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# India health: impact of medical tourism facilities on state health

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**India health: impact of medical tourism facilities on state health and economy**

by

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in partial fulfillment of the requirements for the degree of

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## **ABSTRACT**

The following study is an investigation of the impact on the health of local populations spurred by the medical tourism industry. More specifically the study explores a possible increase in life expectancy in areas surrounding medical tourism facilities in India. There are ten Indian states examined in this study; five states are host to a leading location of Apollo Hospitals, and five are not. Despite the small sample size, the chosen states present a good representation of Indian states based on size, wealth, and health indicators. The findings show that the presence of Apollo Hospital Medical Tourism facilities may lead to increased life expectancy of Indian state populations.

## **CHAPTER 1: INTRODUCTION**

A nearly endless amount of literature has been written regarding international trade, implications of globalization and economic development trends throughout the world. One subject area that is currently lacking sufficient exploration, however, is the burgeoning industry of the export and import of medical services across international borders. This type of global interconnectedness is a relatively new phenomenon within the context of the current sphere of internationalism, thus explaining why few have explored the economic and health factors in a deeper context than simply costs vs. benefits. This “current sphere” is a consequence of the increases in global communication, technology, and overall increased global interaction that have been partially facilitated by the greater availability of the internet throughout the world, among other factors.

Medical tourism is the phenomenon to be addressed in this writing, with special emphasis on its catalysts, specific impact on the health and economies of 10 states in India, and future predictions on both international economies as well as specifically, the Indian medical industry. The theory posed here is that medical tourism facilities not only provide an avenue to increase the health of the foreign participants, but also increase health of local populations in surrounding areas. In many places, medical tourism destinations are among the first hospitals available. The Apollo Hospital system, an Indian public-private hospital system, recognizes the vast inequities of medical care deliverance within India by setting aside a number of beds in each hospital for the poor and indigent (Express Healthcare). Even on a relatively small scale, if a private hospital offers health-care to the local population we expect to find improvement in the health indicators and health potentials of an area.

Empirical data show that populations within states housing one or more Apollo Hospitals are more likely to experience greater life expectancy than populations in states without Apollo, thus reinforcing the theory that medical tourism facilities increase health potential in neighboring areas.

In the first section of this work, medical tourism will be defined and explored in a more general context with special attention to the relevant challenges and opportunities it has created in the globalizing world. Theory and hypotheses follow the general explanation. Empirical tests have been conducted to examine the true impact the leading Apollo Hospital locations may have on the health of the Indian states in which they exist. The last major piece of this paper concerns the future of medical tourism and its economic impact and implications, currently and futuristically, followed by conclusions.

## **1.1 Medical Tourism**

A medical tourist is defined here as an individual seeking health-care for lower cost and/or reduced wait periods outside country of origin, combined with the intention of enjoying a post-operation vacation. There are, however, many other labels given to those pursuing medical treatment while vacationing; medical traveler or health tourist for example. Regardless of term used, each of these individuals is patronizing the same, new branch of the tourism industry.

Understanding the motivation of medical tourists is vital for facilities to better define marketing strategies. Since a significant portion of all medical tourism related advertising is internet based, several airlines, like Air Mauritius, advertise medical tourism locations in

their in-flight magazines and have greater ability to highlight location-specific procedures and tourist attractions (Connell, 2006). Advertisements such as these are able to reach the average traveler and businessperson who may not be visiting specifically for medical treatment but may decide to include plans for a less invasive procedure during his or her journey.

There are several major reasons people choose to travel across the world to receive health-care. In countries such as the United States, where 86.5 million citizens were without health insurance for some part or all of 2007-2008, traveling abroad for medical purposes may be far more feasible than paying large out-of-pocket sums at home (Families USA). Dr. Arnold Milstein, a consultant for Mercer Health & Benefits found procedures in Thailand and Malaysia to cost 20% to 25% as much as those offered in the United States, and even less in India (Connell, 2006). With financial incentives as great as these, tens of thousands of patients are choosing to patronize India's health-care facilities. Over the past four or five years, rates of medical tourists have increased markedly; it is projected that by 2012 India alone will earn as much as \$2 billion from the industry (Connell, 2006).

In countries with socialized health-care, citizens may face lengthy wait periods for surgeries, elective or other, or find their insurance does not yet cover the procedure they require. Medical tourism allows these patients nearly instantaneous care at lower cost. Whether it is reduced cost, wait period, or the mere will to travel, current medical tourism is a phenomenon that would not have been possible in earlier times. Still, it should also be recognized that despite the world context of jet-setting around the world in search of medical procedures is new, traveling great distances for medical attention is ancient. "Some of the



earliest forms of tourism were directly aimed at increased health and well being...” (Connell, 2006; 1093). Within these contexts, many of these tourists vacationed to rest and rejuvenate themselves, indirectly achieving better health; medical tourism differs by *directly* improving health through specific medical procedures performed by specialists.

Medical insurance companies are taking notice of the new opportunities for savings by sending clients abroad (Kher, 2006). Many major self-insured employers are also recognizing the benefits and providing coverage to employees willing to travel abroad for reduced costs (Kher, 2006). Such plans include coverage for a family member to accompany the patient abroad, hotel stay, and nearly all travel arrangements made through the insurer thus decreasing stress transaction costs for patients and family. Several companies entertaining the possibility of this coverage enhance the deal by sharing a percentage of the savings with employees willing to travel.

Dr. Arnold Milstein has also been commissioned to investigate just how large financial incentives must be to induce clients to travel; incentives under \$1,000 encourage few consumers to experience surgery abroad. Incentives reaching over \$1,000 induced 45% of the sampled underinsured or uninsured to admit they would be willing to travel abroad for surgery (Kher, 2006). As the incentives increase, so does the percentage of those willing to leave the country. The future implications for the US health-care system and major insurance companies indicate large changes are necessary not only to provide health-care at reasonable prices, but to maintain their status as major insurers.

The medical tourism industry is experiencing marked growth, as reported by an article in *Forbes* as “an estimated 150,000 foreigners sought care in 2004 in India alone--and

this number is growing at a rate of about 15% annually.” Though these statistics are admittedly estimations, the International Passenger Survey, cited by a British travel website Treatment Abroad, estimates approximately 25,000 Britons experienced a medical visit abroad in 2004, compared to the 77,000 patients in 2006. It is projected that if trends continue at the current pace, by 2010 the United Kingdom will be sending 200,000 patients abroad (Treatment Abroad).

## **1.2 India Statistics**

No state is stranger to health crises or economic disparity, but India, the world’s second most populous country and home to 17% of the world’s population within a country comprising one-third the land mass of the United States of America, faces special challenges of population density. Despite near-constant growth in the economic sector, a reputation as a technological beacon, and an average adult literacy rate of 61%, 26.1% of the 2006 Indian population still lived beneath the poverty line (WHO, 2009). With 71% of India’s 1.1 billion citizens residing in rural areas, immediate access to health-care remains a persistent issue (WHO, 2009).

India has a centrally structured, democratic government organized into 28 states and 7 union territories, all with individual democratic governments which possess similar responsibilities as American states. Each independent state or territory is charged with providing certain resources for its population; especially the poor. Large geographic and economic disparities exist between states due to natural resource distribution among other factors, which may directly influence the health of state populations. This work focuses on

ten states; five of these states are major medical tourism destinations with Apollo Hospitals, five are not.

India is home to a host of top medical facilities, many of which also act as Medical Tourism facilities, attracting patients from all over the world. “The largest international private medical service group in India, Apollo in 2004 had 37 hospitals in India, partnerships in hospitals in Kuwait, Sri Lanka and Nigeria, and plans for others in Dubai, Bangladesh, Pakistan, Tanzania, Ghana, Singapore, Philippines, London and Chicago as private corporations grew and international linkages intensified” (Connell, 2006; 1099). Only Apollo Hospitals are used in this study.

India differs from many other developing nations in its advanced medical delivery system. This does not automatically indicate healthier circumstances within the nation; it simply demonstrates emphasis the government has placed on bettering national health initiatives. The next section examines the goals India’s national government has set forth, with collaboration from the World Health Organization, to better national health initiatives.

### **1.3 Health-care Delivery**

The development of health policy in India is credited as having begun in 1983 when the National Health Policy (NHP) was established. This is not to discount progress made prior to 1983, but to highlight the vast improvements that have been instituted since. The NHP set out to achieve the goal of ‘Health for All’ by 2000 (National Health System Profile). The strategic plan supporting the achievement of this goal relies on the foundation of a primary health-care infrastructure including coordination with health services such as

nutrition, the importance of water supply and waste management; participation by other voluntary organizations; provision of and access to drugs and vaccines; improvement in services related to health and family planning; provision of health training; and research regarding common health afflictions of the population (ibid).

The above appear to be lofty goals to achieve in 13 short years, but the NHP carefully detailed policy prescriptions in a dedicated effort toward success. Some of these policy proposals came in 2004 to build on already existing prescriptions, and include significant increases the government's expenditure on health, a redesign of the Universal Health Insurance program to increase access to citizens living beneath the poverty level, reduction of insurance premiums to Self Help Groups, and even an income tax exemption for rural hospitals. Although only several policy proposals have been mentioned here, the priority Indian officials are beginning to place on improving public health and fostering a healthy population is the main point to observe.

India has made notable progress since the National Health Policy was established in 1983, but still faces many other crises that directly influence health policy. The emphasis placed on improving social sector considerations is low, and social sector spending in India has declined in recent years. India's Human Development Index rests at 126 of 177 countries, and gender development is also lacking attention proven by the Gender Development Index ranking of 96<sup>th</sup> of 177. These factors play a great role in retarding the pace at which India may fulfill the country's lofty health policies.

Medical tourism facilities may lend a helping hand to India's health policy aspirations by developing a more robust private health sector. Building more private hospitals to deliver

medical tourism functions may aid India's health-care climate in many ways; providing additional beds for the poor or indigent, increasing non-governmental funding for health-care initiatives, improving educational opportunities for citizens, attracting more foreign investment as well as trained personnel to help carry the burden of care.

## CHAPTER 2. LITERATURE REVIEW

Despite the recent upsurge in medical tourism and the mass of travel literature being written on the subject, there has not yet been significant investigation into the direct consequences of this industry on the populations within host countries. One goal of this study is to spark greater interest in researching the more in-depth outcomes for those indirectly influenced by the medical tourism industry. Indirectly, it is supposed here that medical tourism will not only increase pressure on countries sending patients abroad to re-examine their health-care deliverance climate, but also enhance and improve medical access for those living in host countries. Other possible indirect results for surrounding areas may be the creation of jobs, increased priority on education to provide a workforce to sustain medical facilities, greater access to health-care for the poor and an overall force of economic stimulation.

There is also speculation that medical tourism may begin to lessen the effects of the brain drain phenomenon by providing more desirable and lucrative employment opportunities for Indian health professionals. Brain drain here refers to the exodus of individuals from their home countries, typically developing nations, to developed countries to pursue higher and professional education and afterward choose to stay abroad to live and work. This phenomenon removes thousands of highly trained and educated personnel from the developing world where educated professionals are desperately needed. Countries on the sending side may see a reversal if the medical tourism industry booms as predicted. Conclusive literature has yet to be published on these topics.

Much of the current literature is constructed to inform the masses on the existence of the industry; available services, which countries specialize in specific procedures or areas of medicine, and to aid the potential medical tourist and family plan a medical journey. Another area being covered more thoroughly is the domestic health situations in outflow countries to examine the impetus for sending citizens abroad. This branch of work encompasses the presence and implications of the lack of health insurance affordability, long wait periods in social welfare states, and future projections for health care delivery systems in developed states sending thousands of medical tourists abroad. Some of this literature is highly cautionary to the developed nations that are unable or unwilling to provide sufficient or timely care for their populations, and points toward the possibility of future medical outsourcing (Kher, 2006).

Thousands of medical tourism agencies exist across the world and more are being established daily. These outfits are able to provide a wealth of country-specific information for both tourists and tourist destinations. Most agencies prefer to maintain a focus of only a few countries, or specialize in planning and publishing trip itineraries for those seeking a particular procedure to better ensure quality of service and information dissemination.

## **2.1 Globalization**

Although not the focal point of this work, it is noteworthy at least to recognize the role globalization plays in both the creation and perpetuation of medical tourism. Many definitions of globalization are used in almost every discipline because the theory touches on the worlds of politics, economics, cultural or global. The term and concept of globalization

has many fans and critics and may evoke extreme sentiments depending on the source. James N. Rosenau recognizes globalization as a force at work, but exhibits healthy apprehension as to how solidly globalization can be regarded as a true explanatory mechanism. On globalization, Rosenau states that "...all the dynamics are extraordinarily complex and require considerable nuance to comprehend their deeper implications and widespread consequences" (Rosenau, 2003; 3).

For the purpose of exploring the catalysts and broader implications of medical tourism, the processes of globalization are credited here for creating an environment in which medical tourism is not just possible, it is available to the masses, or middle class, not solely the wealthy. Although globalization is often examined in an economic context, here direct impact on globalization by economics or impact on economics is not as essential to examine as the effect globalization has had on interconnectedness, cultural understanding and the willingness and acceptance global citizens experience before they decide to travel abroad. Joe Baker of Rice University grants a similar proposition by stating "[M]any proponents of globalization go beyond its economic benefits, however great, to stress the international cooperation that shared economic interdependence will bolster. Still others see globalization as spreading democracy, as economic growth fosters the growth of middle classes and rising calls for greater representative governments throughout the world" (Barnes, 2003; 7). International cooperation and the rising middle class are two vital components for the medical tourism industry. International cooperation allows individuals relatively quick and easy transport in addition to better communication, while a rising middle class ensures many more individuals have the financial ability to travel for health-care.



Globalization within this context can best be defined by utilizing the statement by Wim van Binsbergen that “globalization is not about the absence of or dissolution of boundaries, but about the dramatically reduced fee that time and space impose, and thus the opening up of new spaces and new times within new boundaries that were hitherto inconceivable” (Rosenau, 2003; 195). It should be noted that globalization and medical tourism experience some reverse causation; medical tourism exists due to the increasingly globalized climate, and globalization is enhanced by the medical tourism industry by even further reducing the cost of time and space. To give sole credit to forces of globalization would be a mistake, and would entirely discount the significance of the implicit situation of participating states and individuals.

Globalization is a much debated topic, and is often simultaneously glorified and demonized. Some purport that globalization is responsible for widening the gap (or at least the perceived gap) separating the rich and poor. Many also argue that it is a culturally homogenizing impetus. Proponents of globalization argue that the shrinking size of the world from high speed information sharing due to increased internet and phone access, lowered transaction costs from outsourcing, and greater ease of travel that globalization is actually a positive force that may enhance the quality of life of those living under impoverished situations. Benefits to the poor may come in the form of better employment opportunities, increased access to information and education, or from a trickle-down effect from increasing state economy.

This construct of globalization in relation to medical tourism highlights the importance of the reduction of fees that time and space impose, and should warrant particular

attention to the extensive role of the internet. Over one billion individuals have access to the internet, and this number is growing daily (Internet World Stats). The internet is a truly global forum for information dissemination, advertisement as well as a medical information transport device which has virtually no boundaries. Patients and doctors are able to converse and share information instantaneously; the internet provides a practically free avenue to deliver medical history, X-rays, and other complex tests via email, in addition to videoconferencing or simple, free online chatting. The patients' primary care doctor at home can converse with their surgeons abroad at little more cost than the doctors' time.

Open communication between a team of medical professionals is not only vital for the peace of mind for patients, it is becoming more widely recognized as a vehicle to decrease human error and increase patient safety. Within the United States, the Patient Safety Movement has recently been launched to study better practices within operating rooms hinging on the importance of teamwork and communication; medical tourism facilitates this type of cooperation across both time and space.

Not only is the technological hardware, such as computers, PDA's, and telephones, becoming more advanced, these devices are also more readily available due to lowered cost to those previously deprived access. The acknowledgement that internet access is becoming vital to daily transactions and interactions in the realm of business and economics, politics, as well as information and personal connections, has spurred greater discourse on *equality* of access. Places like Africa, however, have been largely left out of the internet revolution due to a lack of the fiber-optic networks necessary to activate internet access. The remedy for this inequality is currently being addressed by several organizations, not least of all, NEPAD, or

the New Partnership for Africa's Development, made up of African heads of state in conjunction with Corning Incorporated, an industry leader in fiber-optic technology (Dhiwayo, 2004).

Within the realm of the health sector, medical tourism is at the forefront of the globalization debate for various reasons. Firstly, most medical tourism sites exist within developing countries with high populations of poor and typically fewer healthcare professionals than demand requires. Secondly, many developing countries send hundreds or thousands of their citizens to the developed world for medical education, and these newly produced medical professionals remain in the developed world to practice. The combination of these two events leaves the developing world wanting more; much more.

In the context of medical tourism, many potential patients must weigh the options of either waiting months or years for a procedure, paying large amounts out-of-pocket, or traveling abroad to states many have never dreamt of seeing. Standards and accreditation allow patients to make informed decisions and feel an increased sense of security before they decide to travel. This has led to the greater emphasis and import placed on global standardization of nearly every industry. In 1947 a non-governmental organization was created called the International Organization for Standardization, or ISO. The ISO boasts a network of 159 national standards institutes, and is at the forefront of the discussion regarding why standards matter. ISO asserts:

“Standards make an enormous and positive contribution to most aspects of our lives. Standards ensure desirable characteristics of products and services such as quality, environmental friendliness, safety, reliability, efficiency and interchangeability - and at an economical cost. When products and services meet our expectations, we tend to take this for granted and be unaware of the role of standards. However, when

standards are absent, we soon notice. We soon care when products turn out to be of poor quality, do not fit, are incompatible with equipment that we already have, are unreliable or dangerous. When products, systems, machinery and devices work well and safely, it is often because they meet standards. And the organization responsible for many thousands of the standards which benefit the world is ISO. When standards are absent, we soon notice.”

There is a not-for-profit accreditation organization which oversees medical tourism’s specific locations, Joint Commission International (JCI). To date, JCI has accredited over 220 public and private health care centers in more than 33 countries. Accreditation reassures patients and families that the medical care they receive outside of their home country maintains the same, if not higher, standard of care and responsibility as they would receive at home. The medical tourism industry has increased exponentially in the past few years. Accreditation may have played a large role not only in locations where people seek care, but also that so many thousands of patients feel comfortable traveling abroad at all.

### **CHAPTER 3. THEORY AND HYPOTHESIS**

Globalization is credited here for creating the opportunity and means for the creation of the medical tourism industry. The shift from the previous state-centric, border conscious world order to a more open, interconnected, virtual construct is a major impetus for the origination of the medical tourism industry.

The theory behind this research relies on the recognition that human health is a fundamental need; without which humanity would cease to function, and at the most extreme, would cease to exist. Health is a finite good; once good health is achieved there is little more to gain. Once good health has been accomplished, providing more health-care resources to a person cannot improve quality of life past a certain degree. However, creating and devoting resources to better serve those whose health is damaged or in decline has historically been a challenge and goal for many governance structures responsible for any sized population. After recognizing good health as a need, the theory follows with the assertion that the further development of resources toward fulfilling this need, financially or structurally, is a supporting good. Thus, the theory here holds medical tourism to be a facilitator to bring resources and development to areas which did not previously have a state-of-the-art health-care advantage, which increases access to health-care and improves the health not only of foreign patients, but also indigenous populations.

Part of the theoretical framework includes the supposition that states with Apollo Hospital medical tourism specific destinations are more likely to be wealthier than states without. This theory lies in the assumption that wealth is already present within the state in order to fund the establishment of a state-of-the-art facility, but ends with the assumption that

income from foreign sources will increase the wealth of the state by various means. Medical tourism exists within the tourism industry, thus local tourist attractions such as cultural exhibits, restaurants, hotels, travel agencies, etc. fall beneath the umbrella of industries directly associated with the wealth of the medical tourism facility. By bringing more foreign patients and foreign dollars to an area previously not known exclusively as a tourist destination, state wealth should increase with each facility.

The hypothesis posed here is that medical tourism destinations increase the level of health of the states in which they reside. At the most fundamental level we expect to see an increase in health in surrounding areas simply due to an additional health care facility being created. Without health facilities, the opportunity to better the health situation in an area is simply not present. By creating more facilities, we expect to expand access due to reduced distance between the populous to a hospital, as well as make more health professionals accessible in a stationary location. The impact of both increases in health professionals and facilities on the population is intuitive; more of both should increase the health potential of local populations as well as stimulate the economy. In future research, the direct impact of medical tourism facilities on local economies should be examined both due to bolstered tourism industry and either the attraction or retention of skilled medical personnel.

The Apollo Hospital System recognizes the inequitable access to health care, and provides a specified number of beds in each hospital for those who are unable to pay for their care. The Indian government offers land subsidies to hospitals willing to provide beds and care to persons unable to pay for care. Land subsidies reduce costs to hospitals to build in certain areas, which encourages the building of more hospitals and thus contributes to both

economic stimulation and increased health opportunities for local populations. In many cases the hospital sets aside as many as 100 beds for the poor and indigent; a relatively small portion when considering the size of the population in India. However, 100 more beds in a location where there were too few, where hospital stays were too expensive, or in areas where there was not previously a facility or trained medical personnel should be an indication of improvement however minute it may seem.

Intuitively we can expect that the addition of a facility coupled with more nurses, midwives, and physicians will benefit local populations simply by their arrival. In places where the opportunity to receive medical care did not exist, or the facility location created too large a travel obstacle to be plausible, the addition of more facilities is an enormous improvement. The willingness and dedication of Apollo Hospitals to designate extra room for the poor may be a signal of India's National Health Policy moving in the direction toward better health for all, not simply the rich or foreign.

Admittedly, the sample size of 10 observations utilized in this study is relatively small, but this is controlled for within the statistical analysis. The states chosen provide a representative sample of Indian states on the basis of geography, population size, state GDP, per capita income among other variables. Similar size, income, and geographic location of states are important to control for other factors that may influence the findings of this study.

**H<sub>1</sub>: States** (Andhra Pradesh, Dehli, Gujarat, Karnataka, Tamil Nadu) with Apollo Hospital Medical Tourism destinations are healthier than states without Apollo Hospital Medical Tourism destinations (Chhattisgarh, Madyha Pradesh, Majarashtra, Rajasthan, Uttar Pradesh).

The following chapter outlines the methodology used to test this hypothesis.

## CHAPTER 4. METHODOLOGY

The following data are organized into three different tables using bivariate and multivariate ordinary least squared (OLS) regressions which control for varying aspects of Indian state health and wealth. The demographic data are taken from the 2001 Indian Census, while health, economic and population information for 2008-09 was extracted from the India Brand Equity Foundation (IBEF). The IBEF is a public-private partnership between the Ministry of Commerce and Industry, Government of India, and the Confederation of Indian Industry. We are able to control for several potential validity issues; all data utilized in the model is from 2008, and from IBEF which allows for greater continuity, and the levels of statistical significance that appear in these regressions indicate that despite the small sample, the theory retains meaning. The variables are continuous, and meet the assumptions of OLS regression.

The dependent variable used to test the hypothesis is average life expectancy of citizens within each state. Average life expectancy was chosen as the primary health indicator, representing the average health of citizens residing in each state. The bivariate table utilizes Apollo Hospital medical tourism locations as the independent variable to demonstrate possible effects medical tourism facilities have on average state life expectancy. We expect to find increased longevity of life in states with Apollo Hospitals as opposed to those states without.

Two multivariate tables are included in the study to gradually build the model. Variables are added to each test due to concerns of degrees of freedom stemming from the limited set of data observations. The first multivariate regression tests the effects of a state



possessing an Apollo Hospital medical tourism location, while controlling for the state's Gross Domestic Product (current dollars) to further evaluate the effect of medical tourism facilities. The idea here is that wealthier states may be prone to being healthier for other reasons than simply the presence medical tourism facilities, so if life expectancy increases after controlling for state wealth we can be even more confident expressing the effects of these medical facilities.

The second multivariate is similar to the first in that it tests the medical tourism variable while controlling for state GDP in addition to the percentage of population residing in urban locales. There are several reasons to account for percentage of urban population. Firstly, urban centers typically have more hospitals than rural areas and allow greater ease of access which may decrease the significance of medical tourism facilities. Secondly, if the results still indicate an increase in average life expectancy greater confidence may be granted because higher urban populations create higher demands on hospitals; more people per square kilometer require more medical facilities, and due to proximity of living conditions have the possibility also to require more health-care. Greater need for health-care may be due to increased risk of communicable diseases based on close living-quarters, or due to potentially negative consequences of living in an urban setting such as increased cancer rates from air pollution, higher instances of disease or illness due to lower quality of water or poor waste water management, etc.

If the presence of one medical tourism facility within a state increases average life expectancy while these variables are controlled for, we can comfortably declare medical tourism facilities do indeed increase the probability for better health. The number of medical

tourism locations managed by Apollo Hospitals is not included in this study. We solely acknowledge a facility exists within a state or does not. Examining the possible impact of a per-unit facility increase would be an interesting advance for future research to strengthen the theory that medical tourism facilities lead to better health results in a state.

#### 4.1 Variables

The dependent variable, average life expectancy for the population of a state, is the average age of a person born in the state. The independent variable utilizes an indicator of Apollo Hospital medical tourism facilities; states without these facilities = 0, states with Apollo Hospital medical tourism = 1. This variable is common, and an appropriate measurement for health. A table demonstrating summary statistics for overall life expectancy in the ten states examined in addition to statistics for states with Apollo facilities and states without Apollo follows.

*Table 1. Summary statistics for life expectancy*

Life Exp. (years)	Overall	Apollo	Non-Apollo
Mean	62.61	64.78	60.43
Std Dev	3.79	2.8	3.55

State Gross Domestic Product, a control variable, was chosen as an economic indicator for state wealth and is also a common and appropriate measurement for state wealth. State wealth was chosen as a control variable to account for the possible effects it may have on the dependent and independent variables. Higher-income states may be more likely to have medical tourism facilities because: firstly, wealthy states may already be more attractive to investment endeavors, both domestic and foreign, which may increase interest in investing

in internationally focused medical facilities. Secondly, it is likely that higher-income states provide better quality infrastructure; roads, airports, clean water and other services that make the state more attractive to international travelers seeking a medical tourism destination immediately. This does not discount the prospect of medical tourism facilities in lower-income states; in fact it may encourage lower-income states to list bettering infrastructure and attractiveness to foreign capital higher on the state priority list.

There exists a possibility for reverse causation with regard to state wealth. Richer states may already tend to be healthier either due more health-care spending per capita, infrastructural efficiency such as water and sewage management, etc. As a result, if higher-income states enjoy a healthier population, they most likely also enjoy a more productive population which inevitably augments a state's economy. Thus, the last two models include the control variable for state wealth. Summary statistics for state GDP follows, showing mean GDP in billions and standard deviation of GDP for all states and then broken down by states with and without Apollo facilities.

*Table 2. Summary statistics for state GDP*

State GDP (\$ bil)	Overall	Apollo	Non-Apollo
Mean	42.194	43.428	40.96
Std Dev	29.22	12.45	41.99

Future research should also examine per capita income levels in Indian states to provide a broader economic context with which to compare health potential. Per capita income is not controlled for in this study because state wealth and state health indicators convey data at the state population level, not an individual level. The study of per capita income would be best utilized at the city level, not state as explored within this study. Both

state wealth and health indicators are readily available data whereas city indicators are less available and require significantly more resources to uncover. City-wide data on per capita income and life expectancy was not readily available at the time of this study, but should be compiled in the future to better examine the impact on health and economy within Apollo Hospital cities.

The second control variable, percentage of state population residing in urban areas, is able to imply true significance (or lack thereof) of a medical tourism facility while taking into consideration ease of access to hospitals in urban areas, in addition to the larger volumes of both people and hospitals in urban areas. Controlling for the ratio of urban to rural is important to this model to account for several possibilities. Primarily, if a state has a large urban population the effect of the presence of a medical tourism facility on life expectancy may be lower than a on a large rural population. This may be because it is possible there were previously fewer health care facilities to provide services in rural areas, so a medical facility may have a large impact on health. In largely urban states, there are presumably more hospitals per square kilometer than in rural areas, thus offering more location convenient health-care options. There is a fine line in the assumption here; if a state hosts a larger number of available hospitals, this does not necessarily guarantee improved access to health-care for all citizens, but we assume that it is probable. The table below provides summary statistics for the percentage of urban population in all states in addition to statistics for the five states with Apollo and the five states without Apollo facilities.

*Table 3. Summary statistics for urban population*

Urban Pop (%)	Overall	Apollo	Non-Apollo
Mean	48.91	49.74	48.08
Std Dev	26.64	28.77	27.7

## CHAPTER 5. EMPIRICAL DATA ANALYSIS

This section inspects the actual empirical results of the study. The three tables included here utilize the following model: where  $Y$  is Average Life Expectancy,  $X_1$  indicates presence of Apollo Hospitals as an indicator variable (states with Apollo facilities = 1, states without = 0),  $X_2$  is the control variable for state income [table 2],  $X_3$  controls for percentage of urban population in sample states [table 3],  $e$  is the error term, the statistics in parentheses are  $t$ -ratios, \* indicates statistical significance at the .05 level (two-tailed),  $R^2$  is the coefficient of multiple determination,  $N$  is the sample size (number of states), and SEE is the standard error of estimate of  $Y$ .

Table 4 demonstrates that by having a medical center present, there is an increased average life expectancy of 4.3 years. The starting point for average life expectancy began at 60 years without a medical center. By adding the  $X_1$  variable (0 for states without Apollo, 1 for states with Apollo) this average is increased by 4.34 year. With this knowledge, we can comfortably say that for a unit presence of Apollo hospitals, there is a 4.34 increase in life expectancy. This model provides a  $p$ -statistic of .06, so we can be 93.6% confident that a relationship between average life expectancy and Apollo Hospital medical tourism facilities exists. The model is also able to account for 37% of total variance, as exhibited by the  $R^2$  of .3658.

The linear function utilized in Table 4:

$$Y = 60.43^{**} + 4.35^* X_1 + e$$

$$(42.2) + (2.15)$$

$$R^2 = 0.3658 \quad N = 10 \quad SEE = 3.2017$$

*Table 4. Effects of medical tourism facilities on average life expectancy*

Variable	Coefficient	Standard Error	P> t
Medical Tourism Facility	4.3499	1.4318	0.064
Constant	60.43		
N=10 R2=0.3658 Adj R2=0.2866 Root MSE=3.2017			

Table 5 utilizes the following linear function:

$$Y = 58.74^{**} + 4.25^* X_1 + .0411 X_2 + e$$

(28.94)      (2.14)      (1.15)

$$R^2 = 0.4664 \quad N=10 \quad SEE = 3.1396$$

Table 5 utilizes the same model as Table 1, but adds  $X_2$ , state Gross Domestic Product as a control variable to control for state income. This table indicates similar results as the first, which increases confidence in the belief that this model functions appropriately. After controlling for state wealth, average life expectancy increases 4.2 years with a .07 p-statistic, which allows for 93% confidence a relationship still exists between states with Apollo Hospital medical tourism facilities and average life expectancy. The model is also able to account for 47% of total variance, shown by the  $R^2$  of .4664, and a squared error of estimation of 3.1396.

*Table 5. Effects of medical tourism facilities on average life expectancy controlling for state income.*

Variable	Coefficient	Standard Error	P> t
Medical Tourism Facility	4.2486	1.9876	0.070
GSDP (current \$)	.0411	.0357	0.288
Constant	58.7458	2.0300	
N=10 R2=0.4664 Adj R2=0.3139 Root MSE=3.1396			

Table 6 utilizes the following linear function:

$$Y = 51.7^{**} + 3.95^{**} X_1 + .0939^{**} X_2 + .1015^{**} X_3 + e$$

(20.51)    (3.06)            (3.33)            (3.27)

$$R^2 = 0.8086 \quad N=10 \quad SEE = 2.0313$$

Building the model further, Table 6 adds  $X_3$ , percentage of urban population in each state as a control variable. Again, this table increases confidence in the presumed relationship between Apollo Hospital medical tourism facilities and life expectancy. This increased confidence is evidenced in the continued increase in average life expectancy by 3.9 years after controlling for state wealth and population distribution. By controlling for wealth and population density, we can be more confident that the relationship between Apollo Hospitals and increased life potential for the local populations exists, and a relationship does not simply appear due to other factors, such as state wealth or population density.

It could be asserted that wealthy states have greater health potential due to possibly better infrastructure, or states with a larger urban population are healthier due to less distance between populous and hospital. After controlling for both of this possible compounding variables, we still find that average life expectancy has a relatively large increase in 3.9 years, which bolsters the argument for a relationship between increased life potential and medical tourism facilities. This model is also able to account for 81% of total variance with an  $R^2$  of 0.8086, and a squared estimation of error of 2.0313.

*Table 6. Effects of medical tourism facilities on average life expectancy controlling for state income and percentage of urban population.*

Variable	Coefficient	Standard Error	P> t
Medical Tourism Facility	3.949	1.2891	0.022
GSDP (current \$)	.0939	.0282	0.016
Urban Pop	.1015	.0309	.017
Constant	51.7	2.5208	
N=10 R2=0.8086 Adj R2=0.7128 Root MSE=2.0313			

The confidence interval of this table lends encouraging numbers; at best, life expectancy may have a 7.1 years increase, and at worst a .8 year increase. Overall, there is still an upward relationship between the existence of Apollo Hospital locations and population's life expectancy after controlling for several possible compounding variables, indicating the empirical evidence is consistent with and supportive of the theory. Comparing the best and worst case scenarios, .8 years to 7.1 years, we can be reasonably hopeful that the inevitable increase in medical tourism facilities will not only better serve international populations coming to India for medical treatment, but also start to see a gradual increase in health potential throughout India. It does not seem likely that medical tourism will decline anytime in the foreseeable future, which may lend a helping hand to the Indian government to increase collaboration with Apollo and like entities to improve the nation's health.



## **CHAPTER 6. FUTURE RESEARCH**

The prospects for future research surrounding medical tourism are infinite. There are several major sectors which require greater in-depth studies, such as inequitable health insurance coverage; direct economic impacts on both medical tourism inflow and outflow countries; international standards of medical tourism practices relating to facility management, patient safety and litigation rights; and the social, economic and health indicators improvement (or lack thereof) in developing states participating in the medical tourism industry.

This study hopes to jumpstart discourse regarding the health improvements possible within a developing nation hosting medical tourism facilities. This work did not explore the similar implications on health in outflow states. For example, future research may now be more inclined to delve deeper into both cause and projected solutions of US health insurance inequities, or the adverse health effects posed by long wait periods or insufficient coverage associated with socialized health-care. Examining causes will better explain the will of citizens to participate in the medical tourism industry and by projecting solutions to these issues may also give the developed nations sending thousands abroad the necessary tools to make more appropriate health policy prescriptions.

International standards and accreditation for medical tourism are vital to ensure the perpetuation of the industry as patients may cease to travel if facilities are improperly maintained, the quality of care is less than adequate or of poorer quality than they may attain at home, or if an unsatisfactory result is achieved there is no legal recourse. Quality facility management is vital to maintain standards of sanitation, reduce the possibility of infection,

and guarantee a safe work environment for employees. Legal implications currently differ according to country, but these standards institutions remain hopeful that change may come quickly to ensure legal rights to all patients. Future research may observe patient safety procedures and report outcomes; error rates in most cases remain unreported. Another important unearthing to be achieved is wider awareness of litigation rights in different host countries, although much of this research may be more appropriate for travel agents for advisory purposes.

If medical tourism projections come to fruition, the multi-billion dollar industry may drive even greater change throughout both the developed and developing worlds. By increasing tourism revenues and thus boosting economies, broadening numbers and locations of health-care facilities, and perhaps even bringing greater world awareness to social, economic and health inequities, medical tourism may be the vehicle by which some developing nations achieve developed status. To arrive in the developing world, however, these countries must first place greater priority and funding guarantees on human and social development among other goals.

## CHAPTER 7. CONCLUSIONS

The burgeoning medical tourism industry is inextricably linked to myriad other industries in both developed and developing countries. The total future ramifications of this industry on all states are still unknown, but continued growth appears imminent. If the past and current processes of globalization are any indication for future trends, medical tourism may continue to build bridges of communication, understanding and medical cooperation throughout the world. Although it is tempting to rely on the optimistic aspects of this globalizing supposition, a rational reader must also prepare for heightened consequences for the developing world. The deterioration of world culture, increased marginalization of the populations in developing countries, and an ever-increasing gap between the haves and have-nots may come to fruition. There may also be negative consequences on both the health-care deliverance and the health-care economies of the developed world, although it does not seem as likely. Along similar globalizing logic, international standardization of industry may also be on the world's horizon.

After looking at the model created to examine health effects due to medical tourism, within Indian states, it may now be said that there are definite positive effects from medical tourism facilities on the health of local populations. This is an exciting prospect for the growing medical tourism industry, national health policies, and numerous nongovernmental organizations geared toward enhancing quality and longevity of life for the citizens of the world. With the worst-case scenario being an average increase of .8 years to local populations, the empirical evidence supports the theory that medical tourism facilities increase health potential for those living in surrounding areas.

Future plans for research include the investigation of Apollo's satellite clinics, which are becoming increasingly prevalent throughout India and surrounding countries. While the examination of Apollo Hospitals was necessary in this study to fully pursue the specific impact of medical tourism, the literature will most likely branch into two categories henceforth. One avenue I would like to pursue is strictly the economic impact of medical tourism on urban centers within India; how much do these locations truly influence the surrounding economy? The economic base of this research endeavor will necessitate the aid of literature on both outsourcing and foreign direct investment.

A second research endeavor will be more health focused. We have shown the Apollo Hospital System to be known for its state-of-the-art facilities and world renowned medical specialists which attract tens of thousands of foreigners annually and are quickly becoming part of the multi-billion dollar medical tourism industry. The presence of these hospitals may indeed increase local health potential, but we did not look deeper into the numerous satellite clinics Apollo also continues to build and staff.

Thirdly, more attention should be paid to the education possibilities to people in areas surrounding medical tourism sites. The logic here also may be intuitive; new facilities also require new staff, physicians, custodial staff, nurses, etc. Does Apollo recruit these professionals from universities in the area, other locations, or is there a possibility the Apollo administration may take a more proactive approach to train local people? If there is increased training and education around medical tourism locations, these facilities may have far more to offer foreign and local citizens than increased health potential; it may be the impetus to shift the poor and poorly educated into an entirely new set of economic circumstances.

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