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Economics

DECEASED HUMAN ORGAN DONATION IN INCREASING HUMAN EFFICIENCY AND ECONOMIC GROWTH OF THE NATION.

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ABSTRACT In this Research we studied the effect of Organ donations over the human efficiency and the economic growth of a nation through biological and economic views. In the study we used a new economic tool: The BRCCS tool, a new tool which we created analysed the factors affecting organ donation- substitutes, suppliers etc. In the study we also shed light upon various consequences and precautions taken before organ transplants through the eyes of biology.

KEYWORDS : Organ Donation, Economic Growth, Organ Transplants, Efficiency.

INTRODUCTION

Organ donation remains the most complex and challenging areas of modern medicine. The first organ transplantation in India was conducted in the 1970's. Since then India has made a few steps to suffice the number of organs demanded. There are Several initiatives to encourage deceased organ donation include the Indian Network for Organ Sharing, a subdivision of the National Organ and Tissue Transplant Organization, the Transplantation of Human Organ Act (THOA), as well as the Transplantation of Human Organs and Tissue Rules; these rules are stringent towards the donator and the receiver along with the transportation of the organ. The current success rate of Organ transplantation in India is between 82%-95% varying state to state.

Organ transplantation incurs different kinds of both costs and opportunity costs over the person looking for an organ. First, a person spends ₹ 2,000 ($27) over blood test and screening processes. Moreover, the person also takes time off of his working time for appointments and for taking rest after and before the operation, which leads to lower productivity for the economy and the individual.

On the contrary, if the number of donations increases the amount of money spent fighting terminal disease will decrease. as the organ can now be replaced, treating the disease poses a higher opportunity cost. Subsequently, as the number of donations will rise, the number of people who were previously unemployed, due to terminal or other diseases like renal failure, Diabetes, and Hepatitis, will now be willing and able to work as their diseases are either cured or is not there now; this will, therefore, increase the labour force of the country.

However, In India 5 lakh people die due to the lack of organs in 2016; 100,000 people require a liver transplant and a mere 1,000 people actually get a liver in 2016; 220,000 people require a kidney transplant but only 15,000 people get one in 2016. On the other hand, India ranks in top 10 on the list with countries reporting the maximum traffic based fatalities; in 2016, at least 480,652 accidents occurred and this led to 150,785 deaths. This means that there exists a scope for the donation of 150785 livers, 301570 eyes, 301570 kidneys, and 150785 hearts; this abundance of organs is more than enough to fulfil the need of the organs.

Generally, the organ transplantation is an allograft, which is a transplant between two organisms of the same species. Biologically, organ transplantation is affected by more than one factor. The first factor is the effect of the immune system of the host body: the Helper T cells of the host recognizes the peptides released by the organ transplanted and guide B cells and Killer T cells to the specific target sites, these cytotoxic T cells (Killer T) sees the organ in an inflammatory phase as most of the organs transplanted are taken from the donor body after trauma or death, hence the action of the cytotoxic T cells is pro-inflammatory which causes them to recognize their matching epitope and trigger the targeted cells programmed cell death [PCD] through apoptosis. To reduce this PCD doctors use different immunosuppressant that suppress the host's immune system and this suppression takes a lot of days to revert to normal and also open up the body to various other diseases as well. The organ transplantation process is only executed if the doctor thinks that the donor and the acceptor are a close match as the immune systems of the hosts body will have to be compromised if there were any chances of organ rejection. Another problem that increases the time taken for the process is the fact that blood groups play a major role: if the host has ever been exposed to the blood group of the donor then the acceptor's body will have the antibodies in memory state that will be triggered as soon as foreign blood group is detected, this also leads to transplant rejection, hence before the transplant takes place there exists lots of research about the host's and donor's background and diseases which leads to higher time.

People that receive organs from transplantation have the capability to work and biologically they are fit to work as well, however, in India, the number of organs available is lower than what is demanded. Even with many organs being lost in accidents the number of organs remains low. So what will happen when all the demanded organs are fulfilled, will the efficiency of the country increase? Are the days taken for a transplant affecting the overall productivity of the economy? And are the number of days taken even necessary? Do the number of transplants reduce the overall extra cost of treatment and check-ups? And who does the government cultivate the growing number of organs available?

Hence this research aims to find out **to what extent is deceased human organ donation beneficial in increasing human efficiency and economic growth of a nation?**

HYPOTHESIS

Null- The increase in organ donations will not affect the human efficiency and the economic growth of the nation

Alternate- The increase in the number of organ donations will affect the human efficiency and the economic growth of the nation.

ECONOMIC ANALYSIS

Economics is a social science concerned with the production, distribution, and consumption of goods and services. We will predict the way of how deceased human organ donation will affect human efficiency and economic growth, given that the demanded organs are fulfilled.

1. ECONOMIC GROWTH

With economic growth in the nation, the number of jobs will increase. The people, between 18-60 will capture the available jobs which would improve their living standard, which would lead to a greater GNI, hence the economic development in the nation would augment. Plus, higher economic growth will raise tax revenues and reduce government spending on unemployment. Those who are organ deprived contribute less to the society. A healthy person contributes more to the society, will give taxes which the government can use too. The government can also decrease expenditure and invest in the medical department for higher economic growth. The more the number of people available to work, the better the development.

In figure 1 below, we see that as Aggregate demand 1(AD 1) has increased to Aggregate Demand 2, at the same price level, there is an increase in the long run aggregate supply 1(LRAS-1) to long run aggregate supply 2(LRAS-2) with an increase in real GDP from Y1 to Y2, thus an increase in economic growth.

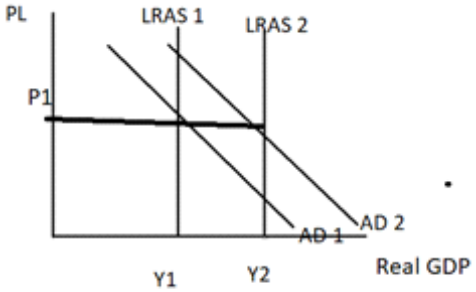

FIGURE 1

THE BRCCS TOOL

Inspired by Porter's Five Forces, a tool for analysing competition of a business, we have come up with a model that would analyse the factors affecting organ donation. Unlike Porter's five forces which deal with threats and rivalry, this model won't do the same as shown in figure 2 below.

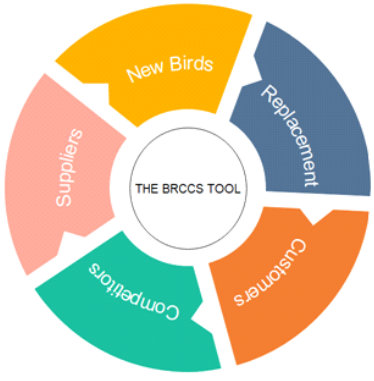

Figure 2

1. New bird- Technology

Technology has transformed the 21st century. Be it smartphones, automobiles or organ donation. For example, Scientists have developed a way to 3D print models of various anatomical structures, including hearts, brains, arteries, x`and bones. In the future, this process could be used to create 3D-printed soft implants in which living tissue can grow to form organs. This process will take both time and money to implement in India, however once successful this could lead to decreased deaths due to organ donation. 'TransMedics' developed a device called the Organ Care System (OCS). The machine is designed to replicate our human functions as closely as possible, by keeping the organs alive outside the body. Also, Using heart-lung support technology, the University of Michigan's Transplant Center was able to increase the number of kidneys, livers, and pancreases available for transplant by about 20 percent. The only drawback to the technology mentioned above is the costs incurred with it. With a scope for the donation of 150785 livers, 301570 eyes, 301570 kidneys, and 150785 hearts; Technology can be utilized for the better.

2. Replacement- Treatment

If the specific organ for the individual isn't available, he/she can always look for the treatment of the disease. For example, Dr. Eduardo Marbán, Director of the Cedars-Sinai Heart Institute in Los Angeles, California, is investigating the possibility that 'irreversible' damage to hearts may, in some cases, be reversible. Early-stage clinical trials of cell therapy in heart attack patients have yielded encouraging results. If doctors can heal the heart instead of removing it, transplants might be avoided. Plus, it may take some time before a whole organ can be grown out of stem cells. In addition, some organ systems, such as the nervous system, are so complex that transplantation may be impossible, hence treatment remains the only option of survival. Stem cells might be a solution. Clive Svendsen, Ph.D. and his team has successfully injected stem cells into brains and spinal cords and observed the damaged tissue rejuvenate. “The stem cells seem to migrate to the diseased areas,” he explains. However, treatment of diseases costs a lot and the patient isn't even sure of reviving back.

3. Customers- High class

The 2 points above show us that technology and treatment are high-cost expenses. Hospitals in India often use the bidding system for organs. In these cases, the high class society will be superior to the others with their power of wealth. Therefore the target audience or the customers for the same would be from the high or medium-high class category. Plus, organ donation isn't cheap too. A kidney sells for around 5,00,000 in the nation. Adding to this is the beliefs people uphold- majority of Indians don't pledge their organs for the sole fact that they believe in rebirth. Plus, they burn the body due to Indian rituals. Dying patients often do donate their organs to the hospital for the better of another person. However, the facts and figures don't generate a generous result- 100,000 people require a liver transplant and a mere 1,000 people actually get a liver in 2016.

4. Competitors

There is no industrial rivalry as of yet. The hospitals which receive the organs are of the patients who are already on their deathbed. However, the informer market can create competition, the data to which we are unaware of.

5. Suppliers- Human Trafficking

Here is an example of a person who came to the nearby Hospital. Here is the summary of his conversation-

The average debt of the person before selling the kidney was ₹ 230,000 ($3,150).

Average money promised for the kidney was ₹ 290,000 ($3,973).

Average money received after selling kidney was ₹ 240,000 ($3,288).

Average money paid to middlemen was ₹ 50,000 ($ 685).

Average money received in the end was ₹ 190,000 ($2,603)

Due to human trafficking, we see that middlemen take about ₹ 50,000 in the example above, that is more than 25% of what the person got. The intermediaries take a great chunk of the person's money away. In my opinion, the government should take serious action towards the intermediaries. As the demand is high and supply is low, poor people like vendors and farmers will sell their organs for low in the black market. The suppliers of the organs are the patients on their deathbeds who have pledged their organs.

EFFICIENCY

Human efficiency is the ratio of output to input, it measures how well was a person able to cultivate all the resources available to him and how fast and good a job he performed. The number of hours a person works is generally proportional to his/her efficiency as the more hours he/she works the more work they are doing earlier than they are supposed to do and end up doing more than expected work hence increasing efficiency. The average Indian works for about 8.1 hours a day, whereas a handicapped person works comparatively lesser, hence the efficiency of a working man is superior and will ultimately lead to economic growth and efficiency.

BIOLOGICAL REVIEW

When we examine the impact of Transplantations on our body through the perspective of biology. The major questions that we will be viewing will be: which out of the two- replacement of the affected organ or treating the disease that is affecting the organ is better for the overall health of the body? and- What time is required for the Preoperative and Postoperative care of the patient and the Donor?

the two options to remove a disease that puts your organs into danger are to replace the organ with a healthy organ or to treat the diseases. When we compared the two options, we took in consideration: the effect of drugs and radiation over the body and the effect of hospital bedrest over the body.

taking a look at the effect of Drugs and radiation, we found out that people who treat the disease rather than replacing the organs have to

take '10' medications for about '2' years. These medications are generally focused to better enhance the functioning of the organ and the organ system as a whole, but these medications create a dependence which forces the patient's body to continue sticking to the medicines, and in many cases these patients develop resistance to several chemicals found in allopathy, these resistances facilitate the Natural Selection of strains that can easily and rapidly modify their DNA to adapt to any situation or any drug to which it is exposed to. Strains of Diseases like Methicillin Resistant *Staphylococcus aureus* are resistant to chemicals like Methicillin, and this strain cannot be treated my normal Methicillin. This resistance causes the treatment to get more expensive and where the doctors have to use newer and stronger medicines to try and tackle the disease.

On the other hand, when we are talking about Organ replacement, the only drugs the Donor and the acceptor have to take our immunosuppressant. These immunosuppressant reduce the functionality of the immune system of a patient and the person who is donating the organ. It is important to use these because when an organ is replaced the new organ has high risk of rejection if the acceptor's Killer T and Helper T lymphocytes are active. These costs might appear to be a high- one-time cost of treatment that are incurred prior to and after the transplant, however this cost is significantly lower than the cost of continuous treatment for 2 years treating a disease that can rearrange its DNA to fight any type of chemical.

Economically speaking, the time taken for a transplant, before it and after it is also a factor that reduces the overall productivity of the person as during that time he/she is not working. However, biologically, there are many things that a doctor has to ensure before he can allow and perform for the transplant to be made before the surgery, the doctor has to run tests to establish the match between the donor and the acceptor: he takes in account the Blood group, Sugar levels, previous infections, injury histories and the overall health of the body. After the doctor is satisfied with the results he puts the donor and the acceptor on immunosuppressant, after the doctor has put both these patients on the drugs he has to observe the physiological and biological responses of the donor as well as the acceptor because even a single mistake can lead to the death of both the people. After the doctor clears the transplant, he has to monitor the patients until there is no risk of rejection, as a rejection of this foreign body can not only damage the chances of the survival of the acceptor but it will also make him vulnerable to various diseases: the acceptor was on immunosuppressant and hence gathering a diseases would be nothing less than fatal.

Biologically, a person suffering from a terminal disease that targets one of his major organs has a better chance of survival and also a better future as he/she does not have to pay for medicines for two years and does not have to go for weekly doctor check-ups. Organ replacement is evidently the better alternative to treat a disease affecting major organs.

CONCLUSION

When we took a look at India's current scenario, we found out that people didn't give consent to donate the organs of the deceased love ones, however this number of deceased people offers an even bigger number of organs that can be used to help someone else. People across India suffer from many diseases that target their major organs and the two lines of treatment are to either replace the organ or treat the decease. Biologically, replacing the organ was better than treating the disease. Hence, organ donation increased human efficiency and therefore lead to economic growth of the nation. The success rate of organ donation stands at a solid 82% to 95%, varying in states, which is a very success rate; hence the number of people with successful organ transplants will also increase.

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