochester now trying to get them certified with the nursing thing in the US." (Doctor)

"There are many skilled health care employees in our country, but the problem is they are not employed. And even if they are employed, a large section of them is underpaid. That is why nurses flee abroad." (Doctor)

"There is somewhat shortage of health care professionals but there are still many who are unable to give their regular proper series due to unavailability of recruitment and job prospects. Many change their fields." (Doctor)

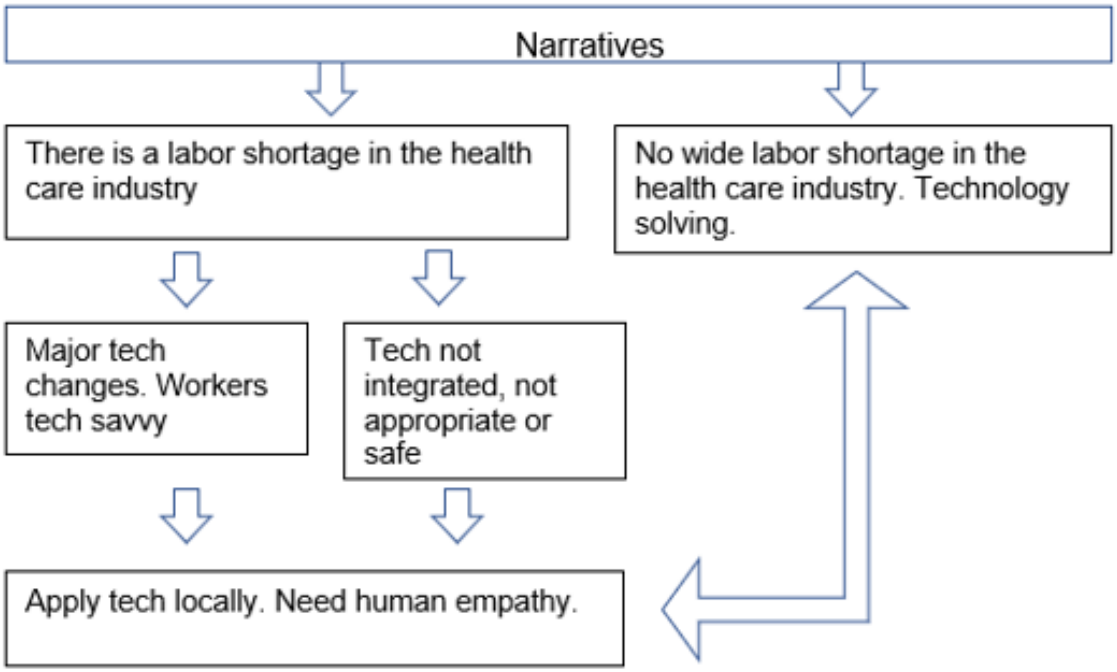
Question: Do you have difficulty finding enough students? More than enough students? Answer: "Well, some currently there are problems, some others you don't get adequate number of applicants. That's the funny part, actually which is sometimes puzzling, because when we offer these courses, we have two purposes. One is to meet the needs. Second is also to create employment for kids who come out of underprivileged families, particularly in rural areas. So, while there is some much need and there is so many kids from these families that don't have any occupation. They also don't apply. We give them completely tuition free. We actually provide accommodation in hostels, and we give them a stipend. They don't have to depend on their families for any financial help. But sometimes find it challenging to get adequate numbers. That is something puzzling that we don't understand." (Administrator)

Metanarratives for Figure 14: India Education and Training

Training picked up in private sector. Applying foreign models. Perhaps enough people, but no interest. States can take lead. Split on adequacy of training. Concern with credentialing. Many applicants for some schools but tightly restricted admission. Losing educated workers to other occupations or countries. Shortages may be related to proximity of schools.

Figure 15

Technology in Healthcare- India



Note. Observations on technology changes from healthcare providers in India

Figure 15 sample is 24 respondents: Administrator 4, Doctor 10, Nurse 6, Healthcare student 4

Story Box. There is a labor shortage: examples same story as previous India tables

Non-Story Box. There is not a labor shortage. Technology is not solving: examples 0

Dominant Story Box. Major Tech Changes: examples include 4 Administrator, 4 Doctor, 1 student, 1 educator

Counter Story Box. Tech not integrated: examples include 1 Administrator, 3 Doctor, 2 Student

Story: There is a labor shortage in healthcare

Nonstory**:** No wide labor shortages. Technology is solving any shortages

Dominant Story**:** Workers capable. Major tech changes occurring.

“Technology within the space of health care, if it means interconnectivity. I’d say, learning, there are things like telemedicine. Telemedicine is reaching rural India a lot. That is one thing technology is providing. But that within itself is not a solution because today even if there is a diagnosis through telemedicine, there is not enough doctors to treat the patient based on the diagnosis.” (Administrator)

“Internet and computer tech is having a valuable role in health care system data saving, presentation made easy.” (Education)

“Because I have learnt to use it and we use it, practice it and its necessary.” (Doctor)

“It is very helpful for time saving and accuracy.” (Student)

“It is very easy to use. IT gives answer to almost all your questions/doubts. They make your work easier and save your time.” (Doctor)

“In this era, we use these technologies very well.” (Doctor)

Internet is the basic thing we need to be able to get updated with the latest info in science and medicine. (Doctor)

“I can give you a couple of examples. The first is the government is looking at telemedicine in a major way. It is trying to connect the VEIC’s, or even if you look at the tertiary hospitals, the primary centers, they’re trying to build out a technology backbone to help link all of these units together. So, to create a network that these doctors even if they’re not living there can remotely advising doctors or even auxiliary staff of what to do and what not to do. There is obviously an attempt beyond the point to connect. For instance, to create a national cancer corridor, and connect it to various grids like the grid with hospitals in the US and the UK so that there is a free flow of knowledge that happens across. The government is talking about a health information system that will digitize all health records and make it accessible to people as they travel across the country.” (Administrator)

“One is it’s creating an efficiency. For instance, in the MAMA program I was discussing where in Madrasah for instance, they’ve created this program to reach out to would-be mothers across all strata of society and to get them information in a timely fashion in neo-natal health, internal health. So, if using technology and it’s in the local language and it’s a service you can subscribe to, it’s push service at certain sections of society. It’s basically adding a layer which didn’t exist earlier. It’s providing greater efficiencies and making it more robust. One could example would be if you look at the i-stocks they’ve created in the transportation of vaccines which again has come out of a couple of American institutions like PATH has been working with various government bodies of India. Ultimately what is happening is the life of the vaccine is becoming longer. The

effectiveness is better. The delivery system is becoming more robust. If you look at what is happening with the auxiliary health workers and the training that they now get, some of it online, what is happening is it's making stable jobs for them. They are becoming more important and critical to the society in which they are operating. So, I think that whichever way you look at it, technology is not replacing jobs at the moment. It's actually adding layers to efficiency and trying to make it more robust as a system. It is definitely aiding, helping the health care system." (Administrator)

"...the mobile phone and smart phones are going to become a very, very important device and medium to communicate with people in health care and bring them into the health care orbit." (Administrator)

Counter Story:

"I am not a much a techno-savvy person, so I am comfortable in a moderate amount." (Doctor)

"Because using computer/mobile phone for long time makes straining of eyes." (Doctor, similar from student)

"But there are millions of poor people in India for those where a computer is a dream." (Doctor)

"It's going to take a long time to fill the gap." (Doctor)

"Because majority of people in our country rely on allopathic treatment and resistance to several medicines have been developed by this, they reduce efficiency of treatment in

allopathy and deprive Ancient Medicine systems of the right amount of exposure to the diseases." (Administrator)

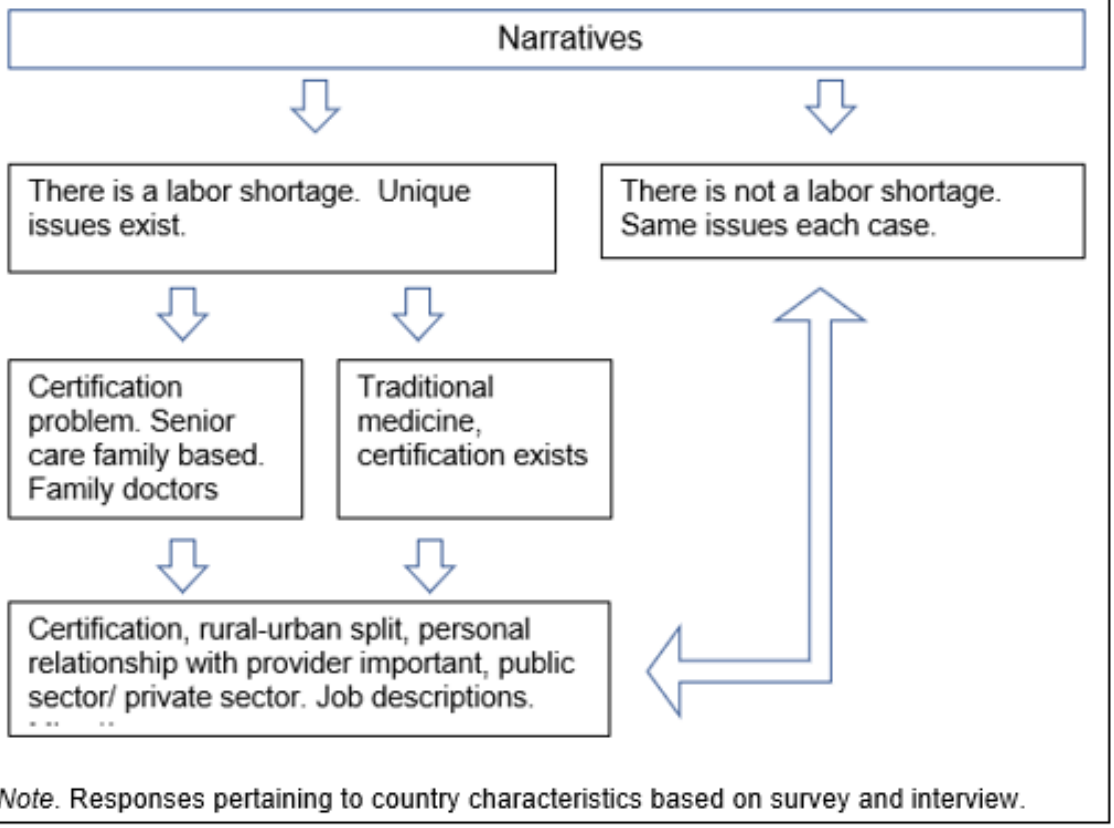
Metanarratives of Figure 15: India Technology Changes in Healthcare:

Apply technology locally. Mobile use has expanded and can reach rural areas. Telemedicine expanding. Training expanding. Supply chains improving. Shared best practices more accessible.

Need human empathy. Concern with personal safety/usage issues. Weakness is the patient and lack of network access.

Figure 16

Cultural and Economic Issues- India



Note. Responses pertaining to country characteristics based on survey and interview.

Figure 16 sample is 24 respondents: Administrator 4, Doctor 10, Nurse 6, Healthcare student 4

Story Box. There is a labor shortage. Unique issues: examples 0

Non-Story Box. There is not a labor shortage: examples 0

Dominant Story Box. Certification problem: examples include 8 Administrator, 2 Doctor, 1 student,

Counter Story Box. Traditional Medicine: examples include 1 Administrator, 1 Doctor, 1 Student

Story: There is a labor shortage.

Nonstory: No labor shortage. Same everywhere.

Dominant Story**:** Certification issues. Training subpar. Migration effecting supply. Financial stresses. Strong traditional medicine component. Inequality Urban/Rural; rich/poor.

"what is coming out is not necessarily all that good. It's not standardized in grade." (Doctor)

"The problem is, if you go a level higher, to the specialists, the problem is a lot of the medical students are heading overseas to study for their secondary degrees.... A lot of them don't go back. And if you really look at it, part of the reason is there are limited opportunities in R & D." (Administrator)

"The problem is, the opportunity to learn, the opportunity to practice the latest technologies is higher in the West. And therefore, a lot of these students who are really, really bright, go away and don't come back to India unlike in say, the technology space where a lot of people actually went back from Silicon Valley to say Bangalore or places like that, you know, the IT hotbed. In medicine a lot of these people haven't gone back. And therefore, what has happened is there aren't a lot of specialists of great quality in the country." (Administrator)

"Doctors are not driven by the Hippocratic Oath, and they need to do well and need to try to treat people and to make them feel better. It is very much a money-making profession. They are obviously driven by commercial and creature comforts. And if you ask a doctor to spend even a couple of years in a rural setting, they would much rather

not. They want to stay in the city, and then go to a bigger city if possible, move overseas." (Administrator)

"The nurses we have are not well trained. Even if they are well trained, they don't want to handle patients who are unfortunately suffering from chronic of infectious diseases." (Doctor)

"The fact is, a lot of Indian families from Kariba found that it was an easy way to migrate to the US, and to the UK. And they'd migrate with their families, and to the Middle East and to Europe. And while they created a lot of talent, the talent has gone overseas. And they have no intention to return." (Administrator)

ASHA network created

"So, what it does do so it basically cascades budgets to the states. And states are free to. They contribute to the budget as well. But the fact of the matter is they've got a large say in deciding what the priorities are in the state. So, if you look at the health care budgets are divided between a federal level that support the federal level programs like the national health mission." (Administrator, similar from student)

"There are lots of male nurses that come out of Kerala. Lots and lots and lots. They are called brothers rather than sisters. If you're introduced to a Nurse, you call her sister. If it's a chap you call him brother. A lot of the leading hospitals across India have nurses called brothers or sisters. And the reason for that is there are certain jobs within nursing that are more strenuous. It's also, if you ask me, because a lot of brothers understand it's a passport out of the country. These are countries like the US and the UK that they can work as nurses and being male or female doesn't 't make any

difference. A lot of people are joining the nursing profession primarily because they see it as a passport to a different life overseas." (Administrator)

"There is something called the Ministry of Ayush. Ayush is an acronym for everything from Ayurveda to Unani. Unani and yoga. Yoga is obviously yoga. Unani is the traditional medicine which comes from Islam. And Ayurveda is the traditional medicine that finds its roots in Hinduism. The fact of the matter is if you look at the current government, they are very, very, very bullish on Ayurveda." (Administrator)

"Because there is very clear mistrust of doctors. And that trust does not exist simply because it has become a large business as medicine. But, at the same time, in urban areas of India, there will be multi-specialty hospitals with the relevant doctors and nurses to support them. But the minute we go to Tier 1, Tier 2 Cities, outside the main cities, which means rural India primarily, multi-specialty is run by quacks, honestly in many stages." (Administrator)

Counter Story

"Because it is obvious that everyone wants to increase the productivity in their respective field. In order to increase the productivity, they need to find out the skilled workers in their business." (Doctor).

"Because we need skilled persons in every field that will help in development of entire country, but a special emphasis will be for health care field, because health is the base for all the development in other fields." (Student)

"The challenge is very simple that are, every family for example, will try to identify one doctor and say, ok, that's the doctor we will go to." (Administrator)

Metanarratives of Figure 16: India Cultural and Economic Issues

Widespread belief that there is a shortage of health care infrastructure in India. Sensitivity to the size of the population. Belief that government is trying to address the issue, but not a clarity on which level of government. Concern with income disparity and the rural-urban differences. Sensitive to the loss of qualified workers for other countries – migration an issue. Awareness that there is a large alternative medicine system in the country. Private education systems, including employers, trying to fill the education gap through their own programs.

Hippocratic oath and motivation for entering health care field is not followed in India.

Interesting sense of a general labor shortage despite the national sense of having a large population and many people in need of good jobs.

India Summary

India has a supply of potential labor to fill a need for health care employees in the country. The population in India had been growing at over 2 percent each year until gradually declining to about 1 percent in 2020. There is a declining percentage of working age people participating in the labor market, measured at 49.8 percent in this study. When adjusted for nonparticipating but potential workers by discounting students and those not working with disabilities, 43.1 percent of working age people are found to be outside the labor market. Adjusting for those not working likely to have interest/ability as potential healthcare employees, research shows there to be a potential 21,500,000 workers to address shortages of 600,000 doctors and 2,000,000 nurses.

There is a strong sense of healthcare worker shortages in India. The feeling is that government is trying to address this issue. The disparity between urban and rural areas is significant with rural areas having a greater deficit of health care availability. Both quantitative and qualitative data indicate a gap of healthcare workers and demand for workers. Quantitative data suggests there are a pool of workers within India that can fulfil the gap to meet minimum healthcare worker density standards established by the World Health Organization, a reasonable goal in public policy.

Compensation is cited as not adequate in attracting people to healthcare occupations, especially nursing/midwifery.

Technology is recognized as having an important role in changing health care service. It is generally viewed as a positive in reaching people and in attaining information. Most people, particularly younger people, have a comfort level using technology. There is a belief that technology can help close the urban-rural gap.

Culturally there is a strong alternative/traditional medicine in India. There is considerable note of an unregulated medical system in terms of certification and in quality of schools. There is a rural-urban split in society, and in a distinct separate private health system for those who can afford it. There is a loss of healthcare workers through outmigration.

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Poland

Present Gap = Demand for Additional Workers – Supply of Participating Workforce

The equation supply side is satisfied through unemployment rates and through participation rates. Demand side is cited in various studies, i.e. McCann (2018) and Manpower (2019). While demand information is provided in this section, it is important

only in demonstrating policy implications and not in addressing the research question pertaining to healthcare occupations.

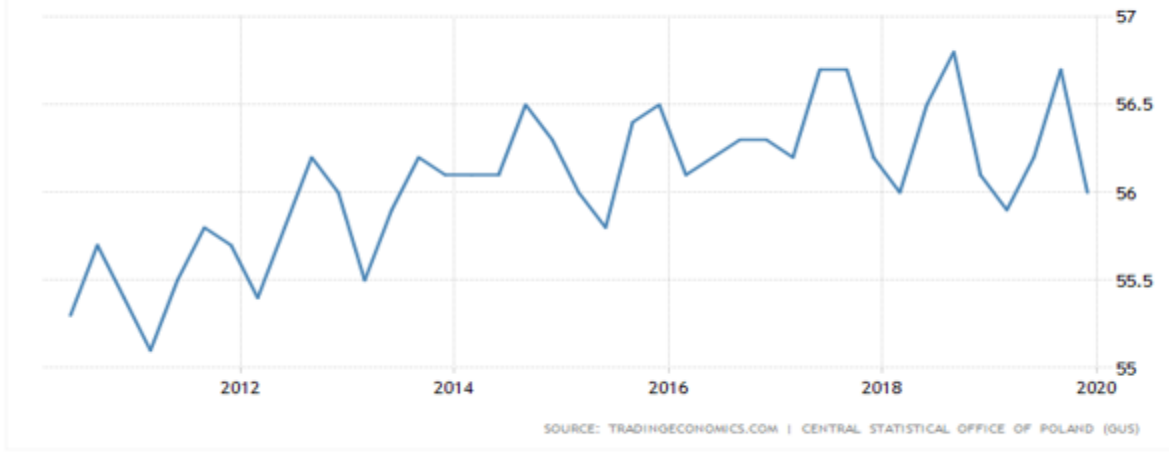
Figure 17

Poland Unemployment Rates

Note. Displays the trend of Poland unemployment rates

Figure 18

Poland Participation Rates



Note. Displays the trend of Poland labor participation rates

Labor 2018	Participation	Unemployment	Nonparticipation
Poland	56.2	6.5	43.8

Summary: There is a steadily tightening available labor supply in Poland based on a declining unemployment rate. The labor participation rate, while below that of 2014, has held steady within a range generally between 56 percent and 56.8 percent over that past six years.

Revised Gap = Demand for Additional Workers – (Supply Participating Workforce + Adjusted Workers Available)

Adjust for Participation Rate + Available workers

Nonparticipation = disabled and students

Poland Disability 13.4

67.7% of those on disability are already in workforce. (Poland Census of Population and Housing). Adjustments are not made for Poland disabled literacy as Poland reports a 99.8% literacy rate (Index Mundi Poland) which for review of final measurements would indicate a more refined number would likely slightly increase those unavailable to work in some healthcare occupations.

67% disabled in workforce of 13.4% disabled population = 9.0% working, (13.4%-9.0%) 4.4% unavailable to participate.

Education

Poland has 90% school population in ages 15-19 and 32% in ages 20-29 (OECD, 2015). These numbers do not align with figures for workforce participation rates. In defining an estimate of this portion of the Labor Gap, a drop off occurs for all countries of those attending school as they age from 16 to 26 years old, and then drop to insignificant numbers of students not in the workforce thereafter. The midpoint percentage is used from the 15-19 and 20-29 age categories to calculate an estimated non-Gap qualifying number. For Poland this would be 61%, used to adjust for size of population in the respective age brackets.

Poland has a smaller 15-24 age group at 10.34% total population of which 61% are considered in school (OECD, 2015), and age 15-64 comprise 68.42% of the population (Central Intelligence Agency, 2019). The Poland Labor Gap would be reduced by 4.3% (10.34% of population x 10.34% in school x 68.42% of population as working age 15-64).

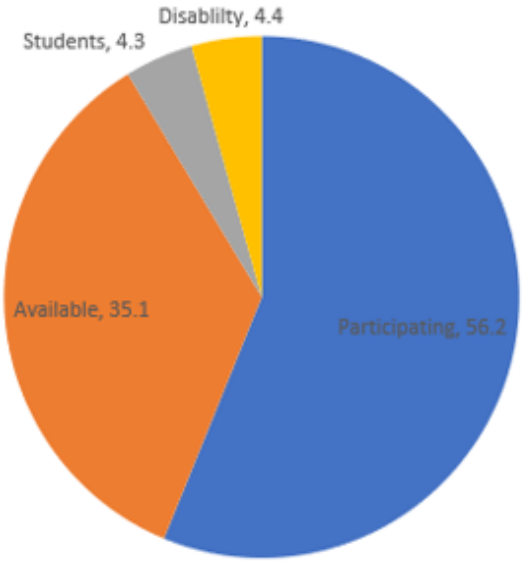
Participation Rate + available workers – adjusted disabled - students (available workers are nonparticipating workers -disabled percentage -students)

Poland = 4.4% disability + 4.3% students = 8.7% Unavailable to work

2018 Poland participation rate = 56.2% Additional available workers = 35.1%

Figure 19

Labor Supply – Poland



Note. Displays percentages of Poland labor participating, available to work but not participating, and unavailable.

Summary

Poland unemployment has had a declining trend. This is favorable towards prospective employees as workers are in demand with fewer people in the job market. At the same time, the percentage of working age people participating in the workforce has been steady. Employers seeking workers are finding a shrinking labor market. There is an available pool of potential workers equal to 35.1 percent of all working age people. These workers are outside of the official labor market and may be interested/capable of filling a variety of occupations.

Health Care Labor Demand

Health Care Gap = Demand for Additional Health occupations workers – Supply of Potential Health Care Employees

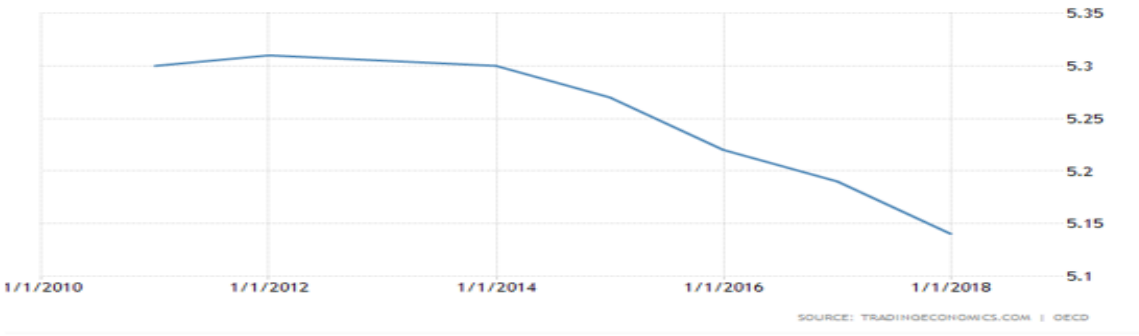
Diagram 20

Poland Physicians

Note. Trend of Poland physicians per 1000 people

Figure 21

Poland Nurses and Midwives



Note. Trend of Poland Nurses and Midwives per 1000 people

	Physicians/1000	Nurses	Total
Poland (2018)	2.57	5.14	7.71
(2019)	2.40	5.14	

Productivity

Life Expectancy in Years (World Bank, 2019)

	1950-05	1960-05	2016	2017	2019
Poland					
Female		80.6	81.6		81.8
Male		72.1	73.5	74.1	
Total				77.9	78.0

Summary

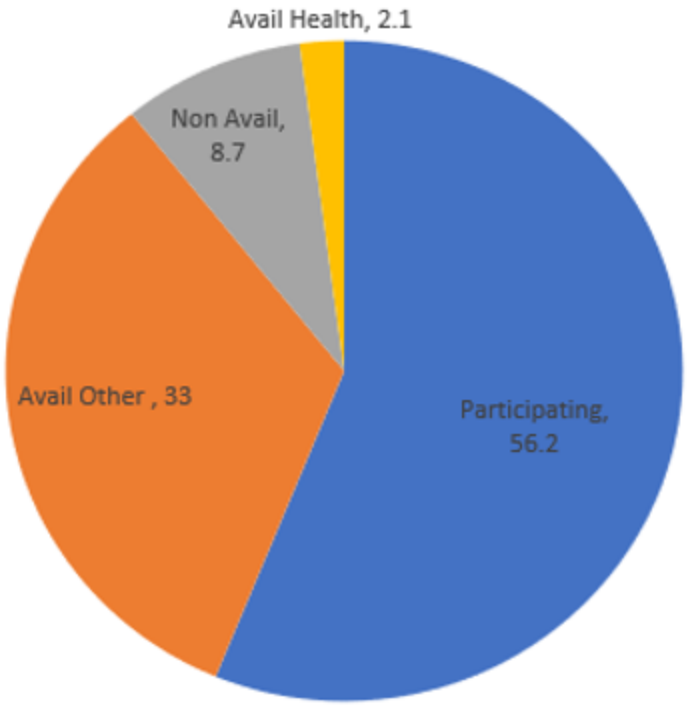
Until 2017 Poland had been increasing the number of physicians per capita, with a drop occurring following 2017. There has been a steady deterioration in the number of nurses/midwives per capital. Productivity has increased slightly despite these trends.

The Health Care Occupation Labor Gap

5.92% potential interest in target occupations x 35.1% pool of available but nonworking population = 2.1% available for target health occupations

Figure 22

Unutilized Health Labor – Poland



Note. Poland unutilized labor available for working in health care occupations, 2.1%

Poland 2.1% available healthcare workers x 23,200,000 working age population (Statistica, 2020) = potential workers 487,200

There is no data on occupation shortages for doctor, nurse or midwife occupations in Poland. Marketplace indicators with job openings would provide the most realistic number of actual worker shortages. Nor do the studies on shortages in Poland provide actual numbers. This study applies the same method to Poland used by the Center for Disease Dynamics, Economics, and Policy to determine an India gap by

determining the healthcare providers density per capita ratio. Again, note that there are differences within the World Health Organization as to a recommended minimum density of health providers. Recommendations range from 2.1 and 3.4 providers/1000 during the period 2010 to 2019. The 2019 updates range from 4.45/1000 to 5.9 (from the U.N. Ending Preventable Maternal Deaths Initiative, WHO Background Paper No. 1, pg. 14). The gap measured in this paper is the number of providers in Poland and that of the EU average based on a more realistic Polish public policy goal. The EU average for Physicians/1000 population and Nurses listed earlier for 2019 are confirmed by OECD statistics (OECD, 2019). OECD figures are used for comparison with European Union countries as peers in healthcare policy. OECD and WHO statistics align in our case studies when measuring the same occupation.

8.5/1000 nurses average in EU. Poland at 5.1 = 3.4/1000 difference, or gap

3.6/1000 physicians average in EU. Poland at 2.4 = 1.2/1000 difference, or gap

Population of 37,975,000

Shortage to become EU average would be 3.4 nurses x 37,975 population/1000 = 129,115 nurses

Shortage of physicians to reach EU average is 1.2 physicians x 37,975 population = 45,570 physicians.

There is a potential workforce of 487,200 for healthcare occupations with understaffing of 174,687 workers.

Summary

Poland has a supply of potential labor to fill a need for health care employees in the country. The population in Poland has a steady percentage of working age people participating in the labor market, measured at 56.2 percent in this study. When adjusted for nonparticipating but potential workers by discounting students and those not working with disabilities, 35.1 percent of working age people are found to be outside the labor markets. Adjusting those not working for interest/ability as potential healthcare employees, research shows there to be a potential of 487,200 workers to address shortages of 45,570 doctors and 129,115 nurses.

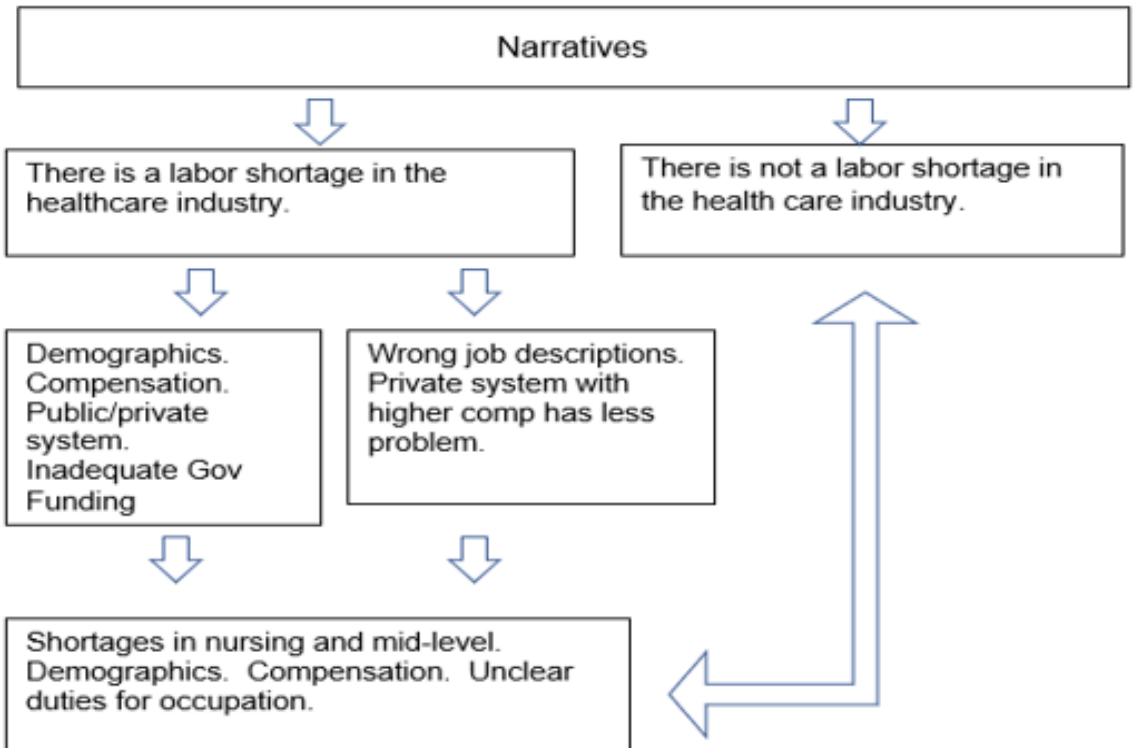
There are an adequate number of healthcare providers per capita in Poland to satisfy the minimum threshold established by the World Health Organization. Public policy goals have peer standards within the European Union. Despite an apparent shortage of health care workers in Poland using the higher threshold, combined with a declining number of health workers per capita, there is still an available pool of workers that could be targeted to satisfy labor demands.

Survey and Narrative Research

Diagram and commentary are coded from interview excerpts. Survey results are included by topic relevant to the Poe diagram.

Figure 23

Poland Healthcare Labor Supply



Note. Perceptions of healthcare provider supply in Poland

Figure 23 sample is 11 respondents: Administrators 4, Doctors 4, Nurses 3

Story Box. There is a labor shortage: examples include 1 Administrator, 1 Nurse

Non-Story Box. There is not a labor shortage: examples include 2 Doctors

Dominant Story Box. Demographics, Compensation: examples include 3 Administrator, 3 Doctor, 2 Nurse

Counter Story Box. Wrong job descriptions: examples include 2 Administrator, 1 Doctor

Story**:** There is a labor shortage in the health care industry

“There is a real market gap.” (Administrator)

.. I think the bigger problem is the nurses. We need to educate more and more nurses and doctors. We should guarantee them a good job and good payment. but we are short in numbers. (Nurse)

Nonstory: There is not a widespread labor problem

“More a shortage in middle level providers” (Doctor).

“Increased funding to healthcare: 6% GDP vs. previous 4 % will help to well fund

specialist.” (Doctor)

Dominant Story**:** Demographics. Inadequate compensation for demanding workload.

aging population

“Lack of nurses, high salary expectations of MD combined with little working hours.” (Administrator)

“Nurse job is less attractive due to the financials and at the same time very demanding.” (Administrator)

Financial reasons

“many doctors left public system as too overloaded and not well paid for their own private practices.” (Doctor)

Especially technicians and nurses (Doctor)

“The average age of a nurse in Poland is around 50 years old.” (Doctor, similar response on age from nurse)

“A great profession but very little recognized in public funding.” (Nurse)

“Growing healthcare expectations with limited resources.” (Administrator)

Counter story: There is not a labor shortage

“Perception of not enough physicians is due to them having to do lots of administrative duties. Wrong people doing the wrong jobs.” (Doctor)

“It does not affect us as one of the best employers.” (Administrator)

“if an employer can provide attractive package it’s not a big challenge.” (Administrator)

Metanarratives for Table 23: Poland Labor Supply

There are shortages, especially in nursing, technicians, and mid-level. Government is trying to address physician shortage with funding and schools.

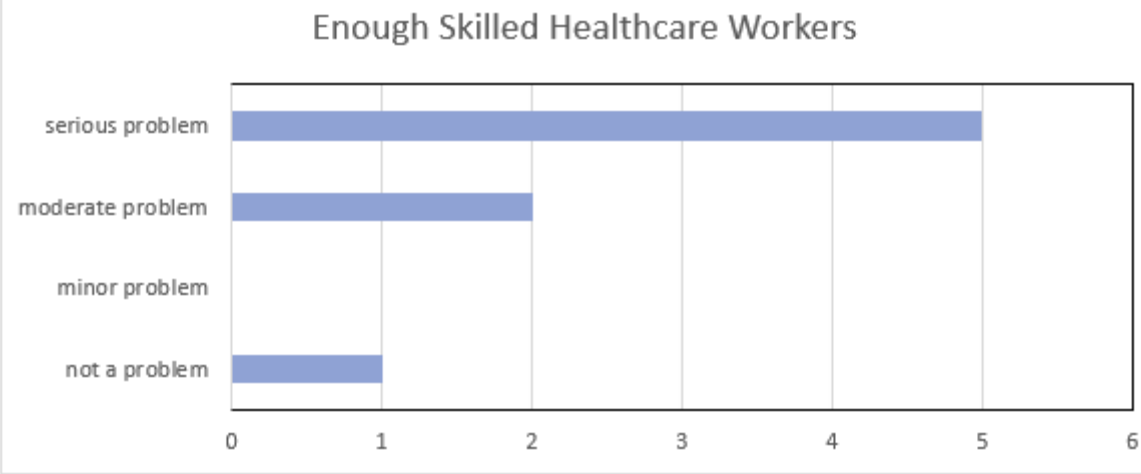
Demographics of aging population for workers and population.

Compensation is not adequate. Does not entice enough mid and low level and creates a dual system of public and private care. Private hospitals do not have the shortage problem with higher compensation offered. Lose workers to foreign markets.

Sense of unclear duties for occupation (doctors do administrative, nurses overburdened)

Figure 24

Survey results Question 1 Do you think there are enough skilled health care employees in Poland?

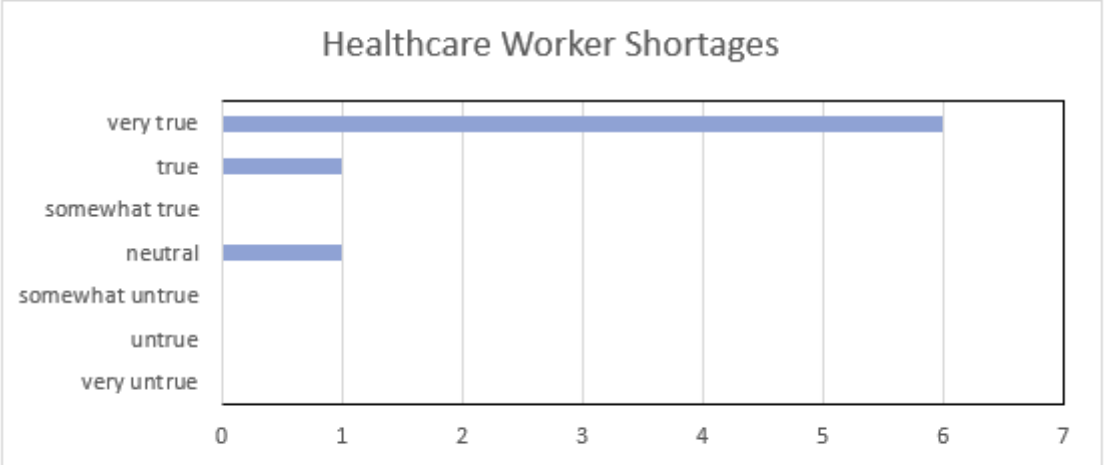


Note. Responses to survey question 1 on perceptions of enough skilled health care employees in Poland.

Figure 24 sample is 8 respondents: Administrators 3, Doctors 3, Nurses 2

Figure 25

Survey Questions 2: Do you believe there are shortages of healthcare workers?

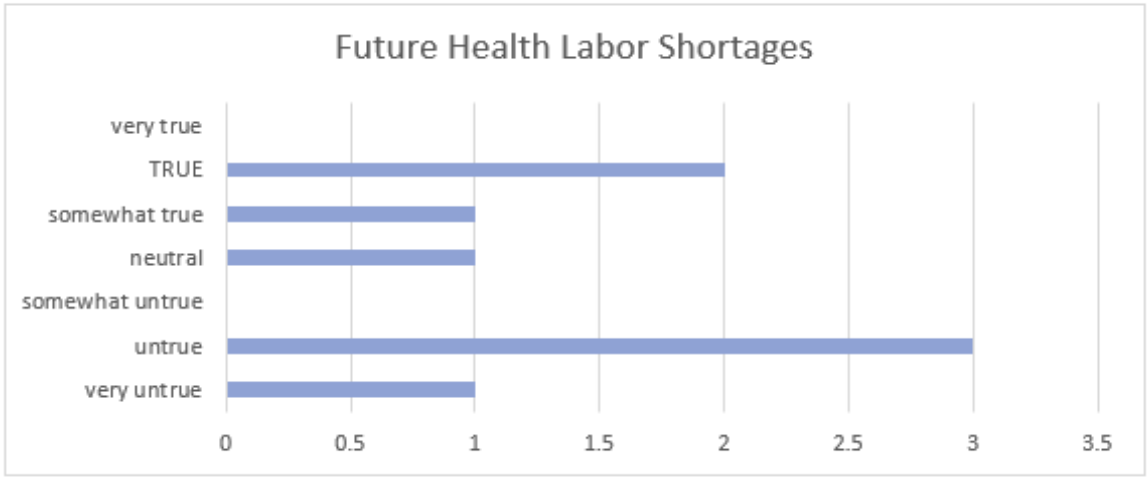


Note. Responses to survey question 2 on perceptions of healthcare worker shortages in Poland.

Figure 25 sample is 8 respondents: Administrators 3, Doctors 3, Nurses 2

Figure 26

Survey Results Question 3. Future healthcare labor shortages

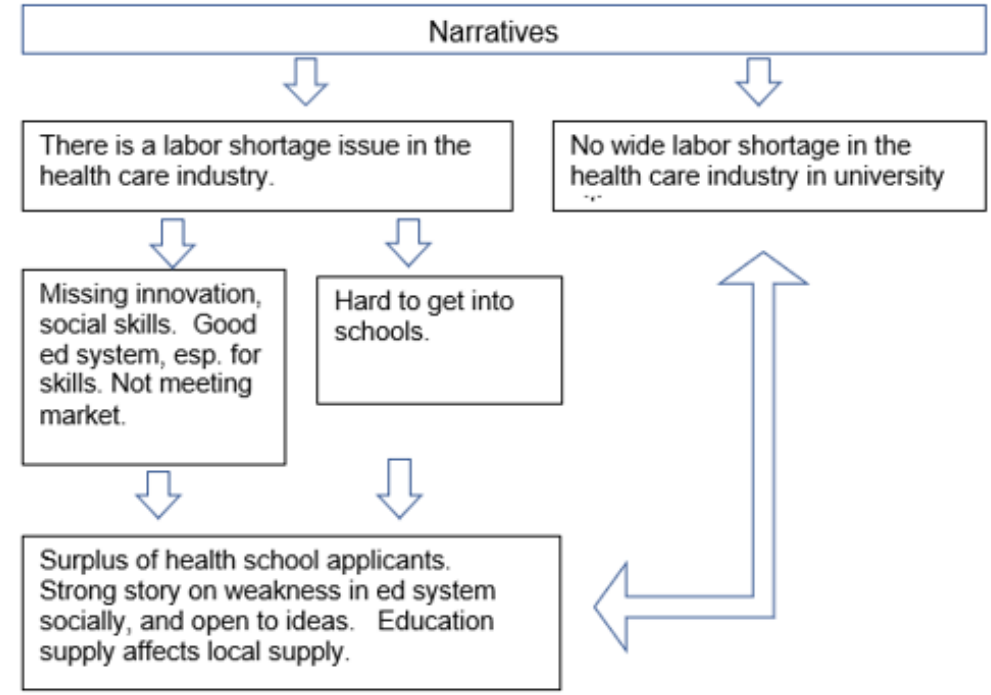


Note. Responses to survey question 3 on perceptions of future health labor in Poland.

Figure 26 sample is 8 respondents: Administrators 3, Doctors 3, Nurses 2

Figure 27

Education and Training- Poland



Note. Responses from survey and interview on supply of labor through education and training in Poland.

Figure 27 sample is 11 respondents: Administrator 4, Doctor 4, Nurse 3

Story Box. There is a labor shortage: examples include 1 Administrator

Non-Story Box. There is not a labor shortage: examples include 0

Dominant Story Box. Missing Innovation. Good ed system: examples include 1 Administrator

Counter Story Box. Hard to get into schools: examples include 1 Administrator, 2 Doctor, 2 Nurse

Story: There is a labor shortage in the healthcare industry. Good government schooling system.

“We have, actually quite good Polish universities. The majority of them are educated here.” (Administrator)

Nonstory: There is no labor widespread healthcare labor shortage

Dominant Story: Schools have good reputation with high standards. Difficult to get admitted but increased numbers for doctors recently. Changing demographics. Compensation.

“Not enough Specialized medical staff for geriatric and rehabilitation, education system has produced e.g., pediatricians in the past but the demographics has changed rapidly.” (Administrator)

“Well defined standards and extensive trainings both pre diploma and post diploma.” (Doctor)

“Intensive University programs, good post diploma program in psychiatry.” (Doctor)

“Good medical universities for physicians, not sure for other medical professionals.” (Doctor)

“Good mix of theory and practical experience plus extensive post diploma training.” (Nurse)

Question: ...they have to work close to where they are educated? Answer: “Yes, it’s an idea. I think it’s crazy. They want to make people stay instead of making work more about quality. It’s a big problem. For example, tomorrow is the inspection of resident

doctors and because they don't want to work abroad, and they want to work in Poland, but they have so many problems. For example, the quality of their program. Their work is about 500 euros now, so it's a problem." (Nurse)

Increased number of medical students over the last couple of years will help to solve the issue but it's not an immediate solution.

Counter Story: Overtraining. Need social skill training and not just theory.

"Post diploma training intensive and maybe too much." (Doctor)

"3600 hours training in Poland v 1200 in US." (Doctor)

"Young doctors with a huge theory but less prepared for daily hands-on patient's management and procedures." (Administrator)

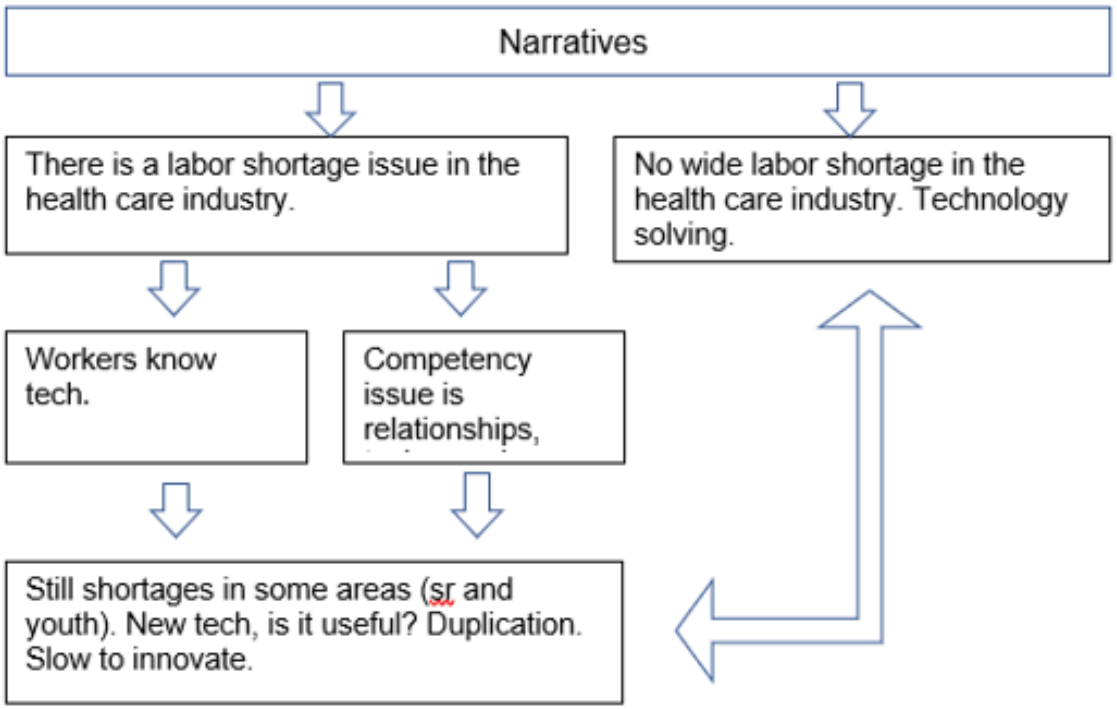
There is very little done as far as the communication with the patient. So, how do you communicate with the patient, how do you communicate the diagnosis, etc. This is the big missing part. (Doctor)

Metanarratives for Table 27: Poland Education and Training

Belief that the education system for doctors is high quality. Government recently increased funding towards healthcare, though system still behind current needs in social skills, workers other than doctors. Perhaps overtraining. Compensation for resident doctors makes them captive.

Figure 28

Technology in Healthcare- Poland



Note. Observations on technology changes from healthcare providers in Poland.

Figure 28 sample is 11 respondents: Administrator 4, Doctor 4, Nurse 3

Story Box. There is a labor shortage: examples include 0

Non-Story Box. No wide labor shortage: examples include 0

Dominant Story Box. Workers know tech: examples include 11 Administrator, 2 Doctor, 1 Nurse

Counter Story Box. Competency issue: examples include 4 Administrator, 1 Doctor

Story: There is a labor shortage

Nonstory: There is no wide labor shortage

Dominant Story: Increased use of technology. Generation difference. Telecare, healthcare modeling, simulated training, administrative functions are all advancing. NHF is supportive.

Guys close to retirement are not but younger people are (comfortable with technology). (Doctor)

“A lot of medical trainings move into virtual patient’s technology which is a challenge for older medical staff.” (Administrator)

“For radiologist’s telemedicine and telecare improved time management and increased number of consultations.” (Administrator)

“Education, daily management of live e.g., banking, shopping, entertainment.” (Nurse)

“Daily work but also, we recognize a competitive advantage using advanced equipment for our patients.” (Administrator)

“We use technology from administration through telecare and up to medical staff training including medical simulation and healthcare modelling.” (Administrator)

NHF reporting and planning (Administrator)

“...she used to spend like 70% of her time in the hospital. Covid has changed this so she has a station at home. She can consult with patients without going into the hospital. Actually, she can consult with a number of hospitals, a number of patients. So, from the

.... perspective, from organization of time, she can spend more time in consultation. It's better not only for her, but better for the system." (Administrator)

"Basically, the health care system was underfunded for a number of years. So basically, the GNP health care spending was like 4% where it was like 6 plus % in Germany for example. So that clearly the system was underfunding." (Administrator)

"... the way the system was created in the past. Obviously over the last 30 years it was improved and changed. But actually, Psychiatry is a good example where even 10 years ago the majority of patients were treated by a hospital basis versus outpatient clinic. Just the last 5 years the Ministry of Health implemented reforms and changes." (Administrator)

"I think that health care professionals realize that telecare has other uses and actually you can consult with a number of clinics. It's not 100% substitution of the face to face visits but still there's a number of innovations that can be managed and done remotely." (Administrator)

"I think what you see right now is a boom of the tech companies providing the solutions in the health care system, but also, it's well recognized by the National Health Fund, the major insurer in Poland." (Administrator)

"Changing needs due to the aging population that not reflected in current number of service providers: medical specialists: geriatric, oncology, psychiatry vs. pediatry." (Administrator)

E- prescription implemented (Administrator)

"Teleconsultation reimbursed by NHF covering a number of medical specialties."

(Administrator)

“Plan to implement a remote tele rehabilitation in oncology and trauma treatment.” (Administrator)

Counter Story: Practical application of innovation is lacking. Weakness in tech knowledge. Use of diverse systems.

“the question is whether that can go quite faster than is happening right now. I would say, I do not see the kind of urgency in the inventing that.” (Administrator)

“IT is evolving. The theoretical knowledge is higher in Poland than in US. Lack of practical. More opportunity at the us side to learn. Poland have to fight more for it, and thus gain more thru that. More of a mentorship model in Poland which has its advantages.” (Doctor)

“A main challenge is the IT infrastructure although very modern in Poland hospitals are using different systems that do not communicate with themselves, issue for EMR and medical research.” (Administrator)

“A need to train medical staff in using different systems, upgrades etc. “. (Administrator).

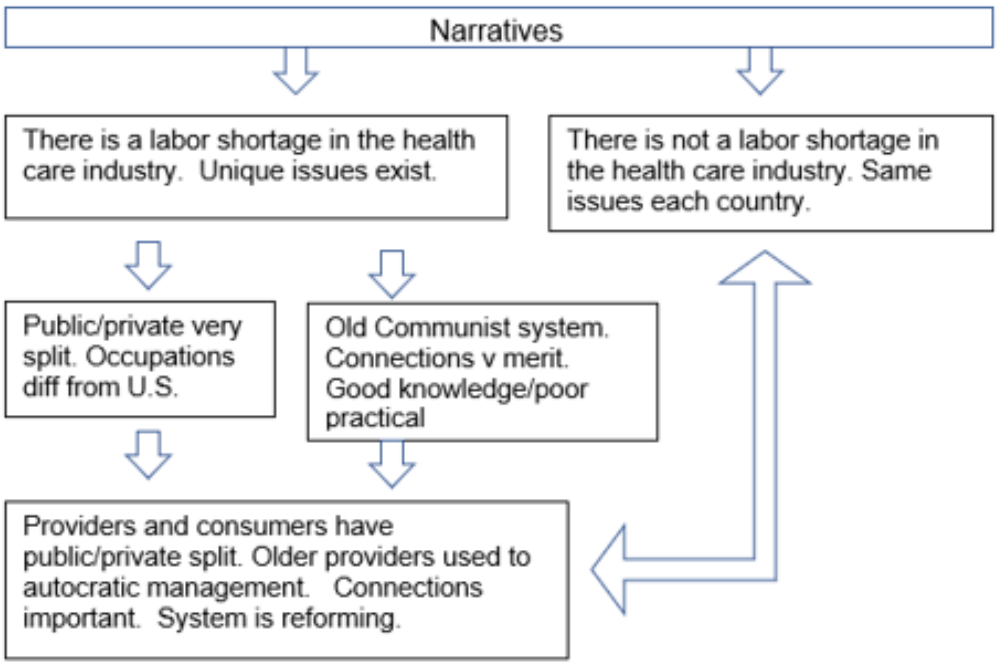
“A lot of medical trainings move into virtual patient’s technology which is a challenge for older medical staff.” (Administrator)

Metanarratives for Table 28: Poland Technology in Healthcare

Tech use growth in past few years. Conversion challenging in training and various systems being used. Government supporting changes through reimbursement plans.

Figure 29

Cultural and Economic Issues- Poland



Note. Note. Responses pertaining to country characteristics based on survey and interview.

Figure 29 sample is 11 respondents: Administrator 4, Doctor 4, Nurse 3

Story Box. There is a labor shortage. Unique Issues exist: examples include 0

Non-Story Box. There is not a labor shortage: examples include 0

Dominant Story Box. Public/private split: examples include 4 Administrator, 2 Doctor

Counter Story Box. Old Communist system: examples include 1 Nurse

Story: Labor shortage. Unique issues exist.

Non-story: No labor shortage. Same issues as elsewhere.

Dominant Story: Migration of Poles, Immigration of others. Application of innovation is slow. Public/Private differences.

“part of the culture, the history of where the faith is a paternalistic relationship between physician and the patient. For instance, being paternalistic. I think it’s coming from the institution.” (Administrator)

“... those who are educated, they are relocating to outside Poland. So, this is creating an additional gap. So, we are bringing people from other countries. But they are not necessarily always up to the levels which is needed.” (Administrator)

“Bogged down in the old communist system.” (Doctor)

“The theoretical knowledge is higher in Poland than in US. Lack of practical. More opportunity at the U.S. side to learn. Poland has to fight more for it, and thus gain more thru that. More of a mentorship model in Poland which has its advantages.” (Doctor)

“Medicine studies attractive but limited interest in middle level medical staff studies due to the low-income level.” (Administrator)

“Rising number of private clinics well paying for all the medical staff.” (Administrator)

Counter story:

“They want to make young doctors stay in Poland, so they have to stay in Poland for some time for their education. It’s crazy. They want to make people stay rather than make a good quality of work for them.” (Nurse)

Metanarratives for Table 29: Poland Cultural and Economic Issues

Different markets in public and private sectors. Government is major driver through funding. Some workers also work outside of the country. Need to apply theoretical innovations.

Poland Summary

Poland has a supply of potential labor to fill a need for health care employees in the country. The population in Poland had been growing at over 2 percent each year until gradually declining over two decades to about - 0.10 percent in 2020. There is a percentage of working age people participating in the labor market, measured at 56.2 percent in this study. When adjusted for nonparticipating but potential workers by discounting students and those not working with disabilities, 43.1 percent of working age people are found to be outside the labor market. Adjusting for those not working likely to have interest/ability as potential healthcare employees, research shows there to be a potential 487,200 workers to address shortages of 45,570 doctors and 129,115 nurses.

There is a perception of a health care labor shortage in Poland. This is especially strong in mid-level skilled areas. While meeting minimum World Health Organization density standards for healthcare providers per capita, public policy would suggest a higher standard to match that of peer regional countries. This is reflected as a shortage in survey and narrative research combined with a quantitative shortage of current healthcare employees per population in the marketplace compared to an EU average.

There is a pool of potential employees within Poland and outside of the labor market that can be targeted to qualify for healthcare labor demands.

Compensation is not competitive in attracting or retaining healthcare workers.

Technology is perceived as an opportunity to increase productivity in healthcare. Comments were made specifically on advances in response to Covid 19, particularly in telemedicine.

Culturally there are older doctors and a restraint on new techniques from new people entering the health field. There is a public system along with a perceived superior private system for those able to afford it. This comes into play with perceptions of labor with higher salaries in the private system able to attract workers.

Demographics play a strong role in outmigration for young Polish workers and an aging workforce population within the country. The demographic trend was expressed through qualitative research then confirmed with population statistics showing that despite a steady percentage of participants in the workforce at between 56 and 56.8 percent over the past eight years the actual population, and thus the actual number of participants in the workforce, has had a consistent decline for two decades. (United Nations - World Population Prospects, 2019 accessed Poland Population Growth Rate 1950-2021. www.macrotrends.net. Retrieved 2021-04-10). This has been partially compensated by the decline in the unemployment rate which measures those participating in the workforce who are unemployed and looking for work.

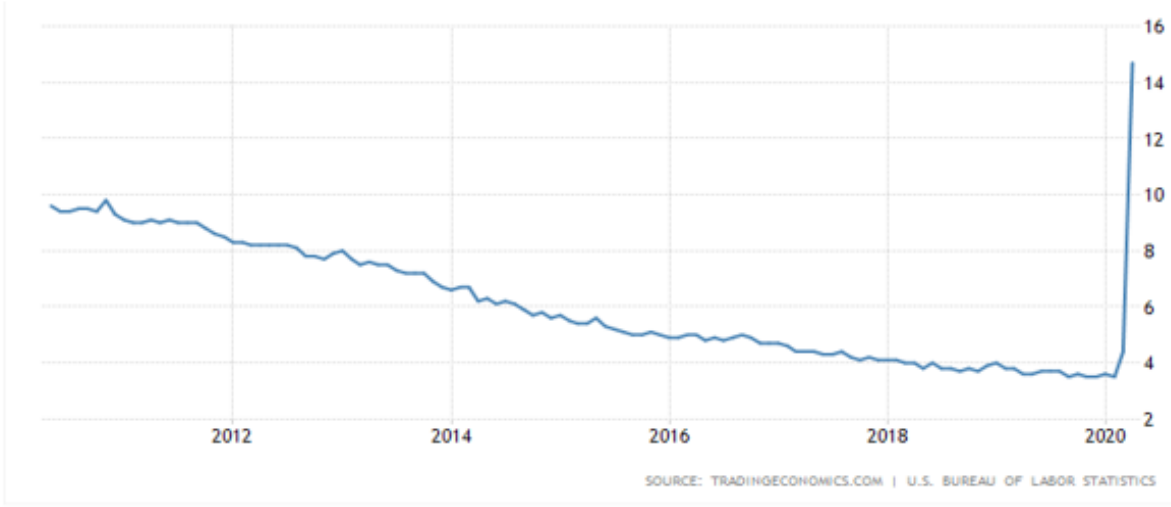
U.S.A.

Present Gap = Demand for Additional Workers – Supply of Participating Workforce

The equation supply side is satisfied through unemployment rates and through participation rates. Demand side is cited in various studies, i.e., McCann (2018) and Manpower (2019). While demand information is provided in this section, it is important only in demonstrating policy implications and not in addressing the research question pertaining to healthcare occupations.

Figure *30*

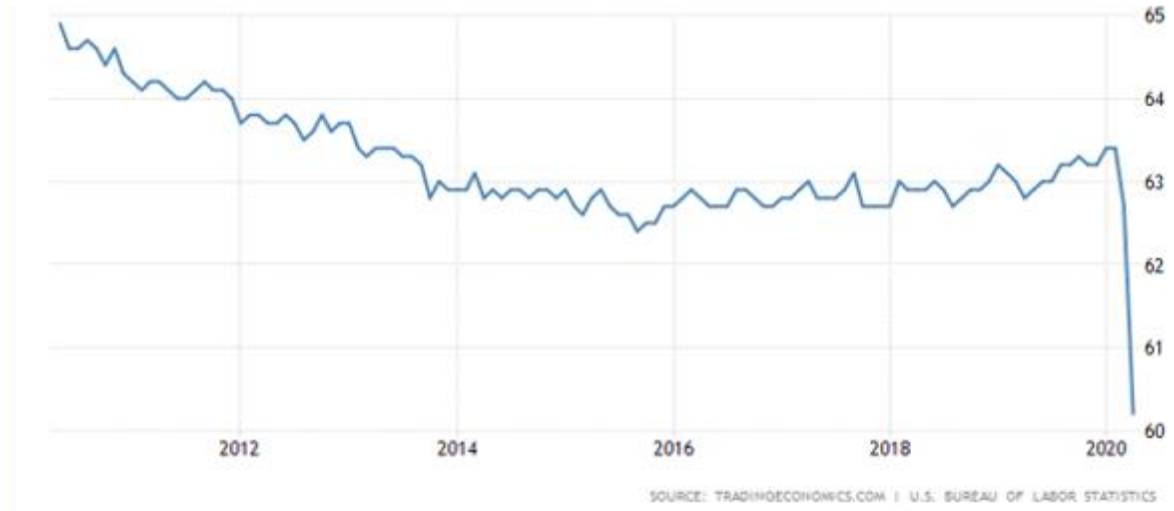
U.S. Unemployment Rates



Note. Displays the trend of U.S. unemployment rates

Figure 31

U.S. Participation Rates



Note. Displays the trend of U.S. labor participation rates

Labor 2018	Participation	Unemployment	Nonparticipation
U.S.	62.8	4.0	37.2

Summary

There has been a tightening labor market in the U.S. At the same time, the number of potential workers participating in the workforce had seen a steady decline until 2016 with a leveling from 2016 until the Covid-19 pandemic in 2020.

Revised Gap = Demand for Additional Workers – (Supply Participating Workforce + Adjusted Workers Available)

Adjust for Participation Rate + Available workers

Nonparticipation = disabled and students

Disabilities

U.S. Disability for workforce consideration is 12.8% (U.S. Census Bureau, 2018). 20% participation rate in workforce, (U.S. Labor Department, 2018).

20% of 12.8 disabled = 2.56%. 12.8%-disabled – 2.56% working = 10.24% nonparticipating.

65% high school graduation rate of disabled. 20% of high school graduates are functionally illiterate in the US. Assuming equal illiterate distribution of high school graduates, there would be 20% illiterate graduates of 65% disabled graduating = 13% subtracted from the 65% available worker pool, leaving 52% disabled capable of working under the same literacy criteria used for India (Brandongaille.com).

52% are qualified as literate high school grads of the present nonparticipating disabled pool which is 5.3% of nonparticipating pool of 10.24% total disabled nonparticipating population

10.2% disabled nonparticipating – 5.3% with the ability to work = 4.9% unavailable to work in the designated health care occupations.

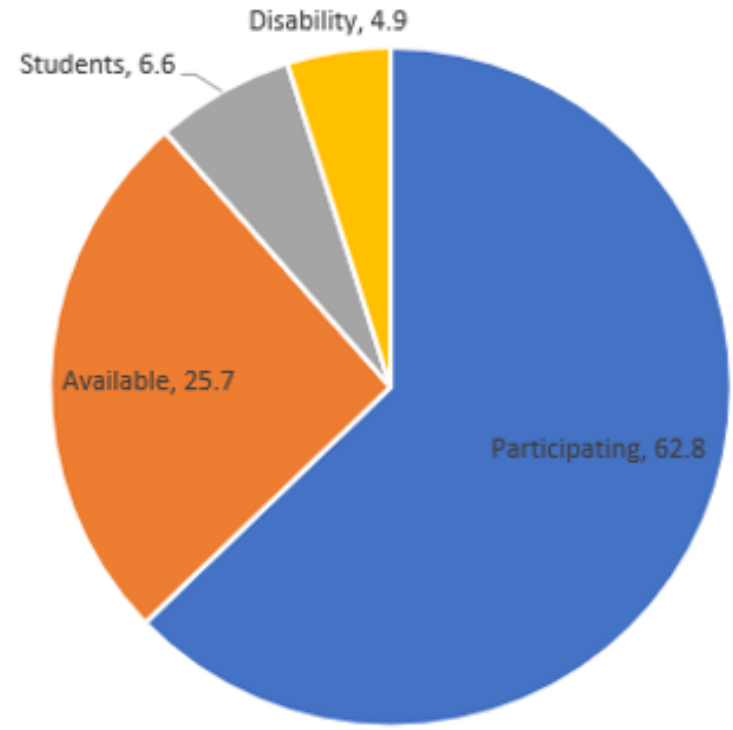
Students

Labor force from the U.S Bureau of Labor Statistics (2018) place working age students out of the workforce at 6.6% of the working population.

2018 U.S. Available workers (37.2) –nonparticipating disabled (4.9) – students (6.6) = 25.7%

Figure 32

Labor Supply – U.S.



Note. Displays percentages of U.S. labor available but not participating.

Summary

U.S. unemployment has had a declining trend. This is favorable towards prospective employees as workers are in demand with fewer people in the job market. At the same time, the percentage of working age people participating in the workforce had been shrinking until leveling out in 2016. Employers seeking workers were finding a shrinking available labor pool with a tightening labor market. This partially accounts for business reports of labor shortages. There is an available pool of potential workers

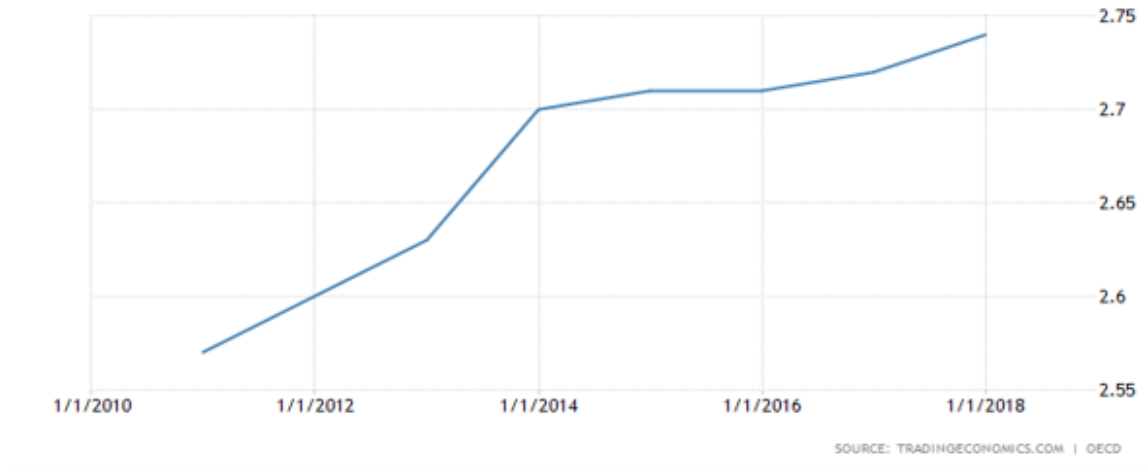
equal to 25.7 percent of all working age people. These workers are outside of the official labor market and may be interested/capable of filling a variety of occupations.

Health Care Labor Demand

Health Care Gap = Demand for Additional Health occupations workers – Supply of Potential Health Care Employees.

Figure 33

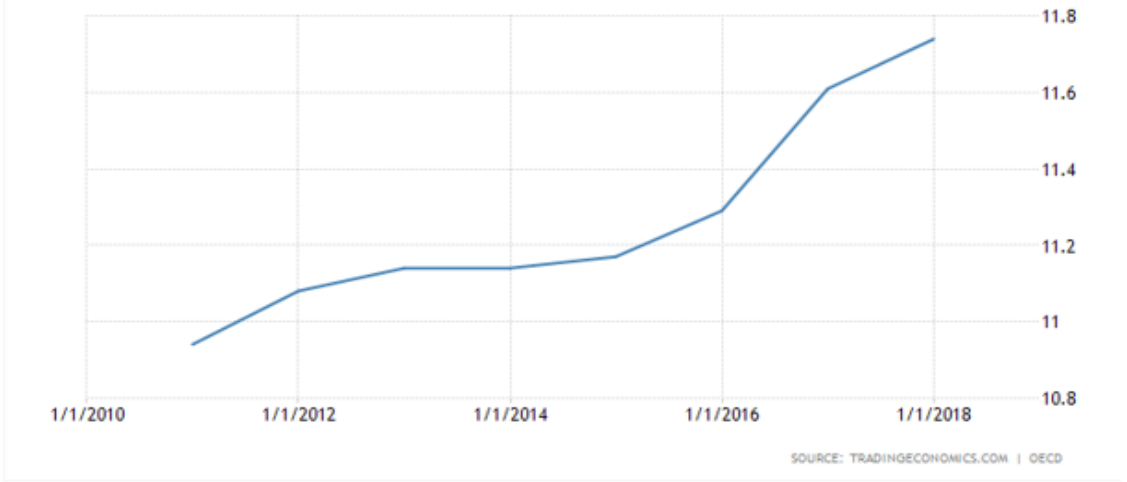
U.S. Physicians



Note. Trend of U.S. physicians per 1000 people

Figure 34

U.S. Nurses



Note. Trend of U.S. Nurses per 1000 people

2018	Physicians/1000	Nurses	Total
U.S. (2018)	2.74	11.75	14.49

Productivity

Life Expectancy in Years (World Bank, 2019)

	1950-05	**1960-05**	**2016**	**2017**	**2019**
U.S.					
Female	81.0		81.2		82.0
Male	76.2		76.3		77.5
Total				79.5	79.8

Summary

The percentage of healthcare workers has been steadily increasing in the U.S. Productivity as measured by life expectancy has increased.

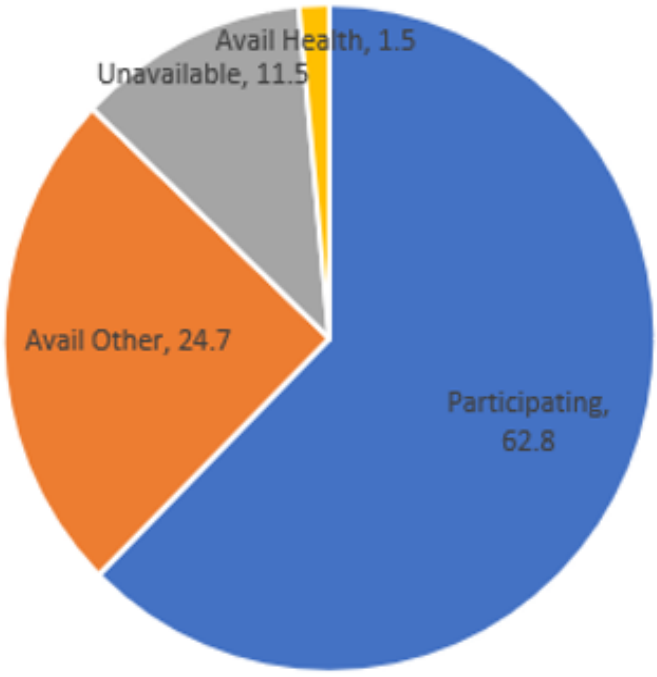
Health Care Gap = Demand for Additional Health occupations workers – Supply of Potential Health Care Employees

The Health Care Occupation Labor Gap

5.92% potential interest in target occupations x 25.7% pool of available but nonparticipating population = 1.5% available for target health occupations

Figure 35

Unutilized Health Labor – U.S.



Note. U.S. unutilized labor available for working in health care occupations is 1.33%

U.S.

1.5% available healthcare workers x 205,915,000 working age population (St. Louis Fed, 2020) = potential workers 3,337,250 to address reported shortages of 800,000 nurses and 123,000 doctors.

There are an adequate number of potential healthcare workers in the U.S. to satisfy present occupation shortages.

Summary:

The U.S. has a supply of potential labor to fill a need for health care employees in the country. The population in the U.S. had a declining percentage of working age people participating in the labor market, measured at 62.8 percent in this study.

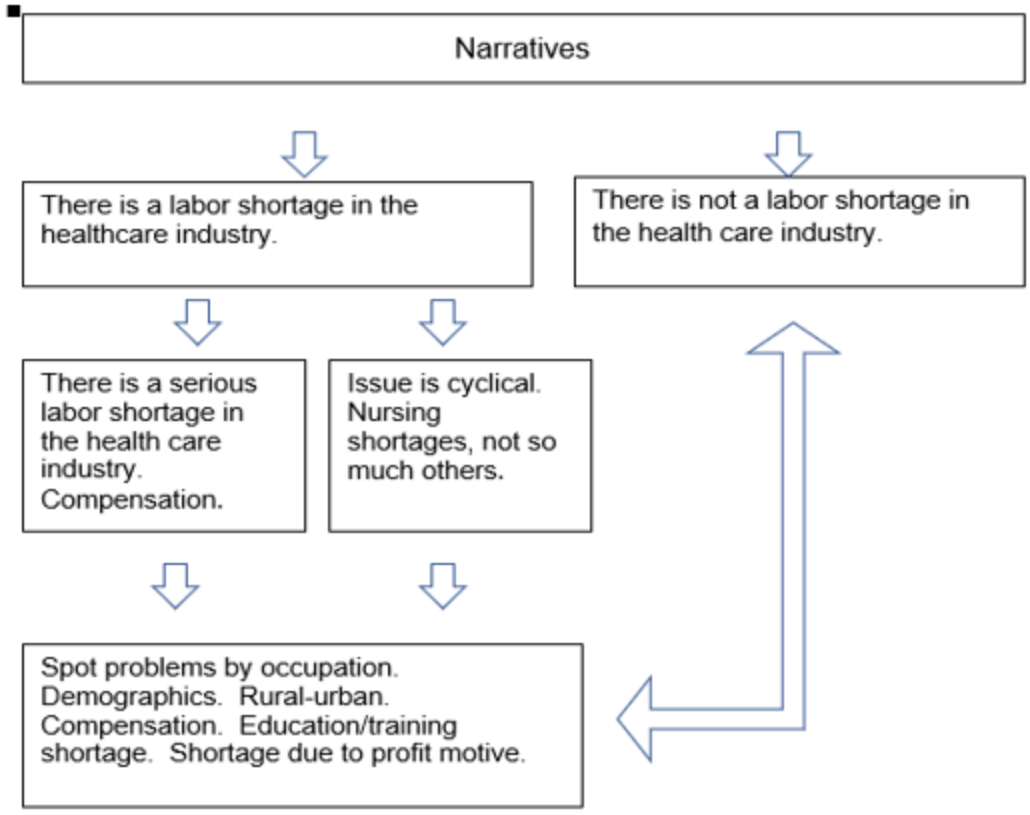
When adjusted for nonparticipating but potential workers by discounting students and those not working with disabilities, 25.7 percent of working age people are found to be outside the labor market. Adjusting those not working for interest/ability as potential healthcare employees, research shows there to be a potential of 3,337,250 workers to address shortages of 123,000 doctors and 800,000 nurses.

Survey and Narrative Research

Diagram and commentary are coded from interview excerpts. Survey results are included by topic relevant to the Poe diagram.

Figure 36

U.S. Healthcare Labor Supply



Note. Perceptions of health care labor supply in the U.S.

Figure 36 sample is14 respondents: Administrators 4, Doctors 5, Nurses 5

Story Box. There is a labor shortage: examples include 3 Administrator, 1 Doctor, 2 Nurse

Non-Story Box. There is not a labor shortage: examples include 1 Doctor, 2 Nurse

Dominant Story Box. Serious shortage. Compensation: examples include 3 Administrator, 5 Nurse

Counter Story Box. Issue is cyclical: examples include 4 nurse

Story: There is a labor shortage in the healthcare industry

“Labor shortages in the industry are not just a WI issue, it’s a national issue in the health care industry.’ (Administrator)

“I absolutely believe there is a growing shortage of professional nurses and I think that will continue.” (Nurse).

“Not enough nurses going into field.” (Nurse)

Significant staffing shortages from physicians to nurses and CNA’s.

“Serious problem recruiting/retaining in PA/LTC. Serious problem recruiting/retaining CNAs. Unable to recruit/physicians for PA/LTC. “ (Doctor)

“We have anywhere from 10-15 openings for CNAs on a daily basis. CRISIS is here.” (Administrator)

“Look at number of job openings statewide and locally. Thousands of open positions.” (Administration)

WI lacks skilled health care employees at every level, from nursing home CNA’s to outpatient clinic medical assistants to RN’s to primary care physicians.

Nonstory: No labor general

“I think it’s variable. (Depends upon the occupation).” (Doctor)

“Maybe, but not everyone is working in the field so that creates a gap.” (Nurse)

“I can only speak for the Hospital I work at but in my institution the employees exist, but they have been cut to save dollars creating a skeleton crew operating at bare minimum. (Covid-19 impact).” (Nurse)

Dominant Story: Insufficient education and training. Demographics. Compensation too low, and government regulations and restrictions on reimbursement. Urban/rural differences.

Not enough training happening in schools to prepare for the demand.

“...the aging demographic requiring health care – especially for managing chronic illnesses – will be increasing.” (Nurse)

“As baby boomers retire and population becomes sicker there will be a greater need.” (Nurse)

Workforce, especially physicians and nursing, is aging. (Multiple respondents)

” There simply are not enough younger people going into health care to replace those that are retiring or that have gone on to work in other industries”. (Administrator)

“Wages and benefits are often lower than other industries (due to government reimbursement) and the work is more difficult.” (Administrator)

Compensation and demanding workload are major factors

“For me it depends upon the type of people that I’m trying to hire. ...it greatly depends upon the health care official that I’m trying to find to fill that spot. “ (Administrator).

“We live in a beautiful state, so I’m not concerned about us, but I am very concerned about remote areas.” (Nurse)

“Health care is rewarding but also intense and exhausting- I’ve seen many RN’s walk away into other careers.” (Nurse)

“Shortages are due to systemic issues of historically low pay, forced overtime, and regulatory burden. For some who would want to enter the health care workforce for altruistic reasons, these systemic issues need to be resolved.” (Nurse)

Counter Story: Difficult work with burnout. Health model based on profits. High turnover.

“I feel as though the ministry that I work at has a lot of great skilled health care providers. Yes, I believe that we need more but our ministry won't hire more. We work on a "productivity" module. ...I know it’s for income purposes, but why are we putting patients at risk to be "most productive". The end result is nurse, healthcare worker burnout and that is why we lose our skilled healthcare members” (Nurse).

“There are four nursing schools alone in Madison. There are two- year programs, one-year programs and four- year programs. There is no shortage. We have new grads busting down the door to get a job.” (Nurse)

“I tend to believe there are Nurses out there but not willing to step back into short staffing long hour situations.” (Nurse)

“The level of experienced health workers perhaps having more to do with turnover and demographics on top of bean counters making staffing decisions is a real issue” (Nurse).

Metanarrative for Table 36: U.S. Healthcare Supply

There is a shortage in some occupations, but not all occupations. There is an urban-rural split, and some urban areas closer to education locations have a greater supply source.

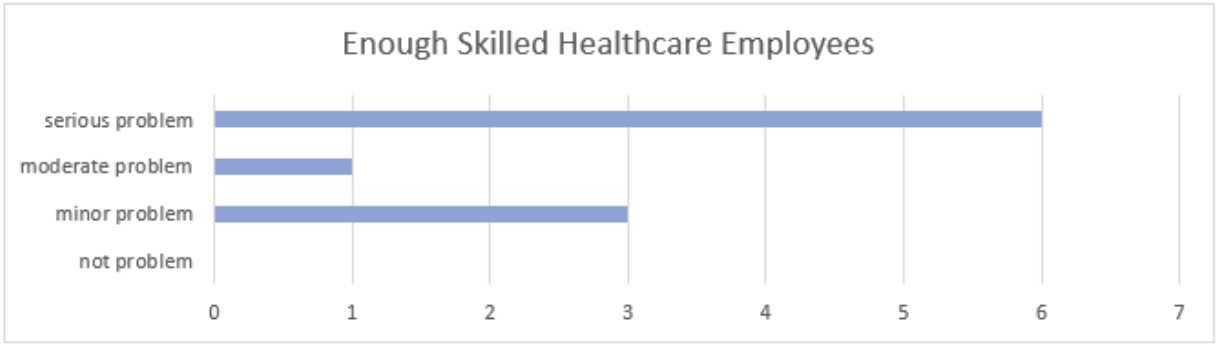
Demographics have a large impact on both the supply of workers as they age out, and in the size of the aging population they must serve.

The compensation is not commensurate with the hours and difficulty of labor.

There are management decisions that contribute to the shortage due to financial considerations.

Figure 37

Survey results Question 1 Do you think there are enough skilled health care employees in the U.S.?

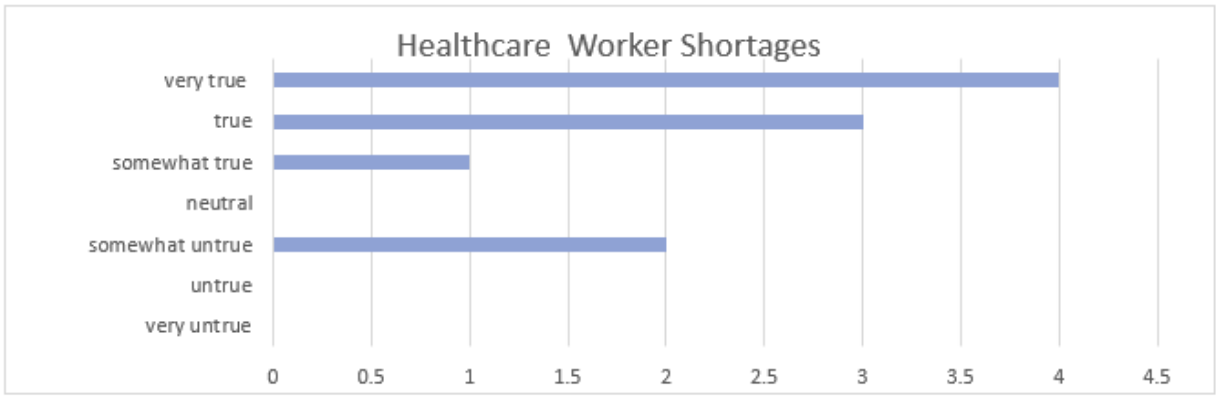


Note. Responses to survey question 1 on perceptions of enough skilled health care employees in the U.S.

Figure 37 sample is 10 respondents: Administrators 3, Doctors 3, Nurses 4

Figure 38

Survey Question 2: Do you believe there are shortages of healthcare workers?

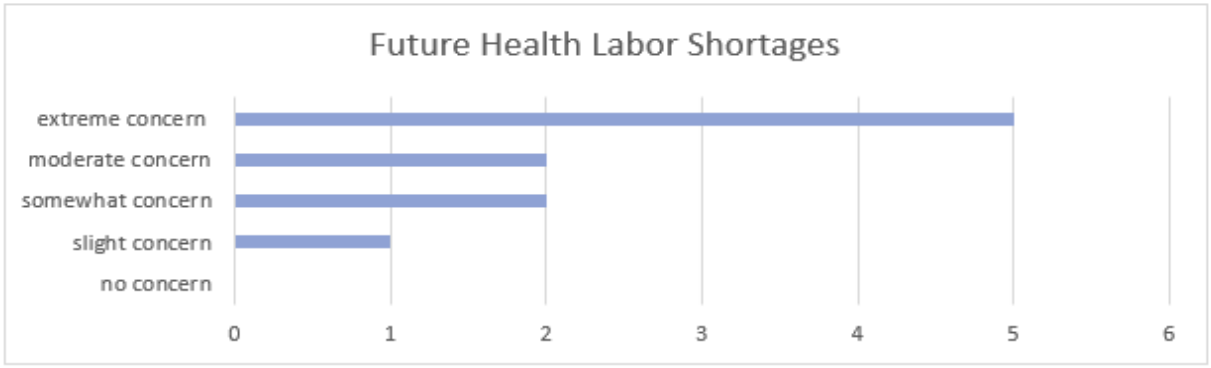


Note. Responses to survey question 2 on perceptions of healthcare worker shortages in the U.S.

Figure 38 sample is 10 respondents: Administrators 3, Doctors 3, Nurses 4

Figure 39

Survey Results Question 3. Future health care labor shortages

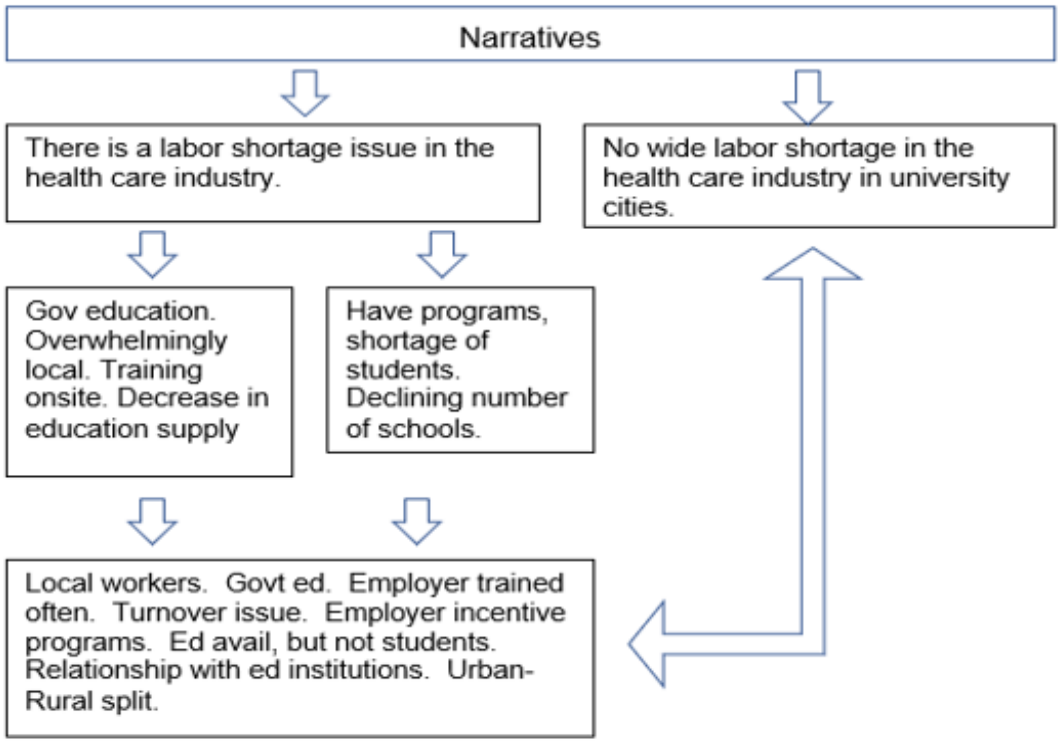


Note. Responses to survey question 3 on perceptions of future healthcare worker shortages in the U.S.

Figure 37 sample is 10 respondents: Administrators 3, Doctors 3, Nurses 4

Figure 40

Education and Training- U.S.



Note. Responses from survey and interview on supply of labor through education and training in the U.S

Story Box**:** There is a labor shortage.

Nonstory Box: The labor shortage is not widespread, and not in locations close to education facilities

Dominant Story Box. Serious shortage. Compensation: examples include 2 Administrator, 3 Nurse

Counter Story Box. Issue is cyclical: examples include 3 Administrator, 1 Doctor, 1 Nurse

Dominant Story: There is adequate education, training done on-site, education standards high

"...are looking at hiring non-CNA's and doing the training ourselves and then paying for their schooling. So, they are getting their training through their private industry, or thru technical college." (Administrator)

"We actually have 6-8 schools we work directly with. We take in their students, hopefully getting those you want to come back, after they graduate, and work here. I think that's an advantage in working directly with the schools." (Nurse)

"Lots of different pathways to practice, high educational requirements for many positions." (Nurse)

"We do a very good job on our unit with continued education and simulation training, but we are the exception because we are a bigger hospital." (Administrator)

"We live in a state with many opportunities for education." (Nurse)

Counter Story**:** Decline in number of graduating students, number of schools, cost of schooling prohibitive to entry

"For example, MATC, which is a Madison area college, they've decreased the number of dental hygienists that they are graduating each year. I know that in the area there are a couple of hygiene schools that have discontinued functioning altogether. So, our specific area in the United States and in WI specifically there is a graduating number that has become a shortage for us. Whereas a lot of dentists themselves are starting to train their dental assistants in their own offices so there seems to be more of a surplus of them in recent years." (Doctor)

“We’ve seen a decrease in even the classes that are offered in the technical schools because numbers are down. I, truthfully, can only speak for our area of the state, Waukesha County. But I know that WTC has cancelled some of their classes. They are having less people registering for the classes” (Administrator).

“There is a real lack of quality instructors and programs that are flexible to the needs of the student. This is witnessed in the many issues that persist in the CNA training programs in WI.” (Administrator)

“Many schools offer good clinical rotations and classroom experience. Just not enough going into the field.” (Administrator)

“Cost of schooling prohibits talented people from pursuing advanced degrees in health care.” (Nurse)

Metanarratives for Table 40: Education and Training U.S.

Most training is done by the employer. Declining number of educational institutions for health care employees. Declining number of people entering as students.

There is an advantage for facilities that are located close to, or have relationships with, education institutions.

“Depends on the type of testing - some of the best clinicians I know were not at the top of their graduating class.” (Nurse)

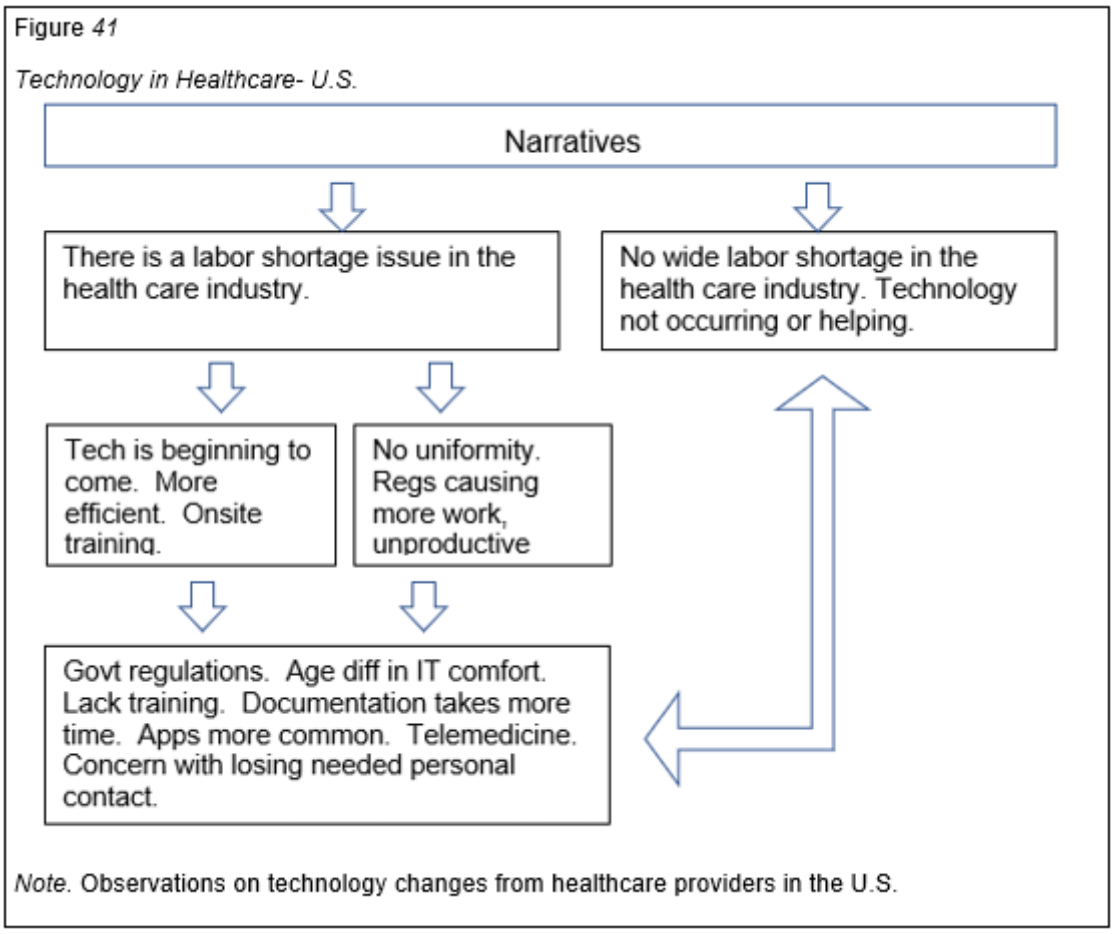


Figure 41 sample is14 respondents: Administrators 4, Doctors 5, Nurses 5

Story Box. There is a labor shortage:

Non-Story Box. There is not a labor shortage:

Dominant Story Box. Serious shortage. Compensation: examples include 2 Administrator, 3 Doctor, 6 Nurse

Counter Story Box. Issue is cyclical: examples include 1 Administrator, 1 Nurse

Story: There is a labor shortage in healthcare

Nonstory: There is no wide labor shortage in healthcare

Dominant Story**:** Technology is coming. Greater efficiencies.

“Necessary to perform work and use tools available to improve quality, efficiency and knowledge base. I do not always enjoy it as I prefer to communicate directly, but it does make workers more efficient I think that electronic health records have evolved into consumer-friendly tools.” (Administrator)

“all of our applicants do … a screening (computer based human resources screening).” (Nurse)

“I think the way the…disputation is something that has definitely changed with technology. We have just implemented our own electronic health record last August. It’s gone up on a full EHR for the last year. And we are noticing now how we document is much different. And it’s probably not as specific as it used to be because of different ways that templets are build, and the time factor. With that being said, we’re now going to be implementing a new part of our care management program the nurses are going to be given a special phone that only works within the building where they can be texting doctors and where they can be having their patient list right on the phone. So, we’re getting more mobile which I think will increase documentation again, because rather than being tied to a desk, it’s not good patient care when you’re tied to a desk.” (Nurse)

(Increase in use of technology?). Absolutely. We see that quite a bit. And I think that technology can enhance productivity. We also see that, because technology, in many respects, a lot of things that – a good example would be the medical electronic records. I think that we are transitioning from a paper world to an electronic world like every other business.” (Nurse, similar from others)

*"*Our organization is trying to make technological changes now in order to have a more productive workforce due to the shortage of health care workers. I think the state will have a real access to long-term care services if this trend continues." (Administrator)

"I also think that technology can be very integral in improving the safety of the environment and a great example of that is we now have bar code scanning as part of the medication administration process." (Nurse)

"We see the educational venues having things like simulation labs." (Doctor)

"Now, you can slap on the blood pressure cup and set up the machine to automatically take and record the pressure every 15 minutes and these things interface with the medical record so that rather than then having to turn around and document it in the medical record that data is pulled right from the monitoring device into the permanent medical record." (Nurse)

"Absolutely. Whereas it used to be non-digital in terms of paper charts, in terms of taking impressions or molds of the teeth, in terms of fabrication of different restoration of appliances. It's now almost exclusively digital. So, digital x-rays, digital radiographs, they reduce the amount of radiation to the patient. Also, for instance, the image on the computer screen as opposed to waiting for the film to process. Also, accuracy of the image. We talk about taking records or molds of teeth in terms of crowns or bridge restorations, or fabrication of removable appliances such as dentures, being able to get digital scan or digital video image of the teeth or gums to fabricate those appliances and restoration devises that's something that's in use. The dental laboratory's themselves have gone largely digital where even if we do take a traditional impression of polyvinyl any type of impression material that we send to the lab they will now scan that

impression and will have things fabricated. So almost every aspect of actual clinical methods that we're using digital and technology at this point. For example, lasers are in high use in terms of simple soft tissue surgeries, we're no longer using a scalpel, instead we're using lasers. The trauma to the tissue is greatly decreased and the healing time is reduced. Even in charting. Very few offices these days use paper charts. We're doing everything digitally in terms of notetaking and patient intake and everything of that nature. So, it's certainly something that's becoming much more technologically based." (Doctor)

"The idea, over the long term, is to have the technology save on costs in terms of materials and shipping since the information is sent electronical rather than Fed Ex or UPS. So really the benefits should be for practitioner, for 3rd parties such as labs, and for the patient as well in terms of accuracy." (Doctor)

"Healthcare has now transitioned to EHC records/EPIC. It's very useful, quick and is what we use on the job." (Nurse, similar from others)

Recognize this is the trend in health care and need to be competent using technology

Counter Story: Impact of technology on human empathy. Still in early adaption. Age difference with computer savvy.

"Our newer physicians are much better than our older physicians because they've been trained as their going through medical schools. Our nurses, I don't know how much computer they get. We have to train them from scratch. I don't know if they have progressed to using electronic documentation through their training." (Nurse)

"They should make people more productive. But in many cases, when they're in the early adoption phase, I think they do not have that effect." (Nurse)

I am not especially computer savvy.

“I do worry that technology will have a lasting effect on how people interact with one another long-term.” (Administrator)

Metanarratives for Table 41: U.S Cultural and Economic Issues

Some see there has been a lag in implementation and productivity. Technology is advancing in health care facilities. The impact appears to be designed for productivity, efficiencies, and improvement of patient care.

Still need human empathy.

Most health care providers, especially those trending younger, are comfortable with technology.

There is an increase in use of simulation labs.

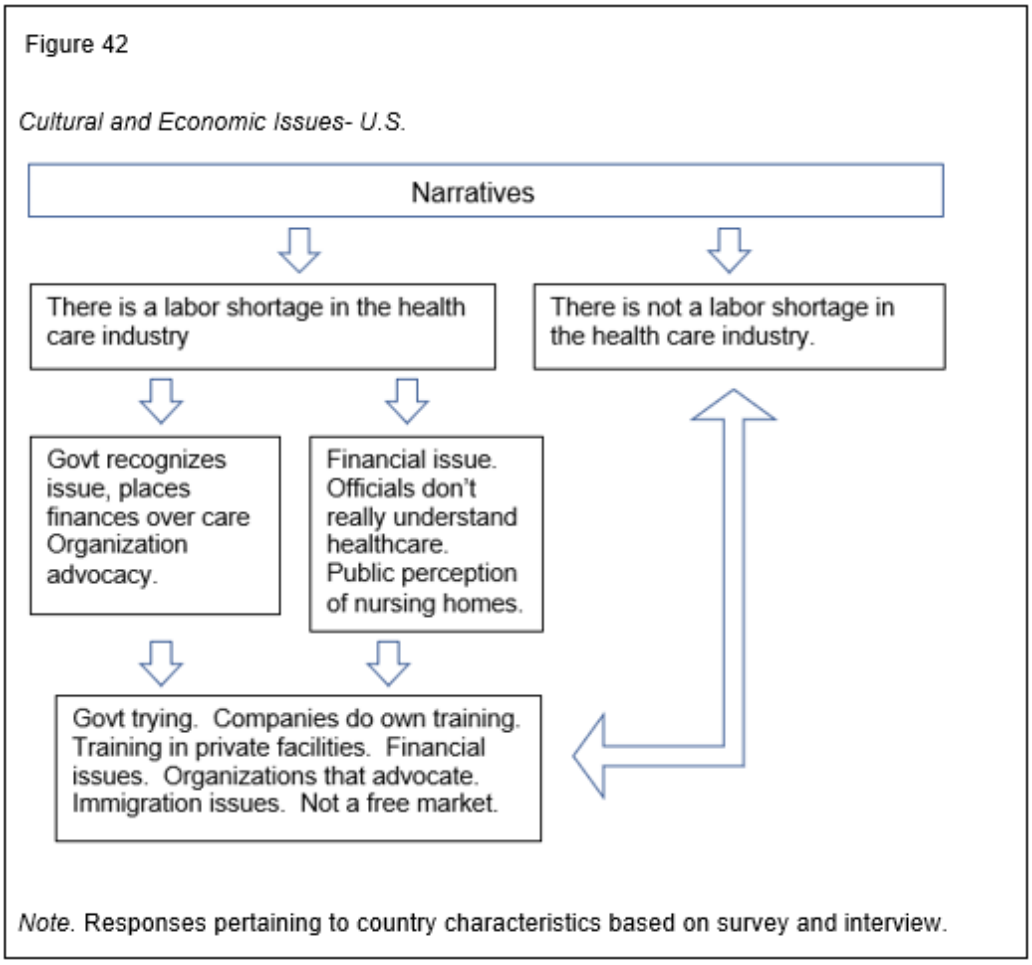


Figure 42 sample is14 respondents: Administrators 4, Doctors 5, Nurses 5

Story Box. There is a labor shortage:

Non-Story Box. There is not a labor shortage:

Dominant Story Box. Serious shortage. Compensation: examples include 2 Administrator, 3 Nurse

Counter Story Box. Issue is cyclical: examples include 1 Administrator, 2 Nurse

"Reimbursement isn't there for those that are publicly funded. And if there is something we can do legislatively to increase reimbursement so that we can have higher wages for those people that provide those services for our elderly." (Administrator)

“Immigration at a stand-still and talent pool is aging.” (Administrator)

“Young people are growing up without any basic skills! No mechanical aptitude, too many sports being played year around and students don’t go out and get jobs the way they used to. They leave college with a mountain of debt, and minimal life skill ability. The trades are great jobs but not being promoted and taught. Many incredibly smart people with crazy abilities to problem solve don’t have a college degree to put on their resume. We need to Channel these brains (while these kids are still in school) into building the trades and bringing jobs back to US.” (Nurse)

“And we now know unequivocally that staffing, the quality of the professional practice environment, whether that’s a positive or negative environment which the nurses are practicing, and the level of education of the nurse, directly impacts patient outcomes. And that’s both clinical outcomes and the patient experience. And since now with the government using carrots and sticks to reward and penalize based on the actual clinical outcomes being produced. It’s going to be really important that decision makers shift from opinion-based staffing. In our history, basically, people would staff their hospitals in a way they thought made sense, in the absence of evidence. But now we recognize that, there’s research, for example, that will show for example, for every extra patient the nurse is caring for the mortality may go up 10%.” (Nurse)

“Because historically, also, the first thing administrators like to do when they think they’re going to improve their bottom line is look at their biggest expense item which is labor and health care and nurses being by far the largest percent of the professional workforce delivering healthcare. It’s been an easy go- to target for cost cutting.” (Nurse)

Counter Story: Public officials don't fully understand the issues.

"I think they hear about it. But I don't know if they really understand the depth of it. When you talk about health care, many times in the governmental areas, it's just all about the cost of health care vs the ability to provide the services needed." (Nurse)

Reimbursement issues (Administrator, Nurse, multiple respondents)

Metanarratives for Table 42: U.S. Cultural and Economic Issues

Government financing through reimbursement formulas, and cost controls through regulations. Government is shifting financing formulas to base reimbursements towards defined outcomes. There is a great focus on cost of health care at the expense of patient care.

Immigration restrictions are restricting the labor pool. Concern culturally with the lack of appropriately educating or training young people.

Feeling that the corporate structure is partially creating the shortages.

A sense of transition in the occupations and in health care, through financing, corporate structure, technology, and all accelerated due to the pandemic.

U.S. Summary

The U.S. has a supply of potential labor to fill a need for health care employees in the country. The population in the U.S. had a declining percentage of working age

people participating in the labor market until 2016 then held steady until the Covid-19 Pandemic. The U.S. population has grown from 2010-15 at a rate of 0.75 percent and from 2015-2020 at a rate of 0.62 percent. Labor participation prior to Covid-19 was measured at 62.8 percent in this study. When adjusted for nonparticipating but potential workers by discounting students and those not working with disabilities, 25.7 percent of working age people are found to be outside the labor markets. Adjusting for those not working for interest/ability as potential healthcare employees, research shows there to be a potential of 3,337,250 workers to address shortages of 123,000 doctors and 800,000 nurses.

There is a perception of a healthcare labor shortage. This is not as strong in the Madison area for nurses as there are several nursing schools in the region. It was noted that the problem is greater in rural areas.

Quantitative data indicates the U.S. easily meets the World Organization minimum standards. Public policy has established higher standards. Narrative and survey data provide the perception of healthcare labor shortages. This is confirmed with marketplace data provided by the U.S. Labor Department and the U.S. Federal Reserve on job openings within the healthcare occupations. There is a pool of potential healthcare workers available to fulfil the indicated occupational vacancies moving into the future.

Compensation is not always competitive in attracting or retaining healthcare workers especially for nursing and in nursing homes. This is compounded with government regulations and inadequate government reimbursement formulas.

Technology is having an increasingly large impact on healthcare, noted mostly for quality but also including examples of increased efficiencies. This impact has been accelerated with Covid 19.

There is a rural-urban split with in-state migration of rural to urban areas. There are stresses within the past year due to a decrease in immigration of healthcare workers from other countries.

Case Study Summary

There are recurring patterns from the three case study countries in addressing the main research question of a labor gap – a public policy and a market shortage of qualified workers for jobs at the same time a pool of potential employees exists. The size of the overall nonparticipating but available population of workers varied from 25.7 percent of total working age in the U.S. to 35.1 percent in Poland and 43.1 percent in India. When adjusted to discount those in school and those defined as having disabilities hindering work in healthcare occupations there were 24.7 of the working age population in the U.S. capable but not working and 1.5 percent of total working population not working that would likely be interested/capable if educated and trained to work in healthcare. In Poland there was 33 percent of working population outside of the labor market with 2.1 percent of the total working population interested/capable if educated and trained to work in healthcare. In India there was 40.6 percent of working population outside of the labor market with 2.5 percent interested/capable if educated and trained to work in healthcare. These figures translate to the tightest labor market being found in Poland with the labor pool of 487,200 potential healthcare workers at

2.79 times the labor gap combined with a shrinking worker age population. The U.S. has a potential healthcare labor pool at 3.6 times the size of the healthcare labor gap. India has the largest available pool of workers at 8.27 times the size of the healthcare labor gap with a slowing but still 1 percent population growth rate in 2020.

Market figures, narrative, and survey all indicate shortages in each case. This study finds that there has been a different expectation for each country in terms of actual providers per patient required to satisfy the shortage. Shortages had been defined and tested based on market demand and perception which would drive public policy. Shortages based on a stationary minimum goal established by the World Health Organization for 2013 would have all three countries meeting that minimum standard. Public studies and research perceptions, and perhaps public expectations continue to demonstrate expectations for more healthcare providers. India provider per population goal is WHO minimum standards, Poland at the midrange of peer countries considered those within the European Union, and the U.S. utilizing market demand through reported job openings. Furthermore, increasing expectations are noted as global standards have changed during this research with the World Health Organization increasing the benchmark minimum number of providers per population.

Based on standards of healthcare employees for each country, there is a similar pattern of an adequate supply of potential workers to meet present demand and to meet national expectations while there is simultaneously a shortage of workers to fill vacant healthcare positions. Adjusting for those not working likely to have interest/ability as potential healthcare employees, India research shows there to be a potential 21,500,000 workers to address shortages of 600,000 doctors and 2,000,000 nurses.

Poland research shows there to be a potential 487,200 workers to address shortages of 45,570 doctors and 129,115 nurses. U.S. research shows there to be a potential of 3,337,250 workers to address shortages of 123,000 doctors and 800,000 nurses.

Education is cited as a labor factor in all countries, with India and Poland responses indicating that the number of students being educated is increasing, and the U.S. respondents feeling that the number of students coming through the system are declining.

Culture and economic factors impact how a healthcare system is functioning. The U.S. has a higher level of senior care facilities versus a more family-oriented approach in Poland and India. India and Poland may be moving towards a system resembling the U.S. over time which will directly impact the demand for healthcare providers. India and Poland have a distinct difference in private sector versus government supported healthcare systems which are perceived differently in terms of care and in flow of labor supply.

Demographic patterns have a distinct impact upon worker supply in healthcare. India and Poland are losing providers through migration. The U.S. is gaining providers through immigration. India has a growing population which provides people to a labor pool but also has an increasing percentage of working age people outside of the labor market. Poland has the issue of not only losing people through migration, but also has a declining population. Unless addressed, this trend signals future labor supply issues despite an economy that is presently strong.

Productivity as measured in life expectancy has increased in all cases. Technology is cited in all cases as increasingly utilized, generally in terms of productivity

being improved through greater efficiency or as an improved means of providing patient care. Technology is perceived overall as a positive factor with concerns on the human aspect being at risk with some technology in healthcare. Covid-19 is accelerating the use of technology in several ways, most notably through virtual access to providers. Data access is identified as a means of increased shared knowledge for providers and patients alike.

Chapter 6 Discussion

Chapter 6 will analyze research findings in direct response to the research questions.

Response to Research Questions

Question 1. What are the perceptions of the skilled labor supply in the healthcare industry?

According to the 38 survey respondents and 49 narrative respondents in this study, there are shortages of the skilled labor supply in the healthcare industry in their respective countries. Workers in the healthcare industry perceive there is a shortage of employees. Their expectation is that the labor gap will increase in the future. While this is a small sample for each country, the results were similar for all case studies through narrative and survey data. The data shows there are perceived labor shortages from workers in the industry, as well as real shortages of employees in meeting market demands for this industry. These findings can be seen in the diagrams discussed in Chapter 5.

India.

India reported 0.86 doctors/1000 population and 1.48 nurses/1000 population. The computed number of healthcare employees in India needed to achieve World Health Organization minimum standards for doctors and nurses of 4.45-5.9/1000 is short by 600,000 doctors and 2,000,000 nurses as presented in Chapter 5. As a result, the data establishes that there is not only a perceived shortage of healthcare workers in India, but an actual shortage.

The main story of a labor shortage is based on the narrative in Diagram 10 (Chapter 5) and applies to Question 1. The dominant story is of a serious labor shortage in the healthcare industry. Public policy and the marketplace have established World Health Organization standards as benchmarks, and they indicate that India fails to meet WHO standards of healthcare employees per capita.

The metanarratives provide a deeper understanding of the labor shortage with an emphasis on the rural/urban split in healthcare, of urban healthcare being superior to that of rural areas, of concern over wages for healthcare employees, and the migration of healthcare employees from India to other countries. Responses to the survey question “Do you think there are enough skilled healthcare employees in India” (Diagram 11, Chapter 5) indicate those in healthcare occupations see a problem in finding enough skilled employees in India. Results from 20 respondents show the following:

- 25% a serious problem
- 65% moderate problem
- 10% minor problem
- 0% no problem.

A similar finding can be seen in the responses to the follow-up question “Do you believe there are shortages of healthcare workers?” in Diagram 12 (Chapter 5). A majority of respondents indicate that it is their belief that a general shortage exists in India.

- 30% very true

- 25% true
- 25% somewhat true
- 10.5% somewhat untrue

Poland.

The shortage of workers in Poland to achieve the European Union average per capita is determined to be 45,570 doctors and 129,115 nurses as discussed in Chapter 5. As a result, the data establishes there is not only a perceived shortage of healthcare workers in Poland, but an actual shortage.

The narratives indicate that there is a strong perception of a healthcare labor shortage. The dominant story is of a labor shortage in the healthcare industry. Numerical data indicates that Poland meets the World Health Organization minimum numbers for doctors and nurses per capita. However, public policy and the marketplace reflect higher expectations which are based on benchmarks established by the European Union. As stated in Chapter 5, the most important measurement is the marketplace. Richard Cooper, M.D. of the University of Pennsylvania, uses a "demand-based" model to show how many physicians in various specialties a given service area. This model differs from a theoretical model on how many health care workers ought to be present in a particular service area (Is There an Ideal Physician-to-Population Ratio (merritthawkins.com), Jan 20, 2018). Furthermore, according to the World Health Organization "National targets are set based on Health 2020 for Europe" (Poland country profile - European Health Information Gateway (who.int). This report for Europe states that "Countries in the Region face different health problems that

require different approaches" (The World Health Organization in the European Region (Eng) (who.int), p. 9). The narrative and survey data show there is perceived healthcare labor shortages as well as market demands that indicate a shortage of 45,570 doctors and 129,115 nurses based on the European Union benchmarks.

The narrative main story as charted in Diagram 23 (Chapter 5) indicates that there is a labor supply shortage. Changing demographics appear to be a main contributing factor for the perceived shortages. In this case, we have an aging population alongside declining numbers of people in the working age population. These shortages are concentrated in nursing, technician, and mid-level health occupations.

By taking a closer look at the metanarratives we see more detailed explanations for the perceived shortages. These include an inadequate compensation, the loss of workers to foreign markets, and the adverse demographic impact from an aging population. Indications of these perceptions can be seen in the survey to "Do you think there are enough skilled healthcare employees in Poland?" (Diagram 24, Chapter 5). From this we see that a majority of the respondents believe that there is a serious shortage of skilled healthcare employees in Poland. The results are as follows.

- 62.5% there is a serious problem
- 25% there is a moderate problem
- 0% there is a minor problem
- 12.5% there is no problem (1 respondent)

In response to the question “Do you believe there are shortages of healthcare workers?” (Diagram 25, Chapter 5), the majority of respondents stated their belief that there are shortages in Poland.

- 75% very true
- 12.55% true
- 12.5% neutral

U.S.A.

The shortage of workers to fill occupational vacancies was shown to be 800,000 nurses and 123,000 doctors as discussed in Chapter 5. As a result, the data establishes that there is a perceived shortage of healthcare workers in the U.S. with a measurable labor shortage in the marketplace.

In Diagram 36 (Chapter 5) we see that in the U.S. there is also a perception of a healthcare labor shortage. Quantitative data indicates the U.S. meets the World Health Organization minimum standards for healthcare providers per capita. Demand side showing a shortage of workers is cited in various studies, i.e., McCann (2018) and Manpower (2019) which indicate U.S. market expectations exceed the World Health Organization global standard for minimum number of providers per capita. Just as Poland with a more advanced economy expects higher than minimum World Health Organization goals and looks to European standards, the U.S., with an even higher economic status has... “rising health cost related to ageing populations, changing lifestyles and increasing demands from citizens...” (The World Health Organization in

the European Region (Eng)(who.int). The narrative research and U.S. Labor statistics measuring job openings in healthcare positions displayed in Chapter 5 suggest that there is a labor shortage of 800,000 nurses and 123,000 doctors.

Metanarrative results are similar to those of India and Poland in that compensation is identified as a contributing cause of labor shortages. This is reflected in the narration samples for the dominant story under Diagram 36 (Chapter 5). The perceived shortages are seen in response to the question “Do you think there are enough skilled healthcare employees in the U.S.”? From the responses listed in diagram 37 (Chapter 5) we see the perceived shortage of healthcare employees in the U.S. The breakdown is as follows:

- 60% a serious problem
- 10% moderate problem
- 30% minor problem
- 0% no problem.

A similar perceived shortage is reflected in the responses to the question “Do you believe there are shortages of healthcare workers”? Here in Diagram 38 (Chapter 5), we see the following breakdown:

- 40% very true
- 30% true
- 10% somewhat true
- 0% neutral

- 20% somewhat untrue

***Question 2. How do national differences account for labor supply variations*?**

There are several common themes repeated in the case studies. All had similar sizable working age populations outside of the participating workforce. All showed a labor gap between the demand for workers in healthcare occupations and the number of people readily available to fill those positions. However, national differences are present as well. These differences affect labor supply in various ways. In Poland the main factor is disability benefits. Meanwhile, India has a significant underrepresentation of female workers, and the U.S. has differing certification requirements between states.

Compensation

The three case studies had a common theme of inadequate compensation for healthcare employees. This was particularly the case for nurses and midwives, a female dominated occupation. Figure 10 (Chapter 5) for India, Diagram 23 (Chapter 5) for Poland and Diagram 36 (Chapter 5) for the U.S. specifically cited under-compensation for nurses and midlevel health workers. Moreover, there is a distinction in India and Poland between the public healthcare system and the private providers. The former has a lower compensation system and have more difficulty in filling positions. This situation was not found in the U.S. In India and Poland there are stories of public health providers “moonlighting” in the private sector to supplement their income.

Demographics and Migration

Migratory movement, both within countries and from country to country, is an important factor in the development of the healthcare workforce. India has a high rate of external labor migration outside of the country. Migration in this case means India is educating healthcare workers who find higher compensation or better working conditions in other countries. Meanwhile, Poland has experienced both migration of its citizens to other countries, and immigration into Poland from elsewhere in Europe (especially Ukraine). This movement has been detrimental to Poland in that higher educated Polish people seek employment outside of the country. Those that immigrate to Poland tend to take lower skilled jobs even when qualified for higher positions. Overall, this downward Polish population trend foreshadows future economic challenges. On the other hand, the U.S. has benefited from the immigration of healthcare workers. However, the country has not benefited as much due to the existence of different certification requirements across states.

In the case of the U.S. and Poland, the narratives point to as an important factor affecting the healthcare labor supply. The aging population was mentioned in the narratives as a factor in identifying, training, and recruiting enough working-age candidates for healthcare occupations. The aging workforce has impacted the rate of retirement of employees from healthcare occupations, and the aging population is putting greater stress on healthcare delivery as older people have more health care needs. Poland in particular has demographic trends in migration which along with an aging population forecast economic growth restraints in the future. This concern was

not present in India regarding finding and losing employees but is mentioned only with respect to increasing concerns over senior living arrangements.

Economic Factors

The regulatory climate was identified in each country as an important influence on building a healthcare labor supply. However, the emphasis was different in the three countries. In India the respondents expressed concerns relating to the certification standards and their reliability. These concerns are identified as part of the dominant story for India (Diagram 16, Chapter 5). There are varying standards for states, falsified credentials are viewed to be widespread in India.

Respondents in the U.S. and Poland reported a concern related to inadequate government subsidies for healthcare workers compensation. In India we have a similar situation where there would be enough employees if there was a higher compensation (Diagram 10, Chapter 5). In all three countries, under compensation for some healthcare occupations was repeatedly cited as a reason for not attracting employees, in losing employees to other occupations, and in early retirement.

In addition to low compensation, we have a situation in Poland and in India where healthcare workers tend to move from public to private systems due to a higher compensation in the latter.

Similar to the public-private movement of healthcare, workers from the three countries noted a higher healthcare worker compensation in urban areas resulting in shortages in rural areas. In India the situation is worse as it is also experiencing high migration of healthcare workers to other countries.

Another difference between the three countries is that the U.S. (more than India or Poland) has an extensive senior care living system (nursing homes and assisted living) which is highly regulated. In Poland and in India this may change in the future as there is an increasing concern for the elderly.

Education

The case studies show differences in national efforts to increase the number of healthcare workers through education. India has undertaken a major policy initiative to increase the number of medical schools. Poland has experienced an increase in the number of admissions to healthcare programs. Meanwhile, the U.S. has not made a concerted effort to expand the number of graduates in healthcare. From the narratives we see the idea that there have been reductions in some healthcare education programs in the U.S.

Question 3. How do variations in the economic system of the three sites play a difference in labor supply?

As discussed earlier, the economic system plays a role in guiding healthcare labor supply. For example, in all the countries, compensation was cited as an important factor, usually in the context of salaries being too low to satisfy demand. In addition to compensation, there are other factors which impact the supply of labor. There are notable free market economy variations among the three countries. The closest to a "free market" exists in India where there is a loose certification/regulatory system, and a strong alternative medical system. This loose certification and regulation system puts the onus on consumers to make purchasing decisions. Here the presence of a large

alternative medical system creates competition for a more expensive Western style healthcare system. Similar to India, Poland has a public system which is available for those that are not able or willing to pay more. The private system is more expensive and is viewed as having better healthcare with the ability to attract the needed supply of providers. In addition, there are remnants of the communist system in Poland which, according to narrative, are detrimental to young people/new ideas in healthcare. This contributes to dissatisfaction among young people entering the Polish system, providing an incentive to consider migrating to another country. Meanwhile, the economic system is less centralized in India, with each state taking the lead, which increases disparity, but also spurs innovation regionally.

Question 4. What role do training and education programs have upon health labor supply?

All three countries have public education and training with a sizeable amount of training being private and on-site, meaning individual business will hire a worker and train them at business expense in their own facilities. There is a supply shortage of healthcare workers in part because the education systems restrict the number of people who enter these professions with enrollment policies or lack of schools. This is the case particularly for health-related programs in India (Diagram 14, Chapter 5). Here the narratives indicate that there are plenty of people available for health-related programming, but not enough interest in the occupations themselves. In Poland the narrative is that it is very difficult to gain entry to the schools that exist (Diagram 27, Chapter 5). In the U.S. narratives indicate both a shortage of students graduating from

the schools and shortage of schools and students in the counter story (Diagram 40, Chapter 5). The main narrative is a lack of students applying to schools and thus reducing the number of graduates entering the workforce. The shortage of applicants creates stress in education institutions with the perception of school closing or an inadequate number of schools. This shortage appears to be related directly to nursing occupations and not at physicians. In addition, the location of health education facilities affects enrollment and graduation. According to narratives in all three sites, school for health workers that are close to healthcare facilities positively impact the supply of labor to those facilities, and established relationships between education and healthcare institutions benefit both parties.

Question 5. What is the effect and projected effect of technology regarding healthcare labor supply?

While technology has not replaced jobs, it is changing the healthcare industry. Most workers, especially younger ones, feel comfortable utilizing technology and believe it is helping the general population have a better understanding of health-related issues. However, there have been difficulties implementing specific systems in the field and at times the tradeoff of increased information flow to the healthcare worker led to a burden of reporting requirements associated with the technology. Healthcare workers in all three countries are optimistic that technology will improve health care and they mentioned advancing technologies to facilitate the internet for research, access to medical records, and virtual visits and diagnosis with patients. They also provided examples of increased simulated training with potential for future growth, and in the

expansion of patient monitoring through technology. While the respondents do not believe that technology is replacing jobs, they emphasized other areas for improving this industry. For example, the emphasis was on making their jobs easier, in providing more efficient patient care, or in lowering cost due to efficiencies. A caution was expressed in Poland and the U.S. that technology cannot replace the many benefits of the human touch in patient interactions.

There is a sense that increased productivity has lagged behind the new technology but that this is changing. The dominant story for the U.S. is that technology is becoming more efficient (Diagram 41, Technology in Healthcare-US, Chapter 5). In Poland, the dominant story (Diagram 28, Technology in Healthcare- Poland, Chapter 5) is that workers know technology, and in India the dominant story is that workers are tech savvy and that major technology changes are now taking place (Diagram 15, Technology in Healthcare – India, Chapter 5). In both the U.S (Diagram 41, Chapter 5). and India (Diagram 15, Chapter 5) there is the narrative that the technology has not been integrated and competing technology systems may require separate training or may not synchronize with other technology solutions. In addition, healthcare practitioners appreciate the ability of being able to share best practices on the web. And there is the recognition that patients are becoming more sophisticated in initial self-diagnosis via the internet. More recently there is the belief in all three countries that Covid-19 is changing the healthcare field and that the use of technology has accelerated during the pandemic.

General Research Question: ***What is the adequacy of skilled worker supply in the knowledge economy?***

There is an adequate supply of working age people to satisfy labor demand in vacant positions in healthcare occupations. All three case study countries have a sizable working age population outside of the participating workforce. The category of people available to fulfill specific occupations in most cases has not been identified, educated, or trained for the jobs in demand. The three case study countries show similar results for the main research question of a labor gap – a perceived shortage and a market shortage of qualified workers for jobs at the same time a pool of potential employees exists.

It has been shown that there are an adequate number of potential workers to satisfy economic growth in the knowledge economy. At the same time, research shows a gap between those participating in the workforce and the demand for workers. Those not participating are not likely to have been identified, educated, or trained for specific healthcare occupations. The inadequacy of participating worker supply was evident from numerical data on official labor department reports in all three countries, from independent publications on healthcare shortages, and from narrative and survey data. The labor gap from a capable but nonworking population creates potential for social unrest. A shortage of workers needed in jobs hinders productivity, in this case hindering an improved level of health care. While there is a shortage of educated and trained workers readily available in healthcare, there is a large population of potential workers for healthcare occupations. This study did not address other occupations, but it is noted in literature review those similar shortages are reported in other sectors

Finally, available human capital that is unwilling, unqualified, or unaware of how to fill vacant positions creates the market gap.

India summary

43.1% of working age people in India are not participating in the workforce (Figure 6). This does not include the 6% that are students nor the reported 1.1% with disabilities.

Not everyone in this population has the ability/interest to work in a healthcare occupation. When adjusted for ability/interest, India has a very large supply of potential labor to fill a need for health care occupations in the country with a pool of 21,500,000 potential workers to address shortages of 600,000 doctors and 2,000,000 nurses.

Poland summary

35.1% of working age people in Poland are not participating in the workforce (Diagram 19, Chapter 5). This does not include the 4.3% that are students nor the 4.4% who are disabled.

Not everyone in this population has the ability/interest to work in a healthcare occupation. While there are an adequate number of potential healthcare providers per capita in Poland to satisfy the minimum threshold established by the World Health Organization, there is a market shortage when European Union standards are applied. When the nonparticipating available workforce is adjusted for ability/interest in healthcare occupations, there is a potential workforce of 487,200 within Poland for

healthcare occupations with understaffing of 174,687 workers needed to meet the EU average.

U.S. summary

25.7% of working age people in the U.S. are not participating in the workforce (Diagram 32, Chapter 5). This does not include the 6.6% who are students nor the 4.9% who are disabled.

Not everyone in this population has the ability/interest to work in a healthcare occupation. When adjusted for ability/interest, the U.S. has a supply of potential labor to fill a need for health care occupations in the country with a pool of 3,337,250 potential healthcare workers to address reported shortages of 800,000 nurses and 123,000 doctors.

Auxiliary Questions

There were two auxiliary questions identified at the start of research that are addressed below.

1*. How can technology solutions be utilized to match potential workers with occupations?*

Survey questions were used in looking at the issue of screening employees for interest and ability in healthcare occupations. Results indicate a concern with testing as a means of judging a person for a job. When phrased as a screening tool for suitability,

there is widespread interest in the use of such tests. There is greater confidence in a screening tool and in assessment of soft skills as opposed to knowledge testing.

2. What policy considerations should administrators consider in addressing health care labor supply?

Policy considerations are presented in Chapter 7 Conclusions.

Chapter 7 Conclusion

Policy

The results of this study have policy implications for governments, local, national, international, and non-governmental healthcare organizations. Employers have difficulty filling vacant positions resulting in the impression of a worker shortage. For the employer and in the job market, this is a true shortage. At the same time, it has been shown there are an adequate number of working age people that have an interest and ability to fill healthcare occupations yet are not participating in the labor market. Both sides of this policy debate are right, there is a shortage of healthcare workers readily available to hire, and there are more than enough people of working age outside the work system that need to be found, brought into the system, trained, and educated as needed, and matched to the appropriate occupation.

Removing barriers to the flow of skilled labor will allow a better functioning marketplace to balance the supply and demand of healthcare workers. Policy recommendations address several barriers such as gender and disability related issues, education barriers, regulatory issues, and the obstacle of a healthcare system that measures input rather than output.

Policy Goal--Improve the Regulatory climate

In the United States, varying licensing requirements provide disincentives for healthcare workers to relocate to other states. To remove such barriers, Governors could work through the National Governors Association, and legislators through their various associations, to bring healthcare worker licensing into a national alignment.

Hospital administrators, nursing home associations, and the various occupational associations should also pursue coordinated licensing among the states. Universities and international health care organizations could also take a lead in developing certification standards that are recognized not only in the various states of the United States but in multiple countries.

Most governments, local and national, have made it a social priority to improve the health care of their citizens. At the same time, government programs to improve health care often have marketplace repercussions for both consumers and providers. Compensation in some occupations does not reflect market value as seen for nurses or nursing assistants in assisted living and nursing homes. This is reflected in budget debates for government subsidies and in the difficulty in hiring and retention of these employees. Distortions occur through regulation and through subsidy. Restrictive regulations of occupations and institutions in the U.S. are hindering innovation, and the development and utilization of new responsibilities and new occupations. Poland and India have evolved more distinct public and private systems than has the U.S. (due to the time of its enactment and implementation the Affordable Care Act was not discussed in this study). Given that a market economy has distortions, especially in healthcare economics, public officials need to recognize that rapid technological change in healthcare requires a more responsive regulatory process. For example, as technology advances in combination of shortages in specific fields, the choice is either to increasingly subsidize the present system (including worker compensation) or to increase productivity by removing barriers to make the system more efficient. With a goal of improving health care results, regulations should not require headcounts of

employees per patient but should look at outcome of services. If people are getting better results through advances in technology, regulations must change to allow replacement of specific occupations through technology, and creation of new occupations that provide better patient health results. Technology now includes devices to monitor patients remotely, to automatically adjust living space (temperatures, humidity, and lighting), in the delivery of supplies, and to constantly monitor vital signs. Generally, these devices operate essentially error-free. As such, obstacles to using such technology should be removed. Since outcome of services should be prioritized, headcounts of employees per patient require further scrutiny. This would require organizations such as the WHO and the European Union to pay closer attention to the figures they recommend for the number of healthcare employees per patient.

Technology is allowing much greater access to medical information through the internet. Increased access to medical information was cited in this study by workers in all three countries. With this comes the responsibility of policymakers to provide trustworthy sites and directives. A policy goal in this regard could include websites certified or otherwise approved by public regulatory bodies or by healthcare associations.

Beyond technological issues, there are subtle cultural differences along gender lines that create obstacles in healthcare professions. In India, for example, it was noted that nursing is not perceived as a male occupation. Thus, this obstacle could be eliminated by modifying occupational labels and task descriptions, while maintaining the essential functions of the job. In this vein, a new occupation akin to nursing, but more attractive to males, could be created that includes as an essential function having to lift

heavier objects. In this case, the occupation would be more attractive to males. Another option would be to encourage the creation of hybrid occupational positions (such as physician's assistants) that maintain many nursing functions without the nursing title.

Policy Goal--Utilize the wider healthcare infrastructure

International institutions measure adequacy in healthcare systems based on specific measures reflecting western standards, i.e., doctors and nurses per capita, and the number of hospital beds. Such measurements may be driving policy to meet specified requirements rather than to specific outcomes. A focus on the latter will allow greater innovation, wider acceptance of technological support tools, and greater cost efficiency. This study cites examples of this type of innovation, notably in India with the creation of community healthcare advocates. This is a new type of healthcare position focused on the development and implementation of healthy living standards which is to achieve healthier and longer lives for patients and not focusing on the number of healthcare providers and the number of hospital beds available. In this situation the use of traditional and alternative medical networks, and the cross-training of various medical professionals, could enhance the overall well- being of a community. For example, the testing for Covid-19 in populations would have been enhanced had an expanded medical network utilizing a range of medical providers and outlets been used, particularly early in the pandemic when bottlenecks in the supply chain were most apparent. In addition, it is recommended that national and international data on alternative medicine be tracked along with Western medicine. An established network of traditional medical healthcare workers could be integrated and used to support community healthcare. It would also reduce Western bias in healthcare research.

Policy Goal--Educate more workers

It was cited in the narratives from all three countries that education systems place high value on grades and academic prowess over practical education. There is restriction of entry to many seeking to enter healthcare occupations due to the existence of a limited number of schools and to tightly controlled admissions requirements. In addition, occupational input factors found in boxes A and C of Diagram 3 in Chapter 3 are altered through government policy. As such, policymakers can increase the supply of healthcare providers through admitting and educating more aspiring workers.

Policy Goal--Reform the Education Process

Shorter education and training courses with certifications that are transportable to other regions or countries should be encouraged by policymakers. There is a particular need for new entry level occupations in healthcare which would provide an opportunity for work experience for general health courses. Meanwhile higher skilled employees would take courses related to changing requirements in their fields. Education systems must go through major adjustments to become relevant in the knowledge economy. Covid-19 has hastened stresses that would have come more gradually. In this new context, the private sector would look more favorably towards online teaching, shorter intense programming that is specifically job-related, technology, and the use of appropriate and adequate certifications.

Policy Goal--Encourage Education and Training relationships between organizations

Respondents in healthcare occupations in this study distinguished between training and education. Most training takes place in the workplace. Most education is

done through separate institutions. The success stories are of those healthcare providers who have established relationships with educational institutions. There are noticeable differences found between urban and rural healthcare worker supply, as well as overall healthcare service. Establishing stronger relationships between rural providers and educational institutions, as well as encouraging urban healthcare facilities to create rural satellites would build upon this present record of success.

Policy Goal--Focus on the Nonparticipating Workforce

Policies should recognize and engage the nonparticipating but capable workforce in all three countries. As discussed before, India has a nonparticipating workforce of 43 percent. Similarly, the figures for Poland are 35 percent and close to 26 percent for the U.S. People are truly the most important component in a knowledge economy, and government officials should be leading the way in identifying those outside the labor market. They also need to understand why they are not seeking employment and address restrictive issues. To facilitate this effort, government officials should work hand in hand with the private sector to incorporate the nonparticipating population into the labor market. The public-private partnership is encouraged as government led programs have generally not solved the problem. This partnership should be inclusive of nonprofit organizations that have a good record of working with hard-to-reach constituencies. In most countries, there is government support for jobseekers. These systems provide opportunity for a nonworking individual to take an occupational assessment and look for job openings. The lead agency in Wisconsin is the Department of Workforce Development accessed online under https://jobcenterofwisconsin.com. The U.S. Labor Department has an online occupation

self-assessment tool known as Occupation Network (O*Net). Europe has a similar system with Occupational Self-Assessment (OSA). These systems require initiative on the part of an individual looking for work. As such, they are passive solutions where a more aggressive and active outreach is needed and should be done in partnership with organizations outside of government. The target populations of a nonworking but capable worker have been identified in this paper and include people who have given up looking for employment, those with family obligations, returning veterans, early retirees, those with other social issues such as drugs and alcohol, some who just do not want to work. It includes people who may want to work but do not know how to get jobs, or even know what types of jobs may exist that they would be interested in.

Two of the larger groups in the nonworking category to be targeted have been identified in this paper as the disabled and women groups. This study identified the literate disabled population for India, Poland, and the U.S. The disabled population would have more opportunities for working as more occupations are included and certain literacy requirements are de-emphasized. An indicator of underutilization can also be seen from the much higher unemployment numbers of this group than of the general population. It is recommended that, to identify and utilize the untapped labor pool of those defined as disabled, governments and disability advocacy groups work together to identify and guide this population to training opportunities and to jobs.

In addition to the disabled population, there has been a disproportionate number of women who are not participating in the workplace. In the U.S. there is a recent downward trend of working women. After increasing over the second half of the 20th century, the labor force participation for U.S. women has flattened or dropped since

2000. “Today, large gaps remain between men and women in employment rates” (Burke, “Facts about American women in the workforce”, Brookings Institute, December 5, 2017). Likewise, Polish women lag those of their male counterparts by comprising 45% of the labor force Women in the Polish Workforce (Poland Perspectives Fact Library, 2018). As discussed earlier for India, women are highly underutilized in the workforce with less than a third of women working or looking for a job (World Bank, 2019, @Working for Women in India - World Bank).

Policymakers should take a deeper look into the gender workforce gap. It may be cultural within the bureaucratic red tape as reported in the narratives, and/or it may be a shortage of jobs for everyone as discussed by mostly male respondents. There is also the possibility of discrimination against women who are competing for higher skilled and higher paying jobs. In the U.S., the male/female difference should be addressed through deeper study of the underlying causes. For example, if elder care and childcare responsibilities falling upon women are the cause of reduced human capital in the market, there are social policies (i.e., subsidized care, increased medical, maternity/paternity support) that would address these concerns while allowing people to return to the workforce. If the market does not result in increased compensation for occupations with labor shortages, perhaps policymakers are not detecting pressure from the public or institutions to address the underlying social issue (refer to page 30 of this paper about the need of a political response to hopelessness and social turmoil). It is noted that Covid-19 has disproportionately impacted the employment of women. Economic recovery data should be monitored closely to detect trends in employment data for women, and to identify obstacles to employment for women.

Policy Goal--Supply Chain Technology for Human Capital

Policy considerations that encourage finding potential workers from the nonparticipating workforce are encouraged. There are technology tools for human resource managers (and educators) that can identify possible employees and match them to suitable occupations. For example, career assessment tests can identify unutilized workers for occupations. They have been successful in saving education costs while guiding workers for the right occupations. Such testing has been found to provide a high return for employers, not the least of which is turnover reduction. As mentioned above, the issue is not the technology, but rather the failure to reach out to those unaware or unmotivated enough to get into the system. This policy would help to address an important issue identified by the World Health Organization where some countries experience vacancies in the public health sector along with high unemployment rates among health workers. The conclusion is the same as that found in research from this paper: the gap is a labor market failure to match the supply and demand for health workers (McPake, et. al., 2013).

Policymakers should consider establishing a requirement for nonworkers to begin an appropriate education/training program in exchange for public benefits. These education/training programs also provide the participants a sense of purpose and dignity as discussed in earlier chapters. To facilitate greater participation these education programs should be subsidized by the public and private sectors.

Policy Goal--Recognize That Disruptions Create Unease

As technology continues to change the health care industry, it is important to address human concerns produced by this change. Concern was expressed in all three

countries regarding the need to focus on the human side of healthcare. The need for personal care and understanding when working with people was highlighted as a critical aspect of healthcare. There is anxiety among health workers that this sensitivity is in danger of being neglected. This concern must be understood by administrators and policymakers alike in addressing recommendations for change. Each of the previous major economic disruptions, the previous "waves", have created social discomfort in a changing workplace. In the case of healthcare, a focus on outcomes and on care of the patient – the human element – must be considered a top priority.

Policy Goal—Technology, transparency, and privacy concerns

Policymakers must recognize that technology is allowing greater involvement and information sharing for patients. In healthcare there is the expectation of privacy and confidence in the source of information about patients. Any policy regarding a patient's health must recognize individual rights of privacy. At the same time, large data sets and information sharing can increase productivity and improve healthcare. Covid-19 medical work is an example of large data providing important information on pandemic hot spots, vulnerable populations, the sharing of responses to treatments, and optimal prevention techniques. It is also an example of the clash of privacy expectations for inoculations, test results, and the tracking through mobile phones of an individual's location and personal contacts.

Technology is advancing using simulated training. Much like simulated training for pilots, medical personal can now be virtually trained with realistic software. This type of training must advance more rapidly in the medical field. Examples that presently exist range from computerized mock human heads with a computerized mouth and

teeth that can be altered by software to train dentists. The military has been advanced in using simulated training with computerized mannequins as the patient and various software programs to simulate different injuries. This is now used for medical evacuation training. This type of training must be accelerated in the public health sector. Government policies can be socially responsible without picking winners and losers through the establishment of central information clearinghouses to share innovative ideas. Indeed, the National Science Foundation in the U.S. is increasingly funding technology solutions to advance information sharing by stakeholders.

Future Research

Much of the research for this study took place during the Covid-19 pandemic. Healthcare employees were under great duress. While it made gathering data for this specific research challenging, it provided a jump to the future with the rapid technology advancements that accompanied the pandemic. There were comments in the narratives relating to technology changes regarding greater telemedicine, information sharing, and safety measures. There are reports of computer simulations for genetic research, and vaccines to accelerate addressing the virus. Policymakers in government and in education should embrace these tools. Frontline healthcare workers are noticing change in the workplace and are resources as to what works and what hinders.

Society would benefit from further research into the nonparticipating workforce. Specifically, we should identify the abilities of nonparticipating workers and put them to use. Assessment testing has yet to be applied to those left behind in the knowledge economy. Longitudinal data on technology use within the workplace would provide a

better reference for trends within occupations. Responses during Covid-19 displayed deep emotional reactions to changes in the healthcare workplace.

GIS mapping was used, but not included in this study, to visually examine hospitals' distancing from education sites for healthcare workers in Delhi, Warsaw, and Milwaukee. Technology tools such as mapping provide insights into monitoring disease hotspots, medical facilities, supply locations, and population vulnerabilities. Visual tools are also helpful in working with policymakers to better identify and illustrate issues.

Compensation and wages are depressed over what a market would dictate. A free market would likely provide large service disparities, with better services for those willing/able to pay for them. Social considerations have brought government involvement. With this understanding, policymakers would need to increase subsidies to eliminate the job gap. This paper does not address the political or financial considerations for such a policy. The result of not increasing healthcare worker compensation has resulted in high turnover, early retirement, and job movement to positions in higher compensating facilities or in other countries. There are also indications that not all healthcare occupations have the same labor gap experience. While policy recommendations included expanding upon occupations that may fulfill some responsibilities for nurses and physicians, it also gives rise to the question of sex-linked wage differentials. The greatest concern in compensation was expressed for nurses, a heavily female dominated occupation. Deeper study is warranted on this as an issue.

Parallel studies of other occupations, and other countries, would likewise provide insights for policy consideration. This study focused on healthcare occupations.

There are Indications of labor shortages in many STEM (science, technology, engineering, and math) occupations as well as in traditional occupations in construction, agriculture, and manufacturing that increasingly rely upon technology (Chapter 1, p.12-13). Other countries of interest would be those with a central planning economy, such as many Asian countries, versus those based on a market economy as in this study.

Academic research on these topics is especially important to society today. Deeper understanding of worker perceptions provides insights that will help direct public policy. In the rapidly transitioning knowledge economy, society cannot overlook human capital as our most important resource. The balance required in labor supply and demand is just as important today as it was when Adam Smith, considered as the Father of Economics, wrote The Wealth of Nations. Smith started his classic book (Introduction and Plan of the Work, pg. 1) stating the importance of working people in relation to those not working is the most important component, that every nation is ...

> "...regulated by two different circumstances: first, by the skill, dexterity, and judgement with which its labour is generally applied; and, secondly, by the proportion between the number of those who are employed in useful labour, and that of those who are not so employed. Whatever the soil, climate, or extent of territory of any particular nation, the abundance or scantiness of its annual supply must, in that particular situation, depend *upon those two circumstances."*
>
> - Adam Smith

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World Health Organization, accessed 8.5.21 @ The World Health Organization in the European Region (Eng) (who.int)

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Zavalloni, M., Triandis, H., & Brislin, R. W. (1980). Handbook of cross-cultural psychology.

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Wall Street Journal. Audio blog. Accessed at https://blogs.wsj.com/economics/2016/05/04/the-rise-of-knowledge-workers-is-accelerating-despite-the-threat-of-automation/

Curriculum Vita

Dr. Scott McCallum

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Education

PhD in Integrated Marketing for Administration and Policy, multidisciplinary degree, 2021 University of Wisconsin, Milwaukee, Milwaukee, WI

MA in International Studies, 1974 - Johns Hopkins University School of Advanced International Studies, Baltimore, MD

BA in Political Science, 1972 – Macalester College, St. Paul, MN

Professional Experience

Executive-in-Residence, Northwestern University Medill School, Evansville, IL, Oct. 2004
Instructor, American Public Policy 210, University of Wisconsin-Milwaukee,1998
Visiting Lecturer, Lutheran College, Milwaukee, Wisconsin
Visiting Lecturer, Maranatha College, Watertown, Wisconsin
Visiting Lecturer, Edgewood College, Madison, Wisconsin
Visiting Lecturer, journalism class, University of Wisconsin-Madison
Visiting Lecturer, political science class, UW-Madison, Madison, Wisconsin
Visiting Lecturer, education department, UW-Stevens Point, Stevens Point, Wisconsin
Visiting Lecturer, Beloit College, Beloit, Wisconsin
Visiting lecturer, marketing department, University of Wisconsin-Whitewater, Wisconsin
Visiting professor, Hunan University, Hunan, China, 2005
Visiting professor, Sun Yat-Sen University, China, 2005
Guest lecturer, Northwestern University, Evansville, Ill, 2005, 2006
Adjunct Professor and Honorary Fellow, Biotechnology, MS program, UW-Madison (2005-2012)
Adjunct Professor, LaFollette School of Public Policy, UW– Madison (2020-2021)
Adjunct Lecturer, Bader Institute of Nonprofit Management, UW-Milwaukee (2018-present)
State Senator, State of Wisconsin (1977-1987)
Lt. Governor, State of Wisconsin (1987-2001)
Governor, State of Wisconsin (2001-03)
CEO, the Aidmatrix Foundation, Dallas, Texas (2005-2015)
President, AmEuro Global (2018-present)

Presentations

Macalester College, St. Paul, Minnesota (2001) Comments and discussion on public policy and political campaigning, including the role of money and the media.

Lawrence University, Appleton, Wisconsin (l982) Comments and discussion on public policy

Concordia College, Milwaukee, Wisconsin (1986, 1992, 1996, 2000, 2002) Presentation on public policy to the assembled school body followed by question-and-answer period.

Maranatha College, Watertown, Wisconsin (2002) Presentation on economic development and public policy to the assembled school body followed by question-and-answer period.

Wisconsin Technical College System – numerous occasions in schools throughout the system

Student Government Organization for UW System, and also to various campus student government organizations on numerous occasions.

University of Wisconsin-Madison (2001) Importance of foreign language and cultural understanding before UW-Madison language instructors and other dignitaries.

Commencement speaker:
University of Wisconsin-Green Bay
University of Wisconsin-Milwaukee
University of Wisconsin-Madison (four times)
Marion College, Fond du Lac, WI

Honors and Awards

Honorary Juris Doctor Degree, Marion College, 2001
Friend of Independent Higher Education, 2001-2002, Presented by Wisconsin Association of Independent Colleges and Universities
NFIB Guardian of Small Business, 2002
Toll Fellow designee. Named as one of 30 top future leaders nationally through the Council of State Governments, 1990
Small Business Development Center, 20th Anniversary Celebration recognition for outstanding work
National Guard Charles Dick Medal of Merit
"I Care for Children" Honor from K A Y (Kids and Youth) Foundation Board of Angels, 2001
Friend of the Hispanic Community, Centro de la Comunidad Unida, 2002
Exceptional Leadership Award, Dane County Republican Party, 2002
Leadership Award, Wisconsin Corn Growers and Soygrowers, 2002
National Multiple Sclerosis Society Award as Honorary Chair, 2002
Lawmaker of the Year Award, Wisconsin Fraternal Congress, 2001
Award for Dedicated Service to the Youth of Janesville, Janesville Board of Education, 2001
Literacy and Lifelong Learning, Wisconsin State Reading Association, 2001-2002
Macalester College Athletic Hall of Fame (football, swimming, baseball), 2001
1996 Peace Tourism Year in Israel Award
Farm Health and Safety Award, 1991
Aerospace States Association Award in promoting private sector aerospace, 1997
Governor's Special Minority Business Award, 1986-87
Italian Justinian Society "Man of the Year", 2001
Honorary Professor, Hunan University, China, 2005

Other Awards and Honors available upon request or refer to Wisconsin Historical Society for information.

Presentations, Workshops, and Publications

Keynote Speaker, Medill School Integrated Marketing Communications Program, Northwestern University, Evanston, IL, October 20, 2004
"Budget Deficit Presents Opportunity for Reform", State News, April 2004. As with many challenges, the state fiscal crisis provides an opportunity for structural reform, says former Wisconsin Gov. Scott McCallum. State policymakers need to step back and focus on long-range solutions, he argues, to make a quantum change in the way government operates
"Voter ID Will Restore Election Integrity", Wisconsin State Journal, November 14, 2004
Written as Senior Fellow of the Discovery Institute, Seattle, WA
"Local Actions in a New World Order" Environmental Law, Northwestern School of Law of Lewis and Clark College, Vol.23:621 Discussions concerning environmental aspects of the New World Order over-emphasize the roles of national governments and international organizations. While these large groups are important, the command-and-control regulations they tend to employ do not fit all situations and may fail to recognize solutions

developed on the local level. Effective management of natural resources and the environment must involve changes at the state and local level where environmental problems are felt by the people.

"Inflation & Your Wisconsin Income Tax", Wisconsin Printing, 1977, A report detailing the hidden inflation tax and promoting income tax indexing.

The Greening of World Trade, A Report to EPA, U.S. Government Printing Office, February 1993. In the relatively obscure world of international policy, one of the most hotly disputed issues discussed in the course of 1991 and 1992 was how environmental policy objectives and trade policy objectives could possibly co-exist. No one could have anticipated the importance of this subject to the environmental community, nor the significant news coverage of an issue considered to be the domain of 'Gattologists,' as trade negotiators affectionately call one another.

Trauma and Injury Task Force, a Report to the State. Federally funded report on ways to reduce childhood injuries and fatalities. The TIP Task Force developed legislative recommendations on gun safety which became law. The Farm Health and Safety Council was created subsequent to the TIP Task Force to follow through on ways to improve farm safety.

How Technology is Transforming Disaster Relief. McCallum, On the Brink, US Chamber of Commerce, 2008

Budgeting & Funding Technology – How to Finance Your IT Structure. McCallum, Thode, Managing Technology to Meet Your Mission: A Strategic Guide for Nonprofit Leaders, Wiley Publishers, 2009

Nongovernmental Organizations: Solving Society's Problems. S. McCallum, R. Boyer, Strategic Public Relations and Integrated Marketing Communications, edited by Caywood, McGraw-Hill 2012

Work Analysis, Technology, and the Millennium Development Goals, S. McCallum, L.F. Thompson, A. Gloss

Humanitarian Work Psychology and the Global Development Agenda: Case Studies and Interventions, edited by McWha, Maynard, and Berry, London: Psychology Press 2016

Psychological Dynamics in Information and Communication Technology for Development Projects. Behrend, Gloss, Honadon, Thompson, McCallum; Information Communications Technology for Development Conference, Cape Town, South Africa, 2013.

Wisconsin Federation of Women's Clubs (1988) Keynote speaker "Break the Glass Ceiling"

Bio2000 International Biotechnology Conference, Boston, Massachusetts (2000)

Bio2001 International Biotechnology Conference, San Diego, California (2001)

Bio2002 International Biotechnology Conference, Toronto, Canada (2002)

Economic Forum (2001) Speaker before a two-day conference of business and education leaders. Conference sponsored by the University of Wisconsin Board of Regents. Spoke on the new economy and what it means to Wisconsin. New economy includes traditional economies transforming with new methods.

Economic Forum (2002) University System program. Keynote speaker setting the tone for the conference to create a common agenda for the state business and education communities. Colleges and Universities need to be 'Towers of Excellence' around which we form clusters of business.

Baird Economic Forum (2002) Keynote speaker followed by media panel in front of 1000 Milwaukee economic and business leaders

Wisconsin Manufacturers and Commerce Business Innovation (2001) Keynote speaker

NGA National Center for Best Practices (2002) Roundtable participant at national forum on economic cluster theory

Energy Symposium (2001) Keynote speaker on energy policy for a two-day conference before energy producers, utility executives, educators, and consumer advocates, "Meeting Wisconsin Energy Needs Necessary for Economic Growth"

Energy Symposium (2002) Keynote speaker. Presented major energy plan for the state to energy producers, utility executives, educators, and consumer advocates

Transportation Panel, Republican Governors Association, Las Vegas, Nevada (2001) Discussion on state, local, and national transportation options in front of transportation decision makers

Financial Services Business Roundtable, Republican Governors Association, Mackinac Island, Michigan (2001) Roundtable discussion pertaining to changing financial services industry in front of decision makers in the financial service industry

Energy, Transportation Panel, Republican Governors Association, Kohler, Wisconsin (2002) Spoke on future infrastructure needs before decision makers in the energy and transportation industries

Workplace Childcare Conference (1988) Moderated panel before several hundred childcare advocates and business representatives on creating childcare in the private sector

Governor's Conference on Small Business (1987, 1988, 1999) Keynote speaker on small business. Moderated small business panel of Governor's cabinet and business leaders (1987)

Guest on Public Television show "Society's Workshop" (1993) Spoke on challenges facing our public schools

Wisconsin Manufacturers and Commerce Annual Conference (2001, 2002), Outlined policies important to the business community to the several hundred attendees

Farm Bureau Annual Conference (2001) Keynote speaker on agriculture policy before 900 Farm Bureau members. "Agriculture in a New Economy"

Dairy Producers Conference (2002) Keynote speaker. Outlined economic agenda to move agriculture into new economy

State of the State Address (2002) Presented before the Wisconsin Legislature and other public officials. Presented in the evening for live coverage on statewide television and radio. Widespread electronic and print media coverage as follow-up.

Wisconsin Budget Address (2001, 2002) Presented a $46 billion biennial budget with details of financing for agencies, including general purpose revenues (GPR), federal revenues (FR), program revenues (PR), and segregated revenues (SEG) before the Wisconsin Legislature, the cabinet, the members of the State Supreme Court, and other officials. Carried live on statewide television and radio and widely covered, analyzed, and critiqued over the ensuing period.

"A Tribute to the American Spirit" (September 2001)Addressed crowd estimated in 1000's on Capitol grounds and carried in every state media market on television and on radio

"A Day of Remembrance" (2002) Addressed crowd on Capitol grounds and carried on statewide television and radio

Task Force on Rural Community Economic Development, Council of Great Lake Governors roundtable (1987) Chair

Badger Boys State (1977-1983) Featured speaker, as a former Boys Stater, before 1000 High School age boys chosen to spend a week learning more about government.

Badger Boys State (1998-2002) Keynote speaker in front of 2000 selected high school boys, counselors, and parents. Generally, spoke on the opportunities they had, and their obligation to give back to society to help others.

Badger Girls State (1977-2002) Featured speaker in front of selected high school girls counselors, and parents.

Conference on Tourism (2001, 2002) Featured speaker at conference attended by 1000 tourism industry members. Announced "Keep your meetings at home" marketing initiative, customer service, technology initiatives, and minority advertising spending.

Participant in "Who Cares for Wisconsin's Children" (1988) A television documentary shown in conjunction with the PBS documentary "Who Cares for the Children"

Minority Business Conference (1998, 1999, 2000) Speaker on furthering minority opportunity. (2001) Keynote speaker "More headway to be Made" (2002) Keynote speaker before several hundred minority business leaders "A Responsibility to Help Others." Presented with an award in recognition for work in promoting minority business.

Women's Conference on Glass Ceiling (2002) Chair and Keynote speaker. Conference involved 1000 women leaders in education, government, and business.

Women in Government (2002) Speaker, with First Lady Laurie McCallum, recognizing and encouraging leadership among women. 1100 in audience.

National Association of Free Clinics (2006) keynote speaker. Health care support for the needy through nonprofit support addressed.

U.S. Chamber of Commerce, Disaster Conference, New Orleans (2006) Spoke on nonprofit response to Hurricane Katrina, and role in rebuilding

National Disaster Conference, New Orleans (January 2011) Keynote speaker. Conference of 1000 government, nonprofit, and corporate leaders in disaster and emergency response

National Disaster Conference, New Orleans (January 2012) speaker

Inter-American Defense College, Northcom. Colorado Springs, CO, speaker on technology solutions

MicroSoft Southern Region Executives, Dallas, TX (2013) Keynote speaker on the value of technology in philanthropic endeavors.

Decide Better, Dallas, TX (2011) keynote speaker in a leadership program

InterAction, Washington, DC, Annual Conference keynote panel. General assembly panelist for 3-day program with 160 INGO organizations

Commissions, Task Forces, Councils

Governor's Blue Ribbon Tax Reform Commission (1977)

Council of State Governments (1990-1992) Executive Committee, Budget Committee

National Conference of Lieutenant Governors (1987-2000), (1989-2000) Executive Committee (1990-1991) National Vice-Chair (1991-1992) National Chair

Clearinghouse for Workplace Childcare Options (1988-1997) Director

Wisconsin Export Strategy Commission (1995)

Governor's Task Force on Education and Learning (1995-96) Chair of Committee on Standards and Assessment

Governor's Council on Model Academic Standards (1996-1997), Chair

Governor's Commission on Jobs in the 21st Century (1997)

Governor's Blue Ribbon Task Force on Stewardship (1997-1998)

Governor's Blue Ribbon Task Force on Year 2000 Preparedness (1998-1999)

White House Advisory Committee on International Trade (1988-1989)

U.S. Environmental Protection Agency National Advisory Council for Environmental Policy (1991-1992)

National Advisory Panel of Child Care Action Campaign (1988)

Governor's Council of Economic Advisors (1988-1991), Chair

Trauma and Injury Prevention Task Force (1989), Chair

Economic Development Committee, National Conference of Lt. Governors, (1989), Chair

Governor's Conference on Small Business (1987-1999), Chair

Federal Intergovernmental Advisory Committee (1989-1990)

Repeat Offender Task Force (1991), Chair
Governor's Study Group on Child Care Fund Consolidation (1993), Chair
Governor's Commission on Children and Families (1995)
National Aerospace States Association (1993-2001), (1994-2001), Vice Chair
Small Business Development Center Advisory Council, University of Wisconsin Extension (1997-2000), Chair
Governor's Commission for People with Disabilities (1998-2000)
Center for Best Practices – State Leadership in the Global Economy Task Force (2001)
National Governor's Association Committee on Economic Development and Commerce (2001-2003)
Council of Great Lakes Governors (2001-2003)
Midwest Governor's Conference (2001-2003)
Forward Wisconsin (2001-2003), Chair
Governor's Biotechnology Partnership (2001-2003)
Governor's Council on Workforce Investment (2001-2003)
Work-based Learning Board (2001-2003), Chair
Information Technology Management Board (2001-2003), Chair
Transportation Projects Commission (2001-2003), Chair
Disability Board (2001-2003)
State Council on Alcohol and Other Drug Abuse (2001-2003)
Building Commission (1975) staff & proxy vote (2001-2003), Chair
Midwest Governor's Economic Task Force (1998-1999)
Public Records Board (2001-2003)
Education Commission of the States (2001-2003)
Center for Best Practices, Washington, D.C. (2001-2002), Board of Directors
BENS Forum on Resiliency, Washington, D.C. (2007-2009)
National Center for Policy, Washington, D.C. (2010-2012) Advisory Board on Community Resiliency
WisEye Network (a state "c-span") (2003-present), Board of Advisors
Wisconsin Historical Society, (2006-present), Board of Governors
National Disaster Conference, New Orleans (2011-2014), Advisory Board

International

London, England Worked for Research Services, Ltd. as a computer programmer.
USSR (1988) Leader of a 25-person delegation under the State Leadership Initiative. Three weeks in Russia, Estonia, Armenia. The only outsiders in Yerevan, Armenia during major anti-Soviet demonstrations. My photos were moved by diplomatic pouch to the Western press and used in Time Magazine and as an international AP Wirephoto. Did interviews with CNN and other media.
Republic of China (Taiwan) (1980) Member of a ten-person state legislative delegation at invitation of R.O.C.
Republic of China (Taiwan) (1988) Small delegation of ranking state officials at invitation of R.O.C. Business meetings and toured economic development zones
Peoples Republic of China (1990) Leader of a 10-person national delegation made up of statewide elected officials. This was the highest-ranking delegation to China following Tiananmen Square demonstrations. Gave a major presentation on American and Chinese relations in the Great Hall in Beijing, met with Vice-President, and with mayors of Beijing and Shanghai. Accompanied and debriefed by U.S. State Department including Ambassador James Lilly.

Japan (1991) Leader of business delegation. Three days in Japan attending auto show, and other business meetings.

Peoples Republic of China (1991) Leader of a delegation pursuing economic development. Three weeks in Harbin, Beijing, Shanghai, and coastal area. Met with government and business leaders.

Hong Kong (1991) Led a delegation to announce Wisconsin Seal Program to identify Wisconsin farm produce as American grown. Press conferences, coverage on front page of Wall Street Journal (Asian Edition), live appearance on "Good Morning Hong Kong" television, interviews with the Economist and with numerous Chinese newspapers. Featured in a television commercial shown in Hong Kong promoting American product.

Peoples Republic of China/ Hong Kong/ Republic of China (1993, 1994, 1995, 1996, 1997) Led economic delegations and follow-up. Keynote speaker for several functions and dedications. Host and honored guest at official dinners. Utilized portions of roughly 300-word Mandarin Chinese vocabulary, shared mutual interest in Eastern martial arts (First Degree Black Belt in Tae Kwon Do and knowledge of Wushu). Toured factories, chaired official meetings, and signed several economic partnership agreements.

Poland (1989) Led 18-member delegation on economic trade mission under the auspices of the State Leadership Initiative. While in Poland was the highest-ranking U.S. elected official. Participated in press conference announcing major U.S. business agreements with Poland pertaining to future U.S. investments. Luncheon speaker along with U.S. Commerce Secretary Mosbacher; John Davis, Jr, U.S. Ambassador to Poland; Dr. Beurt SerVaas, Chair of United States/Polish Economic Council; and Thomas Carroll, President and CEO of U.S. International Executive Service Corps. Private dinner with the newly elected Cabinet of Solidarity Party. Part of trilateral agreement signing between U.S., Finland, and Poland.

Czechoslovakia (1989) Led 18-member delegation. Business meetings including meeting with Ambassador Shirley Temple Black.

Yugoslavia (1989) Led 18-member delegation. Private meeting with Slobadan Milosovich followed by a State Department debriefing.

Nicaragua (1994) Led a delegation to monitor first-time elections on the East Coast. Under the auspices of the Independent Republican Institute, a "non-profit and non-partisan organization dedicated to advancing democracy worldwide," along with a team from the United Nations and a team from the Organization of American States, monitored turnout and election procedure, as well as the counting of ballots. My team was in the Rio Coco River basin, hotbed of dissension between Contras and Sandinistas. Concluded with a press conference in Managua.

Mexico (2002) Led Governor's Trade mission. Met with President Vicente Fox, and Governors of several states. Established student exchanges, several private sector business relationships, and stronger state-to-state partnerships.

Mexico (2006) Press Conference with President Fox regarding food for the hungry in Mexico.

Numerous trips to Europe, America's, Asia, Africa pertaining to the Aidmatrix Foundation, created offices in Germany, England, and India with numerous visits to build philanthropic mission

Have met numerous times with dignitaries - ambassadors, Presidents, Governors, Vice-Governors, and mayors, in various roles representing Wisconsin and the United States.

CEO for organizations with offices located in Germany, Hong Kong, Belgium, Canada, Mexico, Japan

Board of Directors
Institute for Sustainable Development, Washington, D.C. (2020-present)
ResponseNet, New Delhi, India (2008-present)
Lubbock Gas Gathering, Ft. Worth, Texas (2010-2015)
Aidmatrix Foundation, Dallas, Texas (2005-2015)
Helen Bader Institute for Nonprofit Management, UW-M, Milwaukee, WI (2018-present)
Alliance for Innovation, Warsaw, Poland (2017-present)
AmEuro Global, U.S., India, Poland (2017-present)
Whitburn Center for Governance and Policy Research, UW-O, Oshkosh, WI (2021-present)