

University of Memphis

University of Memphis Digital Commons

Electronic Theses and Dissertations

7-29-2019

Free Trade Agreements and the Resulting Health Outcomes: Trade Flow, Knowledge Spillover and Government Regulations among Developing Countries

Samia Tasmim

Follow this and additional works at: <https://digitalcommons.memphis.edu/etd>

Recommended Citation

Tasmim, Samia, "Free Trade Agreements and the Resulting Health Outcomes: Trade Flow, Knowledge Spillover and Government Regulations among Developing Countries" (2019). *Electronic Theses and Dissertations*. 2027.

<https://digitalcommons.memphis.edu/etd/2027>

This Thesis is brought to you for free and open access by University of Memphis Digital Commons. It has been accepted for inclusion in Electronic Theses and Dissertations by an authorized administrator of University of Memphis Digital Commons. For more information, please contact khhgerty@memphis.edu.

FREE TRADE AGREEMENTS AND THE RESULTING HEALTH OUTCOMES:
TRADE FLOW, KNOWLEDGE SPILLOVER AND GOVERNMENT REGULATIONS
AMONG DEVELOPING COUNTRIES

By

Samia Tasmim

A Thesis

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Master of Arts

Major: Sociology

The University of Memphis

August 2019

Acknowledgements

First of all, I would like to thank Dr. Junmin Wang, my major advisor for her immense support and cooperation. This project would be impossible to finish without her guideline and direction. She is not only a great professor but also an excellent mentor and advisor. Secondly, I would like to thank my committee members for agreeing to serve in my thesis committee. Dr. Wesley James who first encouraged me as the graduate coordinator to apply to the MA program in sociology at the university of Memphis. Not only for thesis completion, I also received excellent guidance from Dr. James during my application process for the PhD program. I would not miss the chance to thank Dr. Joseph Lariscy as I learned statistics and SPSS so well from him. He patiently guided me to resolve all the issues I faced during thesis completion. Finally, I would like to thank all the professors of this department for their continuous support and effort.

This acknowledgement would be incomplete without thanking my family. My gratitude to my mom for her unconditional faith and encouragement. My late dad who gave his whole life for supporting us. I always know that my family and friends are with me which inspired me to overcome many obstacles. Lastly, my dear husband who is an absolute inspiration to me. Seeing his dedication and perseverance, I was motivated to pursue higher study in the US. Thank you for being a life partner and a great friend.

Abstract

This study re-tested the associations between Free Trade Agreements (FTAs) and national health outcomes, measured by infant mortality, life expectancy, and adult death rate by examining three mechanisms- firstly, increased trade liberalization and free trade instigate trade flows and attract FDIs that benefit the economy; secondly, global diffusion of ideas and knowledge influences health outcomes; and thirdly, improved health-related policies and practices by government improves health. This analysis is built on a 15-year panel data including 34 developing countries that have participated in FTAs. Current analysis suggests when countries form trade agreements their trade volume expands, and life expectancy and infant mortality rates improves. When trade flows unimpededly, developing countries get access to resources from developed ones, and focus on sanitation, vaccination, etc. that ultimately benefit population health. The significance level among immunization and health outcomes reaffirms that flow of ideas, knowledge as well as trade of pharmaceutical products become effortless among countries who eliminate trade barriers with agreements.

Table of Contents

Chapter	Page
List of Tables	vi
1. Introduction	1
2. Dissension over trade agreements	4
2.1. Intensification of processed food	5
2.2. The accusation of global obesity	6
2.3. Alteration of healthy diet	8
2.4. Difficulties for regulations execution	9
3. Free trade agreements, overall economy and health	10
3.1. Stimulating economic growth and trade volume	10
3.2. Impact of free trade agreements on liberalizing the international borders	11
3.3. Instigating healthcare investment in the economy	13
3.4. Overall influence of FTAs on health outcomes from earlier studies	14
4. Theoretical framework and hypothesis	15
4.1. Trade flow, FDI and economic openness	16
4.2. Knowledge and technology spillover	18
4.3. Global health governance	19
5. Data and methodology	20
5.1. Variables	20
5.1.1 Dependent variables	21
5.1.2. Independent variables	21
5.1.3. Control variables	23

5.2. Descriptive statistics	23
6. Changes in life expectancy, infant mortality and adult death rate from 2000 to 2015	27
7. Results	30
8. Discussion	40
9. Limitations	45
10. Conclusion	46
11. References	48

LIST OF TABLES

Table	Page
1. Description of dependent, independent and control variables	22
2. Descriptive statistics of dependent variables	24
3. Descriptive statistics of independent variables	25
4. Regression model for life expectancy with all independent variables	32
5. Regression model for infant mortality with all independent variables	35
6. Regression model for death rate with all independent variables	38

1. Introduction

In recent years, an increasing number of countries are mutually approving trade agreements between two countries or among a group of countries. These agreements are generally known as Free Trade Agreements (FTAs) and are assumed to provide substantial economic benefits for the agreed countries by eliminating or discounting trade barriers of goods and services. Economic theory upholds that trade agreements and openness affect macroeconomy by instigating economic growth. Novignon and Atakorah (2016) asserted that the macroeconomic advantages of free trade are anticipated to flourish in different sectors of the economy of participating countries including the health sector.

Many leaders are advocating the idea of removing trade barriers through a multilateral system that would benefit all countries belonging to the World Trade Organization (*The Potential Impact of Free Trade Agreements on Public Health*, 2012). According to Stevens et al. (2013), most arguments about the positive impact of trade liberalization centers on escalation of income, invention and productivity; thus, ignoring the influence on human or health sector (Stevens, Urbach, & Wills, 2013). The authors noted that health sectors professionals are uncertain about the impact of free trade on low income or developing countries. Free trades are repeatedly blamed for having a negative impact on health determinants- the social, economic, and environmental conditions that affect population health by instigating income inequity and economic insecurity, making unhealthy processed foods readily available, and polluting the environment (Stevens et al., 2013). Barlow et al. (2017) asserted that trade agreements could possibly deteriorate the consumption habit and nutrition level of agreed country people by augmenting transnational trade of frozen or processed food containing excessive salt, sugar, and fat. After joining in the North American Free Trade Agreement (NAFTA) with USA and Mexico

in 1994, Canada's daily per capita supply of sweetener rose significantly. Before the agreement, the rate was 21.2 kcal/day whereas it reached a level of 62.9 kcal/day after participating in NAFTA (Minerd, 2017). In Canada, tax was abolished from high fructose corn syrup and similar other products from USA and Mexico after NAFTA formation. As a result, their consumption pattern changed and this altered intake pattern was related to intensification of the obesity rate (Minerd, 2017).

On the other hand, Stevens and Banik (2017) asserted the above assumption is not entirely true. According to these authors, termination of trade agreements and lessening free trade would cause a real and genuine harm to health. Fewer trade barriers, tax or tariffs means more business, opening new opportunities, and making the flow of goods and services among nations easy which augment economic growth and trade volume. With FTAs, developing countries get access to substantial international market and receive benefits from increased trade that were difficult to attain with small domestic industry (Chomo, 2002). Combining trade volumes with economic growth substantially improves health as it enables people and government to spend more on healthcare. Nations that spend more on healthcare are expected to have less disease prone, healthy, and active population; thus, live longer (Stevens & Banik, 2017).

The impact of FTAs on health outcomes might function through a variety of mechanisms. Forming FTAs signifies participating in global trades; thus, integration into a comprehensive economy. Lower-income countries are participating in global trades and signing free trade agreements with developed countries (Stevens et al., 2013). The research found that export is a promising aspect for growth for developing countries (Frankel & Romer, 1999). Their involvement in free trade has brought a surprising impact on their own public welfare by trading

advanced drugs and sophisticated medical equipment and promoting easy access to sanitation and safe water, healthy and nutritious foods, innovative health care and therapeutic technologies (Stevens et al., 2013). Furthermore, when trade barriers are removed with agreements, the cost of trades become low. As a result, the diffusion of ideas and knowledge, methods, processes, and medical products from inventor countries to other countries become effortless. Global trade encourages the implicit transfer of knowledge that developing countries could use to enhance treatment practices, health management, and insurance coverage that ultimately benefit public health (Owen & Wu, 2002).

From the literature, it was perceived that FTAs have both positive and negative impacts on the health of the USA, Canada or Mexico population; thus, portraying inconclusive results. Also, the literature does not include countries such as Jordan, Norway, Egypt, Armenia, etc. as well as many other developing countries who are participating in FTAs for quite a long time. Furthermore, Jawadi et. al. (2017), Novignon and Atakorah (2016), Ringkvist (2016) focused on the impact of Foreign Direct Investment (FDI) and trade openness on health outcomes rather than focusing on FTAs, so there is a persistent gap over FTAs and health. Considering the inconclusive arguments about FTAs and health, and the gap in the literature, I assess the holistic impact of FTAs on health outcomes of 34 developing countries. I addressed the following research questions

- Whether countries that have FTAs with the USA or European Union or Canada have observed any significant changes in health outcomes as measured by infant mortality, life expectancy, and adult death rate?
- If so, what are the mechanisms driving these changes?

2. Dissension over trade agreements

Following the World Systems Theory that suggests wealthy and core countries usually exploit less developed or poor peripheral countries for their own gains, it could be assumed that the developed nations are the winners of globalization. This theory recognizes the least benefits enjoyed by the weak countries in the world system. Therefore, the way a country gets assimilated into the capitalist world structure regulates the extend of economic development of that specific country (“World-Systems Theory”, 2019). Pioneered by sociologist Immanuel Wallerstein in 1970, Japan, Germany or USA are the core countries due to having massive industrialization and technological support. Most of the Asian and African countries are recognized as peripheral countries due to their weak economy and dependence on core nations for capital. These nations are less industrialized and have low literacy rates and internet access. Brazil, India, Taiwan, etc. are less developed than core nations but more advanced than peripheral; thus, known as semi-peripheral regions. “Core countries dominated the peripheral nations in such a way that they are always systematically forced to experience a sort of development that repeats their subordinate status” (Martínez-Vela, 2001). This indicates the power and supreme control of core countries on capital as well as the world trade and economic agreements. Following the notion, core countries dominate the peripheral or semi peripheral countries to produce the things exactly the way they want. For example- core nations determine the price of exported products of peripheral nations by often ignoring the true market value of those export items (“World-Systems Theory,” 2019). Another example of Samoa can be discussed here. Samoa is a country with a high and alarming obesity rate. Still, it could not execute the ban on importing low quality harmful fatty meat products from USA as the ban was considered as a violation of trading rules set by the core nations (Bharmal et al., 2017). “Wallerstein termed this as unequal exchange meaning the

planned and regular transfer of surplus from semi proletarian sectors in the periphery to the high-technology, industrialized core” (Goldfrank, 2000). So, with the massive profit gained from global trade and by exchanging manufactured goods for raw materials from peripheral states, the core nations get improved at an expense of peripheral economies. Considering the current trend of economic openness or globalization, both core and peripheral nations could gain benefits from it. However, due to technology, literacy, finance and management, the growth of developed states is impressive which help them the reap the benefits of globalization more than the developing one. Other than this particular criticism, there are some other negative arguments about the impact of trade and trade agreements that are explained in the next section.

2.1. Intensification of processed foods

Global trade signifies the magnified dependence between nation states; by forming trade agreements countries are mutually agreeing with each other for the unimpeded flow of capitals, raw materials, manpower, goods, and services. Gradually trade agreements have changed their forms and purposes and expanded benefits for agreed countries. Previously, trade agreements were formed to lower tariffs to reduce product price and focused on those products only that are worthy to fit their own environment (Riberio, 2015). Today global trade and agreements are considered a powerful economic and social force as they alter the conditions in which money and capital circulate within countries. When countries are united and globalized with trade agreements their economy changes due to change in product price and availability, supply chain, employment and wage rate, and societal and environmental conditions, etc. (Ribeiro, 2015). As a result, Riberio (2015) claimed that trade agreements have an impact on the entire economy as well as population health of signatory countries.

A persistent theme of academic literature and public conception is that tariffs or quota-

free trades and agreements that are directed towards promoting unrestricted trades are disadvantageous for health as they stimulate economic insecurity and inequality, pollute environments, and make unhealthy frozen or processed foods readily available (Stevens et al., 2013). Riberio (2015) anticipated one significant issue of Trans-Pacific Partnership Agreement (TTP) that it would modify the food system and consumption habit in Latin America and Eastern countries by introducing domestic markets toward international food trade, promoting uninterrupted distribution of processed foods, and making transnational food companies highly noticeable with substantial international food advertising (Ribeiro, 2015). The author further noted that TTP would allow global food manufacturing giants to tap the so far untapped larger market in developing as well as Eastern countries where foods with preservatives or additives are not that popular. The author suspected that the changed food habits from fresh intakes to processed food would have a substantial impact on population health in terms of obesity and noncommunicable diseases, body resistance, nutrition level, etc. Another appropriate example is Mexico that has signed and maintained NAFTA since 1994. Execution of NAFTA instantly removed tariffs on more than one-third of US exports to Mexico which has caused a large uneven increase in import and in-house or domestic production of canned, frozen or processed foods in Mexico. As a result, there is an oversupply or excess of no-natural food which are often rich in calories but poor in nutrition. Regular consumption of such foods increases the risk of obesity and noncommunicable diseases, especially detrimental to children. Mexico is second in terms of having the obese population in the world which further justifies the claim of oversupply and consumption of processed food pose risk to health (Ribeiro, 2015).

2.2. The accusation of global obesity

Nowadays, experts presume obesity or overweight as a global issue due to its widespread prevalence, and term this as “Globesity”. Globally, in 2013, the obesity rate has escalated by around 30% for adults and 47% for children compared to 1980. Globalization through FTAs is frequently conveyed in this prevalent concern because of its capacity to augment processed food consumption that is rich in salt, sugar, and calorie, etc. (Barlow, McKee, & Stuckler, 2018). The concern over obesity has recently plunged as FTAs are forming at an unusual rate. In 1990 the number of active FTAs were 16 whereas it reached nearly 300 in 2016. Health experts are concerned about these agreements and doubt these might damage healthy diets and intensify the obesity rate (Barlow et al., 2018).

FTAs minimize tariffs or trade tax and other non-tariff barriers such as “differences in technical or quality standards” that encourage and ease investment and trade in the food and beverage sector. Also, FTAs improve local or domestic food and beverage production by removing barriers (e.g. “lack of investor protection”) to foreign investment (Barlow et al., 2018). Barlow et al. (2018) asserted that all these alternations are related to cheap price, and considerable availability and publicizing of unhealthy food or drinks. The authors suspected that these aspects could modify regular diet as they influence quantity and arrangement of food and beverage production and ingestion. However, whether these alternations induce considerable caloric intake depends on the partner country as well. According to Barlow et al. (2018), U.S. FTAs are particularly expected to boost net caloric intake in partner countries due to high competition and saturation in the U.S. food and beverage industry.

A study initiated by Barlow et al. (2018) inspected the argument that CUSFTA (the Canada-U.S. Free Trade Agreement) intensified calorie consumption in Canada. Using a fixed-

effects regression model to compare changes in calorie availability in Canada with other countries from 1978 to 2006, the authors realized that after CUSFTA implementation, availability of calories in Canada sharply increased. In 1988 when CUSFTA was not in force, available calorie was around 3000kcal/capita/day in Canada. But in 2006, it reached a heightened amount of around 3500kcal/capita/day after CUSFTA execution. Therefore, the available calorie was nearly 350kcal/capita/day higher in CUSFTA execution time compared to before. The authors noted another surprising fact that the rise in available calories in Canada surpassed other countries by a wide margin (Barlow et al., 2018). This phenomenon concurred with \$1.80 billion U.S. investment in Canadian food sector and \$5.20 billion upsurges in food and beverage imports from the U.S. The amplified caloric availability was expected to increase weight gain of maximum 9 kg for men and 12 kg for women aged around 40 years suggesting the CUSFTA modified the dietary pattern and health status of Canadian people (Barlow et al., 2018). Therefore, FTAs could play a leading role in rising calorie availability considerably; thus, induce unhealthy intake and obesity development.

2.3. Alteration of healthy diet

Hawkes (2006) recognized the effect of global market integration on dietary patterns of middle-income countries by applying two concepts known as “dietary convergence” and “dietary adaptation”. Dietary convergence is defined as heightened dependence on a limited base of staple grains, excessive intake of meat and dairy products, oil, salt, sugar, and reduced consumption of nutritional fiber. Dietary adaptation signifies when a nation become inclined towards store made or branded processed foods, prefer taking meals in restaurants than home and gets motivated with appealing food advertising (Hawkes, 2006). According to McNamara (2017), “Intensifications in market-orientation have been observed in middle-income countries within the

context of structural adjustment, through regional and bilateral trade agreements, as well as through GATT and the Agreement on Agriculture”. In general, increased market orientation is responsible for stimulating trade flows, foreign investment, and raising the numbers of multinational food companies. All these processes are accused of altering the supply of foods related to nutrition transition (McNamara, 2017).

A case study explored the integration of vegetable oil in Chinese, Brazilian and Indian markets. This case study discovered that liberalization policies such as reduced import tariff and export tax coupling with investment liberalization and currency devaluation triggered convergence of vegetable oil intake in China and India (McNamara, 2017). Also, nutrition transition in LMICs has expanded the demand for dairy products worldwide which is beneficial for New Zealand’s dairy products exporters yet costly for local consumers. Reform policies such as diminishing government subsidies, discounting import or non-import tariff, and flexible interest rates and wages etc. are found to be accountable for costly milk products in New Zealand. Critics argued these reforms are directly associated with the nutritional disparities in New Zealand where unprivileged people compensate their nutritional need with cheaper low nutritious drinks rather than consuming healthy dairy beverages (McNamara, 2017).

2.4. Difficulties for regulation execution

Other than altering healthy diet and consumption habit, FTAs also make implementation of regulations (that are good for health but pose a threat to free trade) difficult (Hudson, 2016). Unhealthy product manufacturers are using free trade agreements as a tool to challenge and interrupt countries encouraging or championing healthy intake. For example, tobacco company Philip Morris filed a case against Australian government when it announced plain packaging for all tobacco products to make consumers apathetic towards smoking. Philip Morris claimed that

the introduction of plain packaging impedes the free trade as well as violates the trade agreement (Bharmal, Hu, & Tcholakov, 2017). Bharmal et al. (2017) further asserted that “government of different countries are at a risk of being sued for initiating prevention policies against harmful products which hinder free trade”. Thailand also faced WTO challenges when they tried to label unhealthy processed baby foods properly (Bharmal et al., 2017).

3. Free trade agreements, overall economy, and health

3.1. Stimulating economic growth and trade volume

Although there are several criticisms against FTAs and trade liberalization for promoting unhealthy products and increasing net calorie intake, surprisingly there is noteworthy literature suggesting a positive association between free trade and health outcomes. Opponents of free trade agreements center on the issue that free trade deteriorate health by inducing economic uncertainty and imparity, contaminating the environment, and making processed food available. Yet, Stevens and Banik (2017) asserted the above assumption is not entirely true. According to these authors, termination of trade agreements and lessening free trade would cause a real and genuine harm to health. Fewer trade barriers, tax or tariffs means more business, opening new opportunities, and making the flow of goods and services among nations easy which augments economic growth and trade volume. Frankel and Romer (1999) identified that both global and interregional trade raise income. Developed countries prefer interregional trade; thus, gets more benefits than small countries with compact and infant domestic industries. Research also found that export is a promising aspect for growth for developing countries. In 2004, USA signed a free trade agreement with Chile and ten years after the agreement US exports to Chile increased by more than 500% compared to periods before the agreement. Another study conducted in 2016 by U.S. Trade Representatives found that USA economic growth escalated by .05% annually

compared to past years due to NAFTA (O'Brien, 2016). With FTAs, developing countries get access to substantial international market and receive benefits from economies of scale which were difficult to attain with small domestic industry (Chomo, 2002). Higher trade volume opens up employment opportunities and enables people with more purchasing power which positively benefits an entire country's economy. Combining trade volumes with economic growth substantially improves health as it enables general people and government to spend more on healthcare. Nations that spend more on healthcare are expected to have less disease prone, healthy, and active population; thus, live longer (Stevens & Banik, 2017)

A study by Tufts university recognized that NAFTA has reduced the price of daily commodities in Mexico by up to 50%. This price reduction enabled Mexican people to save more as well as increased their cash on hand. As a result, they could spend more in education and healthcare ("North American Free Trade Agreement," 2018). Since the initiation of this particular agreement in 1994, all three participating countries have experienced improved health as measured with life expectancy. Mexico's life expectancy was 72.4 years in 1994 whereas it improved to 76.7 in 2014, nearly catching USA and Canada. Welfare increased by nearly 2% in 2015 in Mexico, poverty, and inequality almost eliminated in most of its globalization affected regions, and the rise of the middle class was significant ("North American Free Trade Agreement," 2018). According to Impact Econ, a consulting agency projected that termination of NAFTA would cause a loss of around one million low skilled jobs in Mexico, more than 100,000 in Canada, and nearly 260,000 in the USA. Price of healthcare products such as basic everyday medicine, vaccines, and medical instruments, and food is anticipated to rise with such termination. This would certainly deteriorate health particularly of low-income people (Stevens & Banik, 2017).

3.2. Impact of free trade agreements on liberalizing the international borders

Literature suggests that free trade agreements improve health by not only stimulating economic growth but also freeing up international borders. For example, releasing of country borders after the second world war is crucial for diffusion of health-related technologies (Stevens & Banik, 2017). Before late nineteenth century, trade was limited to a specific number of nations. After this era, countries gradually expanded cross border trade and developing countries observed better health outcomes as income rose and innovative technologies arrived from abroad (Urbach et al., 2012). As mentioned by Gwatkin (1980), a notable accomplishment of trade agreements was the easy access and availability of medicine, vaccines, sophisticated medical equipment, diagnosis techniques, etc. all around the globe.

Before joining NAFTA, Mexico imposed more than 10% tariffs on imported medicines from USA and Canada which certainly cause imported medicine price to rise and was a burden for general people. After joining NAFTA, these tariffs were eliminated which caused imported drug prices to fall; thus, allowing people to access economical medicines and treatment (Stevens & Banik, 2017).

Similarly, NAFTA has created free zones that are beneficial for the economy. Creation and development of maquiladora¹ has created a major scope for Mexican people to work in the USA. Maquiladoras are beneficial as these zones are excluded from paying excessive tax and can ship the final products to other countries without paying tariffs. As a result, it attracted a significant portion of FDI in the Mexican economy (Dorocki & Brzegowy, 2014). Moreover, it formed a great demand for health services along this border (Frenk, Dantes, Cruz, Hernandez, & Freeman, 1994). Healthcare professionals are comfortably crossing borders to provide services to

¹ "a factory in Mexico operated by an overseas company and exporting its products to the company's home country". Retrieved from <https://en.wikipedia.org/wiki/Maquiladora>

other country and this circumstance is expected to intensify more in the future. Effortless movement of healthcare providers is helping to improve the cultural match between patients and healthcare providers; especially those who have migrated. This interchange would “enhance the knowledge transfer and promote clinical procedure”; thus, benefiting the overall economy and health (Frank et al., 1994).

3.3. Instigating healthcare investment in the economy

Frenk et al. (1994) further claimed that enactment of NAFTA has promoted a venture friendly atmosphere and expanded foreign healthcare industry in Mexico. At present, there is no complex legal constraint for investment in Mexico. Initially, the presence of overseas healthcare industries created distress for local providers, yet they become familiarized with such changes gradually. Presently, overseas healthcare units are supporting the government to satisfy the public healthcare demand as the Mexican healthcare sector is characterized with dated technology, substandard quality of medical service, and inadequate financial capacity for growth (Frenk et al., 1994). Frenk et al. (1994) stated that NAFTA has also minimized the cost for Mexican people who frequently visited USA or Canada for improved treatment. It ultimately induced healthy competition and helped to institute and familiarize competent service delivery and a managerial technology system. According to these authors “NAFTA has created a promising market for “medical- industrial complex”; prompted national and foreign investment that opened up jobs; brought technological contents, affordability, convenience, excellence, and efficiency to the overall health services in Mexico which is imperative for improving health” (Frenk et al., 1994).

Another striking benefit of NAFTA is the development and continuation of the transnational alliances. These joint coalitions offer modernization as well as distinction in

medical service. Collective proposals of tertiary education and scientific projects are novel and offer common benefits. The authors claimed that similar cooperative projects are going in the region and NAFTA has contributed more on this (Frenk et al., 1994).

3.4. Overall influence of FTAs on health outcomes from earlier studies

Anticipating the negative impact of trade agreements, Barlow et al. (2017) scrutinized six studies that analyzed the effects of regional trade agreements on health outcomes measured with body mass index (BMI), maternal mortality, life expectancy, tuberculosis incidence, and cardiovascular disease incidence. Overall trade liberalization policies were associated with higher BMI and cardiovascular disease, however, the author found no reliable association with maternal mortality, life expectancy, and tuberculosis disease. In fact, they found a higher levels of service sector liberalization were connected to lower maternal and infant mortality and higher life expectancy. Another striking result was a restriction on FDI and trade were linked with increased infant mortality (Barlow, McKee, Basu, & Stuckler, 2017).

Owen and Wu (2002) used panel data of 139 countries including both developed and developing from the year 1960 to 1995. Their study depicted a strong positive relation with population health and trade liberalization. One interesting finding of their research was that poor countries gained more health benefits compared to rich countries (Owen & Wu, 2002). Razmi and Yavari (2012) used panel data from oil-rich countries for year between 1980 to 2009. He employed a fixed effect estimation method and found a positive and significant relationship between trade openness and life expectancy. Furthermore, he found that infant mortality was negatively associated with trade openness suggesting the possibility of reducing unwanted newborn death rate with increase of trade openness (Razmi & Yavari, 2012).

Levine and Rothman (2006) investigated the impact of trade openness on child health.

They used panel data of 134 developing as well as developed countries and applied two-stage least squares regression technique. The authors found a coefficient of -0.63 and affirmed that 1% increase in trade openness might reduce infant mortality by more than a year (Levine & Rothman, 2006). By examining the relation between free trade and health, Stevens et al. (2013) claimed that free trade is linked with improved health. These authors further asserted that the above statement is especially true for countries with low income.

Olper et al. (2017) identified a noteworthy short and long-run reduction in child mortality as they initiated a study to assess the effect of trade liberalization on health outcomes (Olper, Curzi, & Swinnen, 2017). Herzer (2014) projected long-term relationship with trade and population health by investigating a panel time series data from 1960 to 2010 for 74 developing and developed countries. The author identified a positive connection between life expectancy and trade openness, and a negative association between infant mortality and trade openness. As a result, the author claimed that trade openness has a definite and notable impact on population health (Herzer, 2016).

4. Theoretical framework and hypotheses

After the literature review, I find that there is a notable association between free trade and better life expectancy and infant mortality rates, especially applicable for low-income countries (Stevens et al., 2013). There are three mechanisms that explain the connection between free trade and improved health outcomes: firstly, increased trade liberalization and free trade instigate trade flows and attract FDIs that benefit the economy; secondly, global diffusion of knowledge influences health outcomes; and thirdly, improved health-related policies and practices by government improves health.

4.1. Trade flow, FDI, and economic openness

Prior to the nineteenth century, cross-border trades were limited among few countries. After the nineteenth century, trade agreements started gaining popularity which is most frequent in today's world. According to Stevens et al. (2013), "nowadays, all countries trade internationally and with few special cases such as North Korea, they trade remarkably which inflate their national incomes". Countries involved in global trade experienced a surprising impact on their own public welfare as trade promoted easy access to sanitation and safe water, healthy and nutritious foods, innovative health care and medical technologies. To be specific, increased participation of developed and developing nations in trade caused a large reduction in global mortality rate. Gwatkin (1980) mentioned this phenomenon as the third of the three great waves of mortality reduction.

This phenomenon could be better explained with Epidemiological Transition Theory. According to Omran (2005), epidemiological transition is the era of development perceived by a rapid and distinct increase in population growth caused by improved drugs and healthcare, and food security. But this population growth is often adjusted with the resulting declines in fertility rates. He divided the epidemiological transition of mortality into three phases where the first phase occurred when human experienced high infant mortality and low life expectancy due to wars, famine, and epidemic outbreaks, etc. The second phase occurred with high population growth due to secured food supply, better nutrition, advanced medicine discovery and extended healthcare system. During the 19th century, mortality in Western Europe and North America was reduced by more than fifty percent because of access to safe drinking water and improved sanitation system. Vaccines of several life-threatening diseases such as smallpox or sepsis were discovered and gradually became available in different parts of the world. As a result, the world

gained two billion people from 1950 to 1980s (“Epidemiological Transition”, 2019). However, the sharp population growth became stagnant as birth rates declined from high positive replacement rate to stable or negative replacement numbers and it was defined as the third phase. Most of the developing countries have experienced delayed transition due to slow economic growth. Advancement of medicine and healthcare system reduced the mortality, but high birth rate remained a concern for these nations.

Though most countries of Asia, Latin American and Africa are experiencing delayed transition, some of their health gains such as reduction of mortality is visible due to access to medicine and increased participation in trade. So, starting from daily commodities to manufactured products and services all are now being traded (Huynen et al., 2005). According to WTO, over-all trade has increased by a factor of 14 between 1950 to 2000 which has been possible largely by forming beneficial trade agreements (Huynen et al., 2005). According to Chomo (2002), Mexican export to the U.S and around the world rose meaningfully once they joined NAFTA. In 1993, the Mexico-U. S trade flow was around 40 million which reached to around 100 million within just seven years. According to this author, the export amount would be much smaller if Mexico did not participate in NAFTA and termed this intensification of Mexican export as the “engine of Mexican recovery” (Chomo, 2002). Moreover, according to Lustig (2001), NAFTA played a crucial role for encouraging FDI inflow in Mexico. Observing the substantial economic benefits, the Mexican government maintained the economic reforms under NAFTA and did not employ trade barriers as a mechanism to overcome the balance of payment problem (Chomo, 2002).

According to Stevens et al. (2013), trade volumes coupled with onward economic growth create job opportunities. Considerable work opportunities improve income and eventually health

as it enables general people to spend more on healthcare. More purchasing power gives better access to nutritious foods, safe and healthy accommodation, adequate health care, medicines, and sanitation, etc. (Stevens et al., 2013). Realizing the importance of FTAs for stimulating FDI and trade flows, I am proposing the first hypothesis as

Hypothesis 1: Countries committal to FTAs observe improved life expectancy, infant mortality, and adult death rate as FTAs augment export, import and trade flow.

4.2. Knowledge and technology spillover

The second mechanism that explains the association between free trade and improved health outcome is knowledge spillover which is a dynamic outcome of increased global trade (Stevens et al., 2013). When trade barriers are removed with agreements, the cost of trades become low. As a result, the diffusion of ideas and knowledge, methods, processes, and medical products, etc. from inventor countries to other countries become effortless (Owen & Wu, 2002). Lowering the cost of trades allows to speed up the adoption of improved medical inventions to different parts of the world. For example- many effective and life-saving medicines were first invented by developed countries, however transnational manufacture and trade of such medicines allowed them to become widely available (Stevens et al., 2013). Due to increased accessibility and convenience, and reduced cost of interventions attained with removing trade barriers and executing trade agreements, crude death rates especially in eastern Asia in the 1940s has dropped sharply (Stevens et al., 2013). So, primarily medicines are invented in one place and steadily become available to rest of the world via international trade. Initially, new drugs are secured with patent, but ultimately it expires and allows other manufacturers to produce. As a result, a huge numbers of affordable non-patented drugs are now globally available (Stevens et al., 2013). Removing trade barriers permits people of developing countries to exploit benefits from

knowledge and innovation of other wealthy nations (Stevens et al., 2013).

Owen and Wu (2002) identified the positive impact of trade liberalization on population health through movement of goods and services such as medicine and medical equipment. Also, Jawadi et al. (2017) affirmed that, at present most countries contribute in global trade and import products, concepts, customs, wealth, etc. So, international trade strengthens the formation of “endogenous dynamics” that ultimately upgrades institution’s quality and foster an environment favorable to health (Jawadi, Gouddi, Ftiti, & Kacem, 2017). Analysis of trade openness and child mortality and life expectancy of 219 countries depicted the positive effect of economic liberalization on wealth through lower infant mortality and higher life expectancy, yet only for developing countries. This result supports the notion of technology and knowledge spillover from developed to developing countries with trade and FTAs (Owen & Wu, 2002).

Comprehending the association of FTAs and knowledge and technology transfer, I propose the second hypothesis as

Hypothesis 2: Countries committal to FTAs observe improved life expectancy, infant mortality, and adult death rate as FTAs ease knowledge and technology transfer among participating countries.

4.3. Global Health Governance

Thirdly, regulations set by WTO influence public health (Huynen et al., 2005). According to the theory of World Polity, engagement and participation in international organizations shape the strategies in the realms of democracy, human rights, environment, women’s dignity, education, and population. Due to globalization and participation in world trade, countries are experiencing an increased level of isomorphism among themselves which means they are being rooted in a world polity (Beckfield, 2010). Huynen et al., (2005) asserted that considering the

global legal standpoint, the control of global health governance has been transferred to WTO from WHO. WTO is increasingly incorporating provisions into trade agreements that are beneficial for health and the environment (Huynen et al., 2005). When a country participates in any trade agreement it must adhere to all policies. Following agreement policies sometimes requires altering the existing and traditional regulations and adopt the innovative one.

Also, formation of the public-private partnership for health is a new trend as the government is progressively welcome private companies to manage tasks that were previously governed by the public sector (Huynen et al., 2005). According to the authors, the public-private alliance could be regarded as a potential form of global governance and have vital consequences for health and related policies (Huynen et al, 2005). According to Hendi (2017) countries that are associated with each other through common membership such as UN, UNESCO, and WTO etc. tend to form a mutual culture among each other that results a greater similarity in fertility. Following the argument that countries participating FTAs are governed by WTO and influence participating country government to employ improved health policies, I am proposing the below hypothesis

Hypothesis 3: Countries committal to FTAs observe improved life expectancy, infant mortality, and adult death rate as FTAs are governed by WTO that bound participatory country government to adopt improved health related policies and practices.

5. Data and Methodology

World development Indicator Database was used for this analysis. A total of 34 countries including low, lower middle, and upper-middle-income countries over 15 years were included. The World Bank divides the whole world into four income groups as high (more than 12055\$), upper-middle (3896- 12055\$), lower-middle (996-3895\$) and low (less than 996\$) based on

calculating GNI per capita (“New country classifications by income level: 2018-2019”, 2018). Based on income level and considering the duration of trade agreements (at least 15 years), selected countries are Benin, Bolivia, Brazil, Botswana, Colombia, Egypt, Ethiopia, Gabon, Gambia, Ghana, Guatemala, Guinea, Guinea-Bissau, India, Indonesia, Jamaica, Jordan, Kenya, Liberia, Madagascar, Mexico, Nicaragua, Turkey, Mauritania, Mozambique, Nepal, Niger, Nigeria, Pakistan, Philippines, Senegal, Sri Lanka, and Zimbabwe (Hur & Park, 2012).

To observe any relationship between independent variables and dependent variables, multiple linear regression was conducted by controlling few variables in SPSS.

5.1. Variables

5.1.1. Dependent variables

Health outcomes were measured with life expectancy, infant mortality, and adult death rate. Table 1 describes the definitions given by The World Bank and purpose of all variables of this present study.

5.1.2. Independent variables

1. To measure the effect of FTAs on health outcomes through economic integration and employment, three variables Import as a portion of GDP, Export as a portion of GDP, and Merchandise Trade as a percentage of GDP were used.
2. To measure the effect of FTAs on health outcomes through diffusion of knowledge, methods, medical products or technology, Internet users, BCG vaccines availability, and Tuberculosis success rate were included.
3. To measure the impact of FTAs on health outcomes through policy diffusion at state level and extended government capacity, two variables Improved sanitation facilities and Improved water source were used.

5.1.3. Control Variables

When a country's health expenditure expands, and employment gets improved, its health outcomes improve gradually (Owen & Wu, 2002). As a result, Government expenditure on health and Employment were considered as control variables.

Table 1. Description of dependent, independent and control variables

Variable	Type of variable	Purpose	Description
Life expectancy	Dependent		Life expectancy at birth, total (years) indicates the number of years a newborn would live if the usual mortality pattern at the time of birth remain same throughout its life.
Infant mortality rate			Mortality rate, infant (per 1000 live births) indicates in a given year, the number of infants dying before reaching age one.
Adult death rate			Death rate, crude (per 1000 people) indicates the number of deaths occurring during the year.
Export	Independent	To measure trade flow	Export as percentage of GDP presents the value of all goods and other market services provided to the rest of the world.
Import			Import as percentage of GDP comprises the value of all goods and services received from rest of the world.
Merchandise Trade			Merchandise trade as percentage of GDP is the sum of goods export and import and divided by GDP.
Internet Users		To measure diffusion of knowledge, medical products, etc.	Percent of population who used the internet via computer, mobile phone, digital TV or games machine in last three months.
Immunization of BCG			Percent of children aged 12-23 months receiving BCG, a vaccine of Tuberculosis (TB).

Table 1 (Continued)

Tuberculosis success rate		Percent of cases that are cured and completed full length treatment.
Improved sanitation facilities		Indicates the percent of population who use flush/pour flush to piped sewer systems, septic tanks or pit latrines, ventilated improved pit latrines, composting toilets or pit latrines with slabs without sharing with other households.
	To measure diffusion of policies at government or state level	
Improved water source		Indicates the percent of population using tube well, piped water, protected dug wells, protected springs, packaged or delivered water.
Employment		Employment to population ratio, 15+, total percentage, indicates a country's population that is employed.
Government healthcare expenditure	Control	Percent of healthcare expenditure funded by public sources of health including revenue of internal transfers, grants, enterprise financing schemes, compulsory prepayment and social health insurance.

5.2. Descriptive statistics

Table 2 shows the frequency distribution of the dependent variables. Over the 15 years period that are covered in this study, the countries exhibited an average life expectancy of 63 years with a fair standard deviation. The average number of deaths occurring a year was 9 for all studied countries. The probability of an infant dying before reaching age one averaged 47 deaths per 1000 infants born alive. However, the standard deviation for infant mortality was 25 indicating there is a large variation in newborn mortality rate across countries. For example- in 2000, the probability of an infant dying before reaching age one was 106 deaths per 1000

newborn in Guinea-Bissau whereas for Colombia it was 21 deaths per 1000 newborn. Considering 2010, the infant mortality rate decreased to 72 in Guinea-Bissau and 16 for Columbia indicating their progress in lowering down the probability of infant dying before reaching age one. The standard deviation for life expectancy was 8, yet the variability of life expectancy from one country to another should be considered.

For example- in 2001, Mozambique and Niger had as low as 49 and 47 years of life expectancies. On the other hand, this rate was as high as 72 and 74 for Sri Lanka and Mexico. According to World Facts, two of the most war affected countries are Niger and Ethiopia where the life expectancy was as low as 60 and 65 years compared to countries such as Brazil and Jamaica enjoying high life expectancies as 75 and 76 years respectively in 2015 (Nag, 2018). The variation in death rate among studied countries were 3 indicating a comparatively small variability. To be specific, in 2000, Nigeria had a death rate of 18 which is the highest for all studied countries and in 2001, Jordan had a rate of 4 which is the lowest across countries.

Table 2. Descriptive statistics of dependent variables

	Mean	Standard Deviation	Range		Sample Size
			Min	Max	
Life Expectancy (years)	63	8	44	77	544
Infant Mortality (per 1000 birth)	47	25	8	125	544
Adult Death Rate (per 1000 people)	9	3	4	18	544

Table 3 provides the summary statistics of the independent variables. All the studied countries engaged in export of goods and services with an average of 28 percent of their GDP. With 12 percent variability, Rwanda did only around 6 percent export in 2000 and Liberia did 82

percent in 2006. The import rate also varied significantly across countries which is evidently seen in 2006 when Brazil did only 11 percent import compared to Liberia who did 236 percent in 2007.

Table 3. Descriptive statistics of independent variables

	Mean	Standard Deviation	Range		Sample Size
			Min	Max	
Measure of trade inflow and outflow:					
Export (% of GDP)	28	12	6	82	533
Import (% of GDP)	39	23	11	236	533
Merchandise trade (% of GDP)	50	21	15	118	544
Measure of diffusion of knowledge and medical Products:					
Internet users (%)	11	13	.01	60	540
Immunization BCG (% of children)	88	12	29	99	542
Tuberculosis success rate (% success Rate)	78	12	18	93	529
Measure of policy diffusion at state level:					
Improved sanitation (% of population)	47	28	3	99	544
Improved drinking water access (% of total population)	74	19	17	100	544
Control Variables					
Employment (%)	60	13	34	88	544
Government healthcare expenditure (% of current healthcare expenditure)	38	17	7	86	527

Considered countries also engaged in merchandise trade which averaged as 50 percent of their GDP. Similar to export and import, merchandise trade also showed substantial variation ranging from 15 to 118 percent. The percentage of people using internet also varied. On average, around 11 percent people of the studied countries had access to internet. The country with lowest internet access was Ethiopia in 2000 and with highest access was Jordan in 2015. On average 88 percent of children under one year old received Immunization of BCG in all thirty-four countries over the fifteen-year period. Though the average number children receiving BCG vaccination was quite high, the variability ranged from 29 to 99 percent signifying some countries are falling behind sharply. Tuberculosis success rate varied too from as low as 18 percent for Jamaica in 2014 to as high as 93 percent for Pakistan in 2013. The average number of people using improved sanitation across the studied countries was 47 percent. As expected, the percentage of people with improved sanitation showed stark disparity ranging from only 3 to 99 percent. Similarly, people with access to safe drinking water showed considerable variation ranging from 17 to 100 percent. In 2000, people of Jordan had almost 100 percent access to safe drinking water whereas in 2000, only 17 percent of total population of Ethiopia had access to safe drinking water.

Countries also showed notable dissimilarity in employment rate and the average employment rate was 60 percent. The highest employment rate was 88 for Madagascar in 2012 compared to the lowest rate of 34 for Jordan in 2015. The country with highest government healthcare expenditure was Mozambique in 2001 and was lowest for the same country in 2011. Surprisingly, the same country secured the place for both highest and lowest government healthcare spending for different years.

6. Changes in life expectancy, infant mortality and adult death rate from 2000 to 2015

Figure one shows the life expectancy of countries in 2000 and 2015. All the studied countries improved their life expectancy within these fifteen years. The top six countries who achieved ten years increase in their life expectancy are Botswana, Ethiopia, Kenya, Mozambique, Niger, and Rwanda. In 2019, The World Population Review identified Nigeria, Guinea-Bissau, Zimbabwe, Guinea, Mauritania, Benin, etc. as countries with low life expectancy (“World Population Review”, 2019). Developing nations are often affected with war, disease epidemic, low nutrition and poor healthcare that cause life expectancy to be low compared to advanced nations. In 2015, developed countries such as Japan, Singapore, Switzerland, Spain, Italy, Sweden, Iceland, Canada, etc. had life expectancy of around 80 years which was particularly higher than the countries included in this study (“List of countries by life expectancy”, 2019).

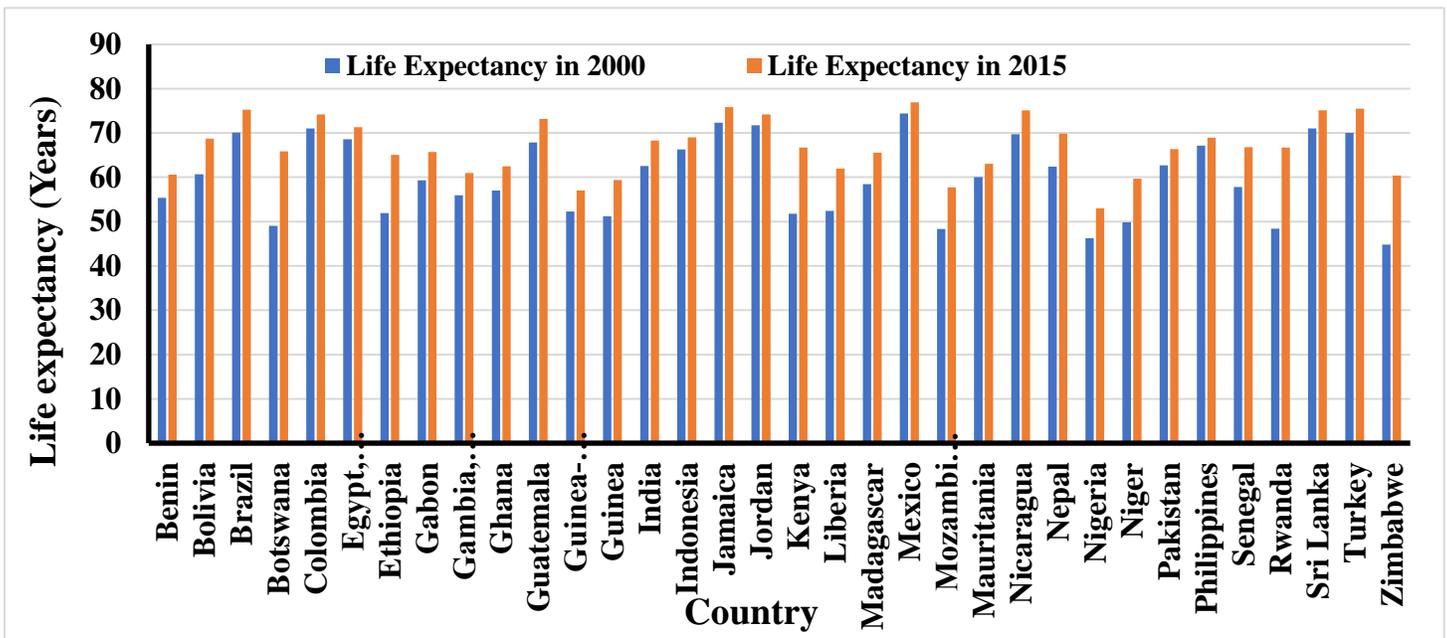


Figure 1. Life expectancy of countries in 2000 and 2015

The highest life expectancy among included countries was around 77 years in Mexico in 2015. However, except Columbia, Egypt, Mexico and Jordan, all studied countries, from 2000 to 20015, achieved at least five years increase in life expectancy indicating their gradual improvement in health.

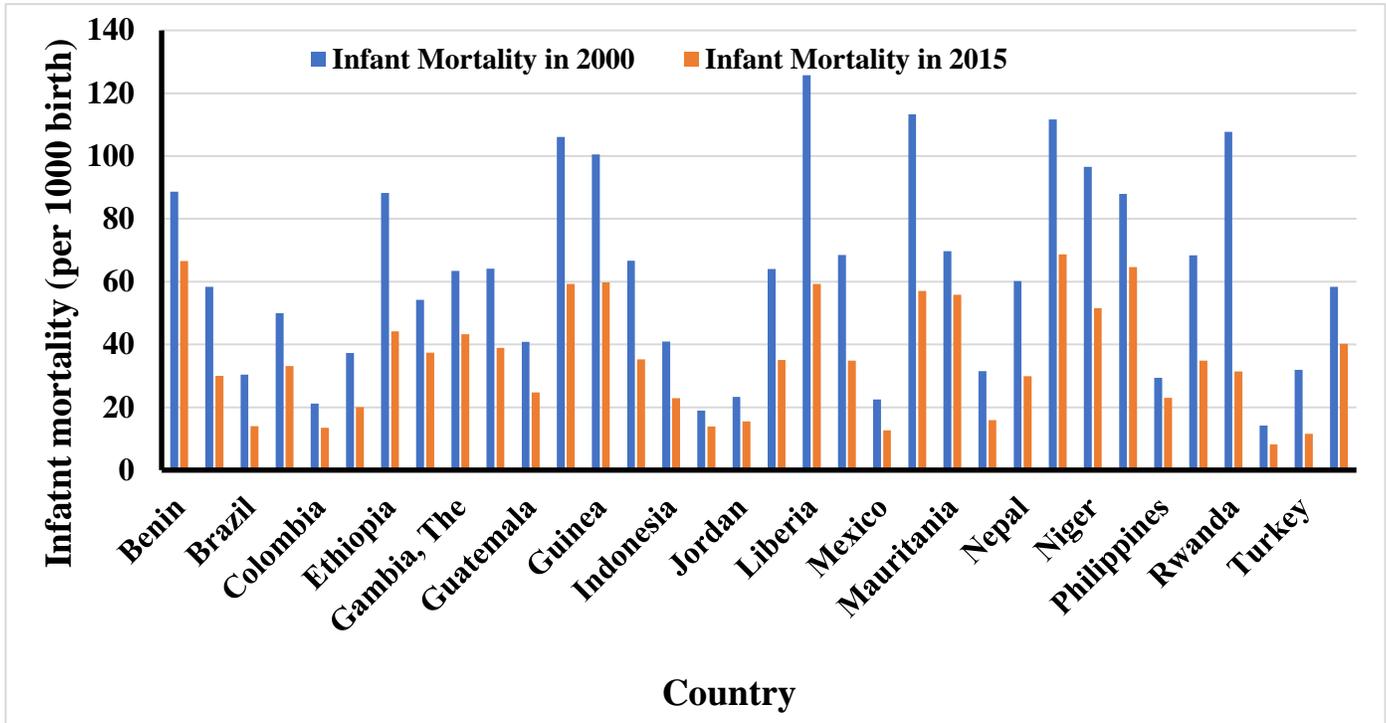


Figure 2. Infant mortality of countries in 2000 and 2015

Figure two exhibits the infant mortality rate of countries in 2000 and 2015. All countries successfully lowered down the unwanted newborn death rate within these fifteen years. Top countries who did exceptionally well in reducing this rate were Benin, Bolivia, Gambia, Ethiopia, Ghana, Guinea, Guinea-Bissau, India, Kenya, Liberia, Madagascar, Mozambique, Nepal, Nigeria, Niger, Senegal, Rwanda, and Turkey. They reduced infant mortality by more than twenty percent which is significant to consider. Yet, compared to advanced countries, the difference of this specific rate is stark. For example- on average, Singapore, Iceland, Sweden, Finland, Italy, Germany, Belgium, Denmark, etc. had achieved infant mortality as low as 3

deaths per 1000 live births in 2015 (“List of countries by infant and under five mortality rate”, 2019) whereas Benin, Guinea, Guinea-Bissau, Liberia, Mozambique, Mauritania had more than 50 infants death per 1000 births. Finally considering the adult death rate, figure three shows the improvements of counties in lowering down this particular rate.

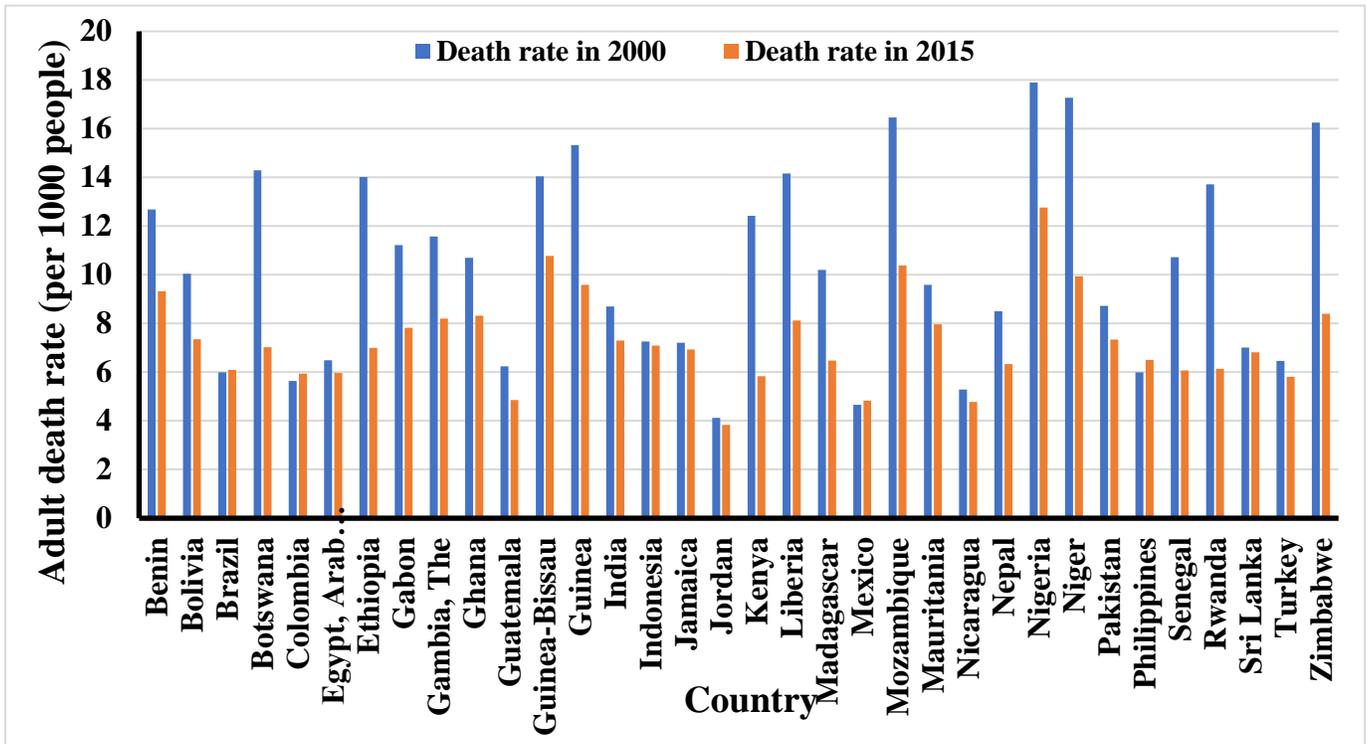


Figure 3. Adult death rate of countries in 2000 and 2015

All countries reduced adult death rate within these fifteen years. Yet, this rate slightly went up for Mexico, Philippines, Columbia and Brazil from 2000 to 2015. The top countries who reduced death rate by more than thirty percent were Zimbabwe, Rwanda, Niger, Mozambique, Liberia, Kenya, Ethiopia and Botswana. Niger, Nigeria, Mozambique, Zimbabwe are some of the countries with high adult death rate. But their improvement in minimizing this rate from 2000 to 2015 signifies many factors that aid them.

7. Results

Table 4 shows the multiple regression model for life expectancy using all the independent and control variables. Export was statistically significant at the .000 level, however in the negative direction indicating export had a negative impact on life expectancy. The more a country engages in export, their life expectancy is more likely to decrease. In model one and two, import showed negative direction, but it was significant at the .000 level only in model one. Except model one and two, import was significantly and positively associate with life expectancy in rest of the models. Merchandise trade was highly significant and positively associate with life expectancy in all five models. Trade agreement opens up the opportunities for expanding trade volume within a country. In other words, higher merchandise trade or escalated trade volume creates job opportunity and increase purchasing power of general people which enable them to spend more on healthcare. As a result, people could afford lifesaving medicines and treatments; thus, increase their life span. Controlling for employment and government healthcare expenditure, intern users showed a highly significant and positive association with life expectancy. Immunization of BCG showed positive significant relation with life expectancy but became insignificant in model five where control variables were included. Tuberculosis success rate showed a positive direction but was significant in model one only. Surprisingly, it showed a negative association with life expectancy, but it was statistically insignificant.

In all five models, both improved sanitation and improved drinking water access were highly significant signifying sanitation and drinking water are crucial for improved health. When government engage and participate in trade agreements, it needs to modify the strategies in the realms of democracy, human rights, environment, women dignity, education, and population, etc. Modification of existing policies extends public welfare programs such as universal medical care

and ensuring sanitation and safe water for all which is extremely beneficial for health.

Employment as a control variable had a significant positive association with life expectancy suggesting employment provides the financial ability or purchasing power for nutritious food, better health care and improved drugs. Also, in some cases employment encourage people to opt for healthy lifestyle that ultimately improves life expectancy. The other control variable government healthcare expenditure was positive in model five yet statistically insignificant indicating merchandise trade, import, internet users, immunization of BCG, improved sanitation, improved safe water access and employment are the main factors that influence the life expectancy.

Table 4. Regression model for life expectancy with all independent variables

	Model 1	Model 2	Model 3	Model 4	Model 5	
Constant	63.615 (0.923)	37.909 (2.844)	38.124 (2.156)	33.629 (2.581)	32.388 (2.166)	
Trade inflow and outflow	Export	-0.175 *** (0.045)	-0.136 *** (.038)	-0.232 *** (.029)	-0.206 *** (.030)	-0.228 *** (.025)
	Import	-0.031 *** (0.018)	-0.001 (.016)	0.042 *** (.012)	0.043 *** (.012)	0.040 *** (.010)
	Merchandise trade	.122 *** (0.027)	.068 *** (.023)	.076 *** (.017)	.070 *** (.017)	.105 *** (.014)
Diffusion of knowledge and medical products	Internet users		.305 *** (.021)	.092 *** (.018)	.087 *** (.018)	.062 *** (.015)
	Immunization of BCG		.196 *** (.024)	.065 *** (.018)	.057 *** (.018)	.016 (.016)
	Tuberculosis success rate		.070 *** (.023)	.030 (.017)	.026 (.016)	-.004 (.014)
Government capacity			.095 *** (.012)	.105 *** (.012)	.109 *** (.011)	

Table 4 (Continued)

	Improved safe drinking water Access			.173 *** (.018)	.185 *** (.018)	.210 *** (.016)
	Employment				.061 *** (.020)	.126 *** (.017)
Control variable	Government healthcare expenditure					.021 (.012)
	Adjusted R ²	.040	.458	.715	.720	.789

Table 5 shows the regression model for infant mortality with all other independent and control variables. In this model, export showed some inconsistent results. For example- it was positive in first three models and became negative in model four and again became positive in model five. Import was positive and significant in first two models, yet negative and insignificant in rest of the models. Merchandise trade was highly significant and negatively associated with infant mortality in all models suggesting increasing trade lowers the risks of infant mortality.

Similar to life expectancy, internet users showed significant negative association with newborn mortality. When a country people have higher access to internet, ideas and knowledge could diffuse quickly and people learn many unknown but crucial facts for health. Immunization of BCG was also negatively related with infant mortality suggesting a country's newborn death rate could be minimized if they have access to this particular vaccine. The more a country successfully implements the vaccination programs, the less it encounters unwanted infant death. Tuberculosis success rate showed negative association but became insignificant in model five after inclusion of control variables.

Controlling for employment and government healthcare expenditure, in every model improved sanitation and improved safe drinking water access was highly significant and negatively associated with infant mortality. The regression model for life expectancy also exhibited similar results for these two variables suggesting country government capacity to improve infrastructure is crucial for improved health outcomes.

After controlling employment and government healthcare expenditure to observe the impact of these two on infant mortality, model five showed the significance of merchandise trade, internet users, immunization of BCG, improved sanitation, and improve safe water access for lowering the undesirable newborn death.

Table 5. Regression model for infant mortality with all independent variables

	Model 1	Model 2	Model 3	Model 4	Model 5	
Constant	54.680 (2.849)	151.418 (8.226)	140.320 (6.482)	179.618 (7.183)	182.349 (7.214)	
Export	.216 (.139)	.011 (.111)	.206 * (.086)	-.027 (.082)	.030 (.084)	
Trade inflow and outflow	Import	.217 *** (.055)	.106 * (.046)	-.004 (.035)	-.014 (.032)	-.023 (.033)
	Merchandise Trade	-.444 *** (.082)	-.206 *** (.066)	-.191 *** (.051)	-.134 *** (.047)	-.171 *** (.048)
	Internet users		-.890 *** (.060)	-.301 *** (.054)	-.259 *** (.050)	-.227 *** (.051)
Diffusion of knowledge and medical products	Immunization of BCG		-.808 *** (.069)	-.476 *** (.055)	-.404 *** (.051)	-.351 *** (.053)
	Tuberculosis Success Rate		-.224 *** (.066)	-.121 * (.050)	-.092* (.046)	-.080 (.047)
	Improved Sanitation			-.436 *** (.036)	-.525 *** (.034)	-.502 *** (.037)

Table 5 (Continued)

Government capacity	Improved Safe Drinking Water Access			-0.186 ***	-0.291 ***	-0.328 ***
				(.055)	(.051)	(.052)
	Employment				-0.533 ***	-0.587 ***
					(.055)	(.056)
Control variable	Government Healthcare Expenditure					-0.088 *
						(.041)
	Adjusted R ²	.065	.526	.731	.773	.779

Table 6 presents the multiple regression results for adult death rate with all other explanatory variables. Surprisingly, export exhibited positive association with death rate, and it was significant in all five models. Except model one, import had an opposite effect which was significant at the .001 level in model three, four and five. Merchandise trade showed consistent significant negative association with death rate indicating the persistent impact of trade on lowering death rate despite including control variables.

Internet users also presented persistent negative association suggesting the power of ideas and knowledge sharing for improving health related practices. Similar to internet users, both Immunization of BCG and Tuberculosis success rate exhibited their significance for decreasing the number of deaths per 1000 people each year.

In previous two regression models, improved sanitation and imported safe drinking water were related with improving life span and decreasing newborn death. In this present model, these two variables exhibited consistent negative association with death rate which was significant at the .001 level. Even after including control variables in model five, the association was significant. Once again, improved sanitation and improved access to safe water proved to evade numerous health complications and justified the positive influence of policy diffusion as well as government capacity on health.

Considering the control variables and their significance level, employment was crucial for lowering down the number of deaths per year. Government healthcare expenditure was positively associated with death rate, but it was insignificant in model five suggesting export, import, merchandise trade, internet users, immunization, tuberculosis success rate, improved sanitation and improved water access were the most important factors explaining the variability in death rate.

Table 6. Regression model for death rate with all independent variables

	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	9.090 (.361)	22.440 (1.140)	22.967 (.945)	24.323 (1.137)	24.562 (1.009)
Export	.094 *** (.018)	.058 *** (.015)	.096 *** (.012)	.088 *** (.013)	.091 *** (.012)
Trade inflow and outflow	Import	-.008 (.006)	-.023 *** (.005)	-.024 *** (.005)	-.020 *** (.005)
	Merchandise Trade	-.063 *** (.010)	-.032 ** (.009)	-.037 *** (.007)	-.049 *** (.007)
	Internet Users		-.094 *** (.008)	-.020 * (.008)	-.019 * (.008)
Diffusion of knowledge and medical products	Immunization of BCG		-.094 *** (.010)	-.047 *** (.008)	-.045 *** (.008)
	Tuberculosis Success Rate		-.053 *** (.009)	-.038 *** (.007)	-.037 *** (.007)

8. Discussion

From data analysis, export and import projected inconsistent and unclear results. As expected from the literature, trade liberalization opens up employment scope and income, and higher income permits improved housing, food, education, health services, etc. that are beneficial for health (Biciunaite, 2014). One possible explanation of the inverse relation of export and import with health outcomes in some regression models could be the income inequality. The gain from trade liberalization in the developing countries are not uniform. According to Dervis and Qureshi, “income inequality is higher in developing or emerging economies compared to developed one” (2016). This present data set includes countries such as Botswana, Egypt, India, Guatemala which are termed as high-income inequality nations (Ventura, 2018). As income inequality is persistent in these countries, I assume, wealth is accrued by the upper class of the society who are already enjoying improved lifestyle. As a result, the real impact of trade liberalization or escalated income on overall country people health become negligible or nonsignificant. Also, economic, political, and social globalization, and trade liberalization were long been criticized for influencing overweight and obesity by making unhealthy foods available and affordable. Consistent with literature, this current study found inverse relation of import and life expectancy and infant mortality. However, merchandise trade showed to influence health outcomes positively indicating when taking both export and import together, the impact became large, comprehensive and substantive than the individual impact of export or import. Merchandise trade is assumed as a measure of economic openness and instigates economic growth. Economic growth is proved to substantially improve health as it could be used to finance appropriate social services such as improving sanitation facilities, making confirmed access to safe water, basic education or affordable healthcare. According to this present study, if a country

increases merchandise trade by 1%, it could increase life expectancy by .11 years and reduce infant mortality by 0.17 and adult death rate by 0.05. However, the health gains from trade liberalization through economic integration was not fully or overwhelmingly supported from the present results. Therefore, signifying the first hypothesis to be partially supported.

The less explored and not apparent association between trade agreements and health outcome is knowledge spillover that happens when goods, services, people, technologies and information could move worldwide without any barriers. From data, internet users exhibited high positive influence on health outcomes signifying the importance of knowledge. Healthcare professionals or educators are constantly trying to facilitate and improve the delivery of health education to individuals as well as to community. Internet has been proved as the low-cost medium for information gathering and sharing, and providing support to a large community; thus, reducing the economic burden of health education. Internet has opened up the scope of circulating health information to previously unreached or difficult to reach communities. So, internet enables people to overcome geographical barriers or physical limitations that prohibit a person from seeking face to face medical care (Mo, 2012). In addition to internet intervention and improved health, it provides an excellent platform for social communication with people of similar medical backgrounds. The emotional support or relief that internet users receive from the online support groups could improve mental stability and boost optimism. Also, internet enables people to search for the best diet, nutritious food with budget, way of exercise, and early diagnosis of any harmful medical conditions that ultimately benefit health.

Data of this present study showed that the percentage of people using internet had been increased gradually and higher internet usage reduced several health complications. With the initiation of trade agreements, countries reap benefits from knowledge and idea diffusion. Trade

agreements ease the formation of several consortiums specifically targeted to remove the internet usage complications. Internet is one of the main sources of knowledge gathering and sharing. Following the notion of World Society Theory, the internet could act as the building block or agent of idea or cultural diffusion around the world. If I look twenty years back, childbirth at home without any skilled birth attendants was very common in societies of underdeveloped countries. But now the rate is significantly lowered. Spread of knowledge about the risks of delivery with unskilled birth attendants along with infrastructural development and NGO interventions helped reducing this tendency. Internet was crucial for circulating such invaluable idea. People with minimal literacy could search through the internet and learn the ideas best for health. As a result, they know the risks of child delivery at home and importance of vaccinations at the right time.

Another exceptional benefit of international trade is the circulation of technology and medical products from the innovator country to other parts of the world (Stevens et al., 2013). Current analysis exhibited that immunization of BCG was positively associated with improved health outcomes and countries slowly expanded their BCG vaccination. So, some lifesaving drugs or vaccines are invented mostly in developed nations, but the international manufacture and trade of such products make these available and inexpensive. Literature suggest, invention of DDT vaccine in 1943 helped the US and Europe to fight against malaria and progressively, these two countries eliminated malaria. Later on, DDT became available in Asian countries and helped to reduced malaria patient by almost 99 percent in Sri Lanka and India (Stevens et al., 2013). Consistent with literature, BCG was invented in France but now available in all TB burden countries. WHO declared thirty countries with high TB prevalence and Brazil, Ethiopia, India, Indonesia, Kenya, Mozambique, Nigeria, Pakistan are few among them that were also included

in this present analysis (“Tuberculosis”, 2018). Despite being declared as TB burden countries, data showed studied countries achieved significant improvement in life expectancy, infant mortality and adult death rate caused by TB by efficiently executing BCG vaccination program. It implies that the extensive availability and low cost of such inventions are largely possible through international trade or trade agreements that instigates free trade.

The entry of developing nations into the global economy might be recent, but it brought an astonishing change on their health. Majority of the trade agreements were signed during early 1980s. During the late twentieth century, after joining the global trade, developing nations experienced a stark reduction in infant mortality and sharp increase in life expectancy as income rose and ideas and technology begun moving freely. The mortality decline rate was so extensive that Gwatkin (1980) termed the phenomenon as the third of the three great waves of mortality decline. This specific period experienced the easy and safe access to sanitation and water in underprivileged countries, increase in per capita food supplies, introduction of basic hygiene knowledge and healthcare services at state level, and the arrival of new medical technologies that were contributory for improving health outcomes of these nations. These advancements resulted an increase of life expectancies in both low- and high-income countries. From 1950, the global life expectancy rose from 46 years in to 69 years in 2009 as expanded wealth and knowledge circulated around the world. The present data also pictured the same trend for life expectancy. From 2000 to 2015, the studied countries realized an average of five years increase in life expectancy. Therefore, global trade is not only instrumental for economic consequences but also for transferring knowledge and technology. Back in mid nineteenth century, malaria, diarrhea or chicken pox were considered as the main cause of child and adult death. But now infants and adults rarely die due to these diseases. Confining the flow of medicine or technology would

surely expand the death rate caused by these diseases. But, once the developing nations started participating in global trade, the reduction of mortality due to malaria or diarrhea became visible.

In this analysis, other variable Tuberculosis success rate did not influence infant mortality or life expectancy at birth significantly because it mostly affects adults in their productive years (“Tuberculosis”, 2018). As a result, it was significantly associated with minimizing adult death rate. Tuberculosis is curable with an average of six-month course of four antimicrobial drug and its success rate indicates the percentage of people who are treated and cured with drugs. The studied countries expanded their TB treatment outreach with accessible and affordable antimicrobial drugs that is again an exceptional gain of international trade. Considering all the models and variables, hypothesis two was supported.

Lastly, hypothesis three was supported. WTO requires member countries to be committal on medical, hospital or other health services as well as on health insurance. It allows countries to be flexible while reforming the existing policies to adjust with WTO rules, but these commitments act as legal binding. Few countries choose to modify the rules for expanding global trade in health services such as increasing cross border supply of health services or consumption of health services in other countries. Other countries chose to improve existing capacity by increasing presence of FDI, joint venture or merchandise trade (“WTO Agreements and Public Health”, 2002). All the studied countries were involved in export, import and merchandise trade. Increased government capacity and inclusion of rules set by trading partners helped modifying or upgrading the health services such as improving sanitation and ensuring safe drinking water for all.

Access to safe water and sanitation are common public right for developed nations, yet still scarce in many emerging countries. Considering the realm of World Society theory, the

world is now a large society that shares similar culture, directions and structural rules. The world is a social system with a cultural framework that includes and influences the actors such as nations or government, NGOs and individual. Specifically, intergovernmental organizations and international nongovernmental organizations are the core mechanisms in which the diffusion of norms or practices takes place (“World Polity Theory”, 2019). When countries participate in trade agreements, they must adhere the policies set by the WTO or other participating nations. Long term participation in such trade agreements act as diffusion mechanisms of a particular culture or practice such as using safe sanitation and drinking clean water. So, joining trade agreements does not only create the way of economic or political exchanges. It induces a common belief or practice among participatory country. In this study, WTO acted as an agent of diffusion as it sets and govern the rules for countries participating in FTAs. Also, when developing country agrees for trade agreements, it attracts FDI or escalates merchandise trade which in return enhances government capacity and investments in infrastructure. Considering the regression results, hypothesis three was supported.

9. Limitations

In this present study, health gains from trade liberalization through economic integration showed some mixed results. This inconsistent result could be due to income inequality among participatory nations; however, this assumption is not proven. Due to time constraints and limited data, inequality could not be incorporated as an independent variable into the analysis. Future study could take a different way to quantify income inequality as a variable and measure its impact on health outcomes. Also, few other variables such as Social insurance coverage, Investment in water and sanitation with private participation, Education, etc. were thought to be included to measure the impact of proposed mechanisms on health outcomes. However, due to

data limitations, these were dropped from analysis. Political situation of a country might also have a large impact on health. Political situation of a country includes government type and its stability, regulation and de-regulation movements, labor law and several consumers right protecting law, and freedom of speech. Countries with instable government or rigid bureaucracy are assumed to receive less health benefits from trade liberalization. Future study could incorporate the effects of increased trade on health by considering the political regime of countries.

10. Conclusion

Trade agreements are frequently criticized to alter consumption pattern with increasing import of processed food, soft drinks, and tobacco. Few analysis confirm reducing tariffs of edible oil, meat, and processed food is associated with more consumption, sale, and supply of these products (Chatterjee, Rae, & Ray, 2011). Yet, literature suggests that free trade and trade liberalization is imperative for instigating economic growth as well as improving human welfare (Stevens et al., 2013). Countries are cautiously devoting their efforts to reduce heavy tariffs and initiate open markets to expand trading and business; thus, create jobs. The purpose of this present study was to determine the impact of FTAs on health outcomes of 34 developing nations as well as the mechanisms that drive such changes. This study found mixed results of the economic impact of trade agreements on health. However, the effect of diffusion of knowledge or medical products as well as policy at the state level was notable. It is clear that the improvements in health would be stagnant with restricted movements of medical inventions or information. So, there might be dissension over the economic benefits of trade agreements, but this piece of work complements the increasing body of literature by showing a profound link between global trade and improved health.

Knowledge or technology spillover and diffusion of policies at the state level are some of the intrinsic benefits of trade agreements. It is certain from this present analysis that developing countries get access to several improved technologies and medical products when they join trade agreements with rich countries. In past, majority of the studied countries experienced high infant and adult death due to different infectious disease such as tuberculosis, malaria or diarrhea. But, at present, their improvements in controlling these diseases and lowering down the death rate is remarkable. During the late nineteenth century, developing nations ended their several years of economic and political isolation and started joining the global business. Their participation caused a sharp transfer and massive diffusion of health-related knowledge, public health programs, techniques and technologies that were initially originated in developed nations. This present data confirmed on average an increase of five years of life expectancy and 30% reduction of newborn mortality among studied countries. This result indicates the flow of knowledge and technology among countries which further gets augmented with trade agreements. Moreover, WTO sets and regulates the rules of global trade and forces the participatory countries to follow them. Following these rules require government of participating country to modify the existing one such as inclusion of mandatory health insurance and infrastructure development. This present data show that when government uses its enhanced capacity to improve sanitation and drinking water resources, it largely benefits health. So, trade liberalization and agreements should be remained important not only for its economic benefits but also for improving health through knowledge and policy diffusion at country level.

11. References

- Barlow, P., McKee, M., Basu, S., & Stuckler, D. (2017). The health impact of trade and investment agreements: a quantitative systematic review and network co-citation analysis. *Globalization of Health, 13*(13). Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5343316/>
- Barlow, P., McKee, M., & Stuckler, D. (2018). The Impact of U.S. Free Trade Agreements on Calorie Availability and Obesity: A Natural Experiment in Canada. *American Journal of Preventive Medicine, 54*(5), 637–643.
- Beckfield, J. (2010). THE SOCIAL STRUCTURE OF THE WORLD POLITY. *American Journal of Sociology, 115*(4), 1018–1068.
- Bharmal, A., Hu, J., & Tcholakov, Y. (2017). *Is free trade bad for our health?* Retrieved March 14, 2018, from <http://healthydebate.ca/opinions/free-trade-health>
- Burns, D., Jones, A. P., Goryakin, Y., & Suhrcke, M. (2017). Is Foreign Direct Investment Good for Health in Low and Middle Income Countries? : An Instrumental Variable Approach. *Social Science & Medicine, 181*(C), 74–82.
- Biciunaite, A. (2014). *Economic Growth and Life Expectancy – Do Wealthier Countries Live Longer?* Retrieved April 14, 2019 from <https://blog.euromonitor.com/economic-growth-and-life-expectancy-do-wealthier-countries-live-longer/>
- Chatterjee, S., Rae, A., & Ray, R. (2011). Globalisation, India's evolving food economy and trade prospects for Australia and New Zealand. In M. Tonts & M. A. B. Siddique (Eds.), *Globalisation, Agriculture and Development: Perspectives from the Asia-Pacific* (pp. 102–120). Cheltenham UK: Edward Elgar Publishing.
- Chomo, G. V. (2002). *Free Trade Agreements Between Developing and Industrialized Countries: Comparing the U.S.-Jordan FTA with Mexico's Experience Under NAFTA*. Retrieved from <http://ageconsearch.umn.edu/record/15868/files/wp02001b.pdf>
- Dervis, K., & Qureshi, Z. (2016). *Probing the productivity paradox*. Retrieved May 20, 2019 from https://www.brookings.edu/wp-content/uploads/2017/12/income-inequality-within-countries_august-2016.pdf
- Dorocki, S., & Brzegowy, P. (2014). The maquiladora industry impact on the social and economic situation in Mexico in the era of globalization. In A. W.-R. Mirosław Wójtowicz (Ed.), *Environmental and socio-economic transformations in developing areas as the effect of globalization* (pp. 93–110). Wydawnictwo Naukowe UP. Retrieved from <https://www.researchgate.net/publication/264117793>

- Frankel, J. A., & Romer, D. (1999). Does Trade Cause Growth? *The American Economic Review*, 89(3), 379–399.
- Frenk, J., Dantes, O. G., Cruz, C., Hernandez, P., & Freeman, P. (1994). Consequences of the North American Free Trade Agreement for health services: a perspective from Mexico. *American Journal of Public Health*, 84(10), 1591–1597.
- Goldfrank, Walter L. (2000). "Paradigm Regained? The Rules of Wallerstein's WorldSystem Method. *Journal of World-Systems Research*, 6(2), 150-195.
- Gwatkin, F., (1980), "Indications of change in developing country mortality trends: the end of an era?" *Population and development review*, 6(4), 615–44
- Hawkes, C. (2006). Uneven dietary development: linking the policies and processes of globalization with the nutrition transition, obesity and diet-related chronic diseases. *Globalization and Health*, 2(4).
- Herzer, D. (2016). The long-run relationship between trade and population health: evidence from five decades. *The World Economy*, 40(2), 1–37.
- Hudson, M. (2016). *The Dangers of Free Trade Agreements: TTIP's Threat to Europe's Elderly*. Retrieved March 15, 2018, from <https://www.counterpunch.org/2016/05/11/the-dangers-of-free-trade-agreements-ttips-threat-to-europes-elderly/>
- Huynen, M. M., Martens, P., & Hilderink, H. B. (2005). The health impacts of globalisation: a conceptual framework. *Globalization and Health*, 1(14).
- Hur, J., & Park, C. (2012). Do Free Trade Agreements Increase Economic Growth of the Member Countries? *World Development*, 40(7), 1283-1294.
- Jawadi, F., Gouddi, S. E., Ftiti, Z., & Kacem, A. (2017). Assessing the Effect of Trade Openness on Health in the MENA Region: a Panel Data Analysis. *Open Economies Review*, 29(2), 469–479.
- Levine, D. I., & Rothman, D. (2006). Does trade affect child health? *Journal of Health Economics*, 25, 538–554. <https://doi.org/10.1016/j.jhealeco.2005.10.001>
- Lustig, N. (2001). Life is Not Easy: Mexico's Quest for Stability and Growth. *Journal of Economic Perspectives*, 15(1), 85–106.
- List of countries by infant and under-five mortality rates*. (2019). Retrieved June 1, 2019, from https://en.wikipedia.org/wiki/List_of_countries_by_infant_and_under-five_mortality_rates
- List of countries by life expectancy*. (2019). Retrieved June 1, 2019, from https://en.wikipedia.org/wiki/List_of_countries_by_life_expectancy

- Martínez-Vela, C. A. (2001). *World Systems Theory*. Retrieved from <http://web.mit.edu/esd.83/www/notebook/WorldSystem.pdf>
- McNamara, C. (2017). Trade liberalization and social determinants of health: A state of the literature review. *Social Science & Medicine*, 176, 1–13.
- Mo, P. (2012). The Use of Internet for Health Education. *J Biosafety Health Educ* 1:e102. doi:10.4172/2332-0893.1000e102
- Minerd, J. (2017). *Did Free Trade with U.S. Undermine Canada's Public Health?* Retrieved April 28, 2018, from <https://www.medpagetoday.com/primarycare/dietnutrition/66403>
- North American Free Trade Agreement*. (2018). Retrieved April 27, 2018, from https://en.wikipedia.org/wiki/North_American_Free_Trade_Agreement
- Novignon, J., & Atakorah, Y. B. (2016). How does the health sector benefit from trade openness? Evidence from panel data across sub-Saharan Africa countries. *African Development Review*, 30(2), 135-148.
- New country classifications by income level: 2018-2019*. (2018). Retrieved January 27, 2019, from <https://blogs.worldbank.org/opendata/new-country-classifications-income-level-2018-2019>
- Nag, O., S. (2018). *The World's Most War-Torn Countries*. Retrieved March 03, 2019, from <https://www.worldatlas.com/articles/the-world-s-most-war-torn-countries.html>
- O'Brien, B. (2016). *5 ways that free trade helps everybody*. Retrieved April 28, 2018, from <http://www.tradeready.ca/2016/topics/import-export-trade-management/5-ways-free-trade-helps-everybody/>
- Olper, A. ;, Curzi, D. ;, & Swinnen, J. F. M. (2017). *Trade liberalization and child mortality: A synthetic control method* (LICOS Discussion Paper Series No. 387).
- Owen, A. L., & Wu, S. (2002). *IS TRADE GOOD FOR YOUR HEALTH?* New York.
- Omran A. R. (2005). The epidemiologic transition: a theory of the epidemiology of population change. 1971. *The Milbank quarterly*, 83(4), 731–757. doi:10.1111/j.1468-0009.2005.00398.x
- Razmi, S. M. J., & Yavari, Z. (2012). Reviewing the Effect of Trade Openness on Human Development. *Interdisciplinary Journal of Contemporary Research in Business*, 4(6), 970–978.
- Ribeiro, H. (2015). Free-trade agreements: challenges for global health. *Revista de Saude Publica*, 49(52). <https://doi.org/10.1590/S0034-8910.2015049006169>

- Stevens, P., & Banik, N. (2017). *NAFTA, global trade deliver crucial health benefits to vast majority*. Retrieved April 27, 2018, from <http://thehill.com/opinion/finance/361548-nafta-global-trade-deliver-crucial-health-benefits>
- Stevens, P., Urbach, J., & Wills, G. (2013). Healthy Trade: The Relationship Between Open Trade and Health. *Foreign Trade Review*, 48(1), 125–135.
<https://doi.org/10.1177/001573251204800106>
- Tuberculosis*. (2018). Retrieved June 4, 2019 from <https://www.who.int/news-room/fact-sheets/detail/tuberculosis>
- The Potential Impact of Free Trade Agreements on Public Health*. (2012). Switzerland. Retrieved from http://www.unaids.org/sites/default/files/media_asset/JC2349_Issue_Brief_Free-Trade-Agreements_en_0.pdf
- Venkatamaran, S., & Stevens, P. (2015). *Are Free Trade Agreements bad for health*. Retrieved from <https://geneva-network.com/wp-content/uploads/2015/08/FTAs-and-health.pdf>
- Ventura, L. (2018). *Wealth Distribution and Income Inequality by Country 2018*. Retrieved May 21, 2019, from <https://www.gfmag.com/global-data/economic-data/wealth-distribution-income-inequality>
- World-Systems Theory*. (2019). Retrieved July 5, 2019, from [https://socialsci.libretexts.org/Bookshelves/Sociology/Book%3A_Sociology_\(Boundless\)/8%3A_Global_Stratification_and_Inequality/8.6%3A_Sociological_Theories_and_Global_Inequality/8.6I%3A_World-Systems_Theory](https://socialsci.libretexts.org/Bookshelves/Sociology/Book%3A_Sociology_(Boundless)/8%3A_Global_Stratification_and_Inequality/8.6%3A_Sociological_Theories_and_Global_Inequality/8.6I%3A_World-Systems_Theory)
- World polity theory*. (2019). Retrieved June 23, 2019, from https://en.wikipedia.org/wiki/World_polity_theory
- World Population Review*. (2019). Retrieved May June 05, 2019, from <http://worldpopulationreview.com/>