

The Economics of Organ Donation in India

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Abstract

The Indian organ donation landscape is mired in economic imbalances, supply inadequacies, and institutional bottlenecks, resulting in systemic welfare losses and negative externalities in production and consumption. The loss to life and property arising out of this scenario cannot be quantified and yet must be. We look at the regulation of organ donation in India, its costs, and the economic impact of the demand-supply gap created in this market on the general lives of Indians, directly or otherwise and resulting black market practices.

Keywords: Organ Donation, India, Economics, Opportunity Cost

1. Introduction

Roughly 500,000 people need an organ transplant every year in India, with less than 800 of them being able to meet their demand, translating to about 0.52 transplants per million of the Indian population [1]. The USA does 50 times better, with about 26 transplants per million population.

The massive demand for transplants would appear to be the primary problem in India with regards to the supply gap, but one need not look beyond China, clocking in at over 6 transplants pmp (per million population), to see how such large demand for transplants may be met with better institutions in large economies. Though China is miles ahead of India, China's figures might not read well in a global context, with smaller countries such as Argentina and Brazil reading in 47 transplants pmp and 34 transplants pmp respectively. France and the UK lead the charts with 70 transplants pmp and 67 transplants pmp respectively [2][3][4][5]. Still, they have had different developmental contexts throughout their history and make for difficult normalisations with India's current state.

India has the most unique combination of bureaucratic quagmires and red tape, a thriving black market, information asymmetry, superstitions borne of regressive customs, and a striking lack of skilled labour, all working together in harmonious discord to yield terrible outcomes for organ donation outcomes.

2. Regulation of Organ Donation and Transplants in India

The organ donation and transplant ecosystem of India works on the back of the primary legislation of the Transplantation of Human Organs Act (THOA), 1994. Subsequent amendments and additions have kept the law relevant, but questions over enforceability remain. The setting up of the National Organs and Tissues Transplant Organisation in 2014 was a watershed moment in the history of organ donation regulation in India and remains the apex regulatory body for overseeing and enforcing the provisions of the THOA with its Amendments.

As per Indian laws, living donors must be at least 18 years old and are generally limited to donating to their close relatives. For deceased donor, organ donation can occur after brain death is certified by 2 doctors. The most critical aspect of Indian organ donation laws require the consent of near relatives even

if the deceased person has pledged their organs. Commercialisation, and trade of human organs is strictly prohibited. Below is a short overview of how Indian organ donation laws have evolved over the years.

2.1 Transplantation of Human Organs Act (THOA), 1994 [6]

Scope: Regulations surrounding the removal, storage, and transplantation of human organs for therapeutic purposes, and preventing such acts for commercial use

Major provisions:

- Brain death was defined as legal death for organ retrieval
- Live donations were regulated to be allowed only from nearby relatives, like spouses, parents, children, siblings, grandparents, or grandchildren
- Outlined punitive penalties for illegal commercial dealings of human organs, including but not limited to the unauthorized removal of human organs
- Outlined the regulation of and registration required for hospitals in the business of removal, storage, and transplantation of human organs for therapeutic purposes
- Established the official hierarchy of authority in this regard within the country, detailed later
- Established a national registry for lists of suitable donors and recipients

2.2 The Transplantation of Human Organs (Amendment) Bill, 2009 [7]

The 2009 Amendment introduced the concept of swap donations and laid down intricacies regarding regulation and authorisation of retrieval, storage, and transplantation of human organs, and for the first time extended the ambit of the THOA to human tissue.

- A donor-recipient pair who are near relatives but whose organs do not medically match for transplantation are permitted by the bill to swap organs with another pair of such persons, leading to the groundbreaking practice of swap donations
- The doctor in an Intensive Care Unit would be required to inform the patient and/or relatives of the patient about the option of organ donation and ascertain whether they would consent to the donation or not

Further additions were made to the Bill to increase its comprehensiveness and allow for more robustness of its provisions and their enforcement before passing it as an Act in 2011.

2.3 The Transplantation of Human Organs (Amendment) Act, 2011 [8]

The 2011 Amendment to the THOA largely strengthened the ambit of the Act regarding practices dealing in human organs and tissues, outlining the regulation of and registration for practices of removal, storage, and transplantation of human organs and tissue, and laying down punitive penalties for the act of such practices carried out for commercial use and benefit.

- Accordingly, the term “tissue” was clearly defined as such with an exception of human blood being considered as tissue
- Further specifications regarding the quality of care the hospital which engages in the removal and storage or transplantation of human organs or tissue were also laid down, and accordingly Human Organ Retrieval Centres were demarcated
- Further legalities regarding specification of the donor’s mental health and wellness in the case of live donations, specifications regarding minor donors and recipients, and non-citizen donors were also laid down
- More details regarding the hierarchy of authority, including the setting up of Advisory Committees, registration of hospitals under THOA, and updating the national registry for donations were also set down

- Establishment and maintenance of a National Human Organs and Tissues Removal and Storage Network at one or more places, alongside Regional Networks, to disseminate information relating to the registry and to perform such functions as may be prescribed
- Provided for the establishment of Tissue Banks, facilities that collect, store, and distribute human tissues (such as skin, bone, corneas, heart valves, etc.) for use in medical treatments, surgeries, or research
- Further extended punitive penalties to up to ten years of rigorous imprisonment, and not less than twenty lakh rupees and up to one crore rupees as penalty, for engaging in practices of unauthorized removal, storage, or sale of human organs or tissue for non-therapeutic use and/or commercial benefit
- Additionally, the Amendment laid down requirements of educational qualifications and experience required by medical practitioners authorized to be involved in the removal, storage, and/or transplantation of human organs and/or tissue for therapeutic use.

2.4 The National Organ and Tissue Transplant Organisation, 2014 [9]

In 2014, the National Organ and Tissue Transplant Organisation (NOTTO) was established in Delhi. The NOTTO works under the authority of the Ministry of Health and Family Welfare of the Government of India. It acts as a nodal point for all dissemination of information related to organ and tissue retrieval, storage, or transplantation, and has two divisions - the National Human Organ Tissue Removal and Storage Network (NHOTRSN), and the National Biomaterial Centre (NBC).

- Donated organs were officially accorded the status of being national resources, with the spectrum of regulation falling under 5 Regional Organ Tissue Transplant Organisations (ROTO) and several State Organ Tissue Transplant Organisations (SOTTO), with the NOTTO as apex
- The NHOTRSN coordinates with similar bodies at the regional and state levels, updating and transferring information regarding the national registry
- The Network also co-ordinates and organises training camps for skilling healthcare professionals in the field, and keeps a databank on performance of all SOTTOs and ROTOs
- The National Biomaterial Centre was set up in accordance with the norms laid down regarding the establishment of a central Tissue Bank
- The NBC coordinates the provision of and acquiring of human tissue for transplantation purposes, while also disseminating information regarding donors and recipients with other Tissue Banks in the country.

2.5 Central Advisory Committee and other Advisory Committees (AC)

A central Advisory Committee, as mandated by the THOA, is in charge of upholding the provisions of the Act and leading the executive charge in the field of authorised organ transplantation in India. There are regional and state Advisory Committees set up too, with the central Advisory Committee acting as apex and nodal point of information for all other ACs.

- The central AC is under the chairmanship of the Director General of Health Services, MoHFW, and steers the activities of NOTTO, ROTOs, and SOTTOs
- Each AC has a chairperson from the MoHFW, a Member Secretary, medical and legal experts, and social representatives from NGOs
- States with well-functioning ACs report higher donors pmp (0.9) versus states without such ACs (0.3) [10]
- The efficiency and structural integrity of ACs remains under scrutiny and is a subject of debate, with several ACs not conforming to the structure mandated by the THOA due to a lack of skilled personnel

The efficiency of implementation of THOA or its Amendments remains questionable in India, with donor counts still lagging in the country. There have been several instances of structural gaps in ACs, resulting in poor administrative effort in regulating the laws in place [11][12][13]. There are cases of administrative successes too, as in Tamil Nadu [14] or Maharashtra [10], but these remain too far and few in between. The law itself might be stringent enough but tends to emphasize on the punitive actions in place to prevent criminal activity regarding the harvesting and sale of human organs and tissue, with the required weight on improving health infrastructure, legal and social constructs, and administrative effort largely overlooked.

2.6 Regulation in India: an executive summary on THOA

The Transplantation of Human Organs Act (THOA), enacted in 1994 and subsequently amended in 2009 and 2011, serves as India's primary legal framework for regulating the removal, storage, and transplantation of human organs and tissues for therapeutic purposes. The original Act criminalized the commercial exploitation of organ transplantation and established key safeguards, including defining brain death, restricting live donations to close relatives, and mandating hospital registration. The 2009 Amendment introduced the concept of swap donations, allowing incompatible donor-recipient pairs to exchange organs with other such pairs under regulatory oversight. It also mandated that intensive care unit (ICU) doctors inform patients or relatives about the option of organ donation. The 2011 Amendment significantly expanded the Act's scope to include tissues, refined the legal and medical protocols around live donations, and introduced stringent punitive measures for illegal trade in organs and tissues. It also laid the foundation for creating national and regional organ transplant networks.

Building on these reforms, the National Organ and Tissue Transplant Organisation (NOTTO) was established in 2014 to serve as the apex body for organ and tissue coordination in India. Supporting bodies like Regional (ROTTOS) and State (SOTTOs) organizations and Tissue Banks were also institutionalized to streamline donor-recipient matching and storage. Advisory Committees at central, state, and regional levels were introduced to ensure regulatory compliance and promote awareness. However, while THOA offers a robust legal structure, implementation challenges persist due to administrative inefficiencies, inadequate infrastructure, and lack of public awareness. Successful state-led models highlight the Act's potential, though nationwide consistency remains elusive.

Although health in itself remains a primarily State Subject under the Constitution, THOA being a central legislation passed in the Parliament under Article 252, which allows for the Centre to lay down the legislative and institutional framework if two or more States passed a Resolution requiring as much, falls largely under Central jurisdiction. States monitor compliance of the regulations laid down by the Centre, and individual States have discretion to implement THOA to the best of their administrative ability. Accordingly, ROTTOS and then SOTTOs lead the administrative charges in States, working under the direction of the NOTTO.

3. Organ Donation in Public vs Private Healthcare in India

There is a tremendous skew in the availability and dispensation of organ donation and retrieval services between the public and private sectors in India. Almost three-quarters of organ transplantation services are carried out by the private sector in the country [15]. This figure varies from region to region as well, with over 90% of donations being handled by private hospitals in Mumbai in 2023 [16]. The public hospitals contributed only three donations that year in Mumbai!

ROTTTO North released data in 2024 marking Chandigarh as the leader in organ transplantation surgeries

in government hospitals of North India, with 320 surgeries performed at the Post Graduate Institute of Medical Education and Research (PGIMER) [17]. Uttar Pradesh comes in second on the list with 203 transplants, but North India on the whole clocked only 698 government-hospital transplants. In comparison to the 1,636 transplants in private hospitals, the numbers tally up to only 29% of the transplants being accounted for by public infrastructure. PGIMER and Uttar Pradesh remain outliers in a general landscape of organ transplantation dominated by the private sector. This skew remains, although public hospitals deal with most physical trauma and accident cases, where organ retrieval is more probable.

Table 1: Public vs Private Sector Transplants in Select States

State	Public Hospital Transplants (2024)	Private Hospital Transplants (2024)
Punjab	0	621
Rajasthan	104	580
Chandigarh	320	0

Source: Estimates from ROTTO North, 2024

Literature relevant to the subject shows that this skew exists in the case of living donations too [15][18]. 80% of all kidney transplants are carried out privately, while only 10-20% of kidney transplants are carried out employing public infrastructure. This is despite the significant difference in expenses related to transplants between private and public infrastructure.

Table 2: Cost Estimates of Select Transplants: Public vs Private

Procedure	Government Hospital Cost (INR)	Private Hospital Cost (INR)
Kidney Transplant	INR 2 – 5 lakh (avg. package) (Karnataka: INR 2 lakh for Below Poverty Line (BPL), up to INR 4 lakh elsewhere) (Government Hospital, Pune: up to INR 4 lakh)	INR. 10 -15 lakh (avg. package, can go up to INR 20 lakh in metros)
Liver Transplant	Tamil Nadu Govt: INR 8 lakh	INR 20 – 35 lakh (avg. package)

Source: [24]

Public organ donation services are often cheaper owing to the heavy rates of subsidization employed by the government for them. Tamil Nadu's state government provides free transplants in several cases and lifelong immunosuppressants [21]. PGIMER offers kidney transplants at INR 2-2.75 lakh, compared to INR 6 lakh in the private setup [17].

Reasons for the preference for private services over public infrastructure:

There is the all-important consideration of opportunity cost which comes into play when patients in need of organ or tissue transplants go the pricier private route over public options. There is a big divide in the wait times for availing access to required organs or tissues in government hospitals as opposed to the wait times in availing as much in the private setup. Wait times are compounded by parallel considerations of lost productivity and thus wages, savings, consumption, quality of life, and lesser contribution to society on a whole by the person owing to the longer wait times.

In 2023, Mumbai saw an average of 8 years of wait time for kidney transplants in public hospitals as opposed to less than four years in private hospitals [19]. Bureaucratic delays also affect wait times in public hospitals, as with AIIMS in Delhi [15].

Even on the infrastructure front, public infrastructure lags behind private counterparts. Only 16 of Delhi's more than forty public hospitals are authorized retrieval centres, and even the centres which are authorised to carry out transplantation services often come short on several other indices, as shown below.

Table 3: ICU Beds and Ventilators Availability: Public vs Private

Parameter	Public Hospitals (India, 2019)	Public Hospitals (India, 2019)
ICU Beds	35,699	59,262
Ventilators	17,850	29,631

Source: [2]

Staff shortages plague the public setup as well. Several public hospitals lack dedicated transplant surgeons [22]. On the other hand, private hospitals maintain doctors, nurses, and other healthcare professionals on rotation throughout the day and night. The difference is crucial in determining what goes into deciding whether to opt for public transplantation services or private ones: the opportunity cost calculations come into play. The table below compares some of the above parameters with other countries, where data as available for latest years has been used. Data from blogs and less reliable sources have been marked in asterisks (*).

Table 4: International Comparison of Organ Transplants

Country	Deceased Donors pmp	Total Organ Transplants pmp	Public vs Private Sector Transplantation
United States	36.88 (2021)	26	Data not specified
United Kingdom	24.88 (2021)	67	Predominantly public (NHS)
Brazil	18.10 (2021)	47	Data not specified
China	0.6 (2021)	<4 (2023)	Data not specified
India	0.52 (2019)	0.52 (2024)	Predominantly public (80%)

Sources: Wikipedia, NHS (for UK), NOTTO (for India), official sites for other countries where available

4. Costs of Organ Failure: a representative Indian household

In India cost of organ failure is not the cost for organ transplant alone. Organ transplant cost is well documented as above but in India the costs are much higher as in addition to long lead times leading to an organ transplant the entire family is impacted as a care giver or as a primary family income earner. The actual cost of organ failure for a household is not documented. This paper tries to quantify the same to show how organ failure can lead to high costs for a household.

The opportunity cost angle is interesting to note for there is little to no literature, or for that matter, recognition of these associated costs. The methodology used in estimating the costs associated with organ transplantation is simple: a representative Indian household is taken to deal with the expected values of costs, treatment periods, and utilities associated with one of the most common diseases requiring organ transplants: chronic kidney disease. Facts and figures have been borrowed from official sources where necessary, but most of the estimates have been borrowed from a seminal paper by Kumar et. al (2021)

[25]. One case of the representative Indian is highlighted: the rural household, in the face of two different, likely scenarios: the first where the household manages to secure a transplant after medication during the waiting period, and another where the household cannot secure a transplant and the afflicted individual remains on medication until death. Representative averages have been used where data from official sources have been unavailable.

4.1 Scenario 1: The rural household secures a transplant as per predicted possibilities

Authors Kumar et. al in their study with over 4,000 clinical respondents find rural males to be the most dominant class of respondents at almost 44% of the sample strength. Based on this, a few assumptions are in order before estimating the costs of organ transplantation faced by the representative rural household. The following assumptions are made in order to estimate the income of the rural household.

- The Sample Registration System (SRS) Abridged Life Tables for 2016–2020, published by the Office of the Registrar General & Census Commissioner, Government of India, puts the life expectancy at birth of rural males at 67.7 years, as of 2020 [26].
- The average age of respondents afflicted by chronic kidney disease (CKD) in the seminal survey was pegged at 50.9 (+/- 11.9) years, which, after normalizing for rural households, reflects a life expectancy of 15.5 years on average.
- Considering that, according to periodic labour force survey (PLFS) reports, only about 10-20% of rural households are engaged in formal employment, where the age of 60 or 65 is considered the retirement age, it may be expected that the representative rural household in the study who is aged around 51 will likely work until death.
- The rural household earns from a variety of sources owing to his primarily informal nature of employment, from farm and non-farm sources, as well as casual labour elsewhere. The average wage earned by the rural household is pegged by the authors at the median annual household income of \$1,680, amounting to about INR 129,136 per year.
- 78% of Indian adults attained banking services in 2021 [27]. If the rural household had access to a bank, interest income until death might also be considered.
- The average inflation for the 2020-21 period may be considered to be 5% (CPI). The average rate of interest may thus be assumed to be 6% to beat said inflation and record real interest rate of 1%.
- The inflation rate may also be assumed to be consistent throughout the lifetime of the household.
- The Pradhan Mantri Kisan Samman Nidhi (PMK) scheme provides about INR 6,000 per year to farmers, with specific states adding onto these schemes with schemes of their own. For simplicity, the rural Indian household is assumed to receive INR 6,000 per year on average in the form of cash transfers from multiple sources, with the PMK scheme forming the lion's share of the measurement for the same.
- Historical trends assume a 0.82 marginal propensity to consume (MPC) for Indian rural households in the long-run, consistent with Keynesian economic theory [28].
- The consistent historical trend as observed by popular literature suggests nominal wage growth to be around 5%. This is a broad approximation and may not necessarily apply to the rural household in this case, but in the spirit of rational expectations a 5% YoY nominal wage growth is expected to be earned, in the face of consistent gross domestic product (GDP) growth of at least 6% and in spite of seasonal fluctuation in agricultural outcomes.

Thus, we may have an income function $Y(w, R, T)$ for the rural male, where w is the wage variable relating to the median household income, R relates to interest income earned, and T relates to direct cash transfers from the government. Accordingly, we may have

$$Y_{t+1} = (w_t + w_t * w_g) + P(R) * (MPS * w_t) * R + T_t \quad (1)$$

Here, Y_{t+1} is the income of the rural household in the next period with respect to current period variables. w_g is the nominal wage rate growth, given by 0.05. Marginal propensity to save (MPS) and is given by $1 - MPC$, and so $MPS = 0.18$. $P(R)$ is the probability that the rural household has access to a bank, given by 0.78. R takes the value 0.01, representing nominal interest rate discounted by inflation.

For the representative rural household working until death, contracting CKD at the median age of 50.9 would leave the household afflicted for 16.8 years on average. For 16.8 years, we have

$$\Sigma Y_{t+1} = (w_t + w_t * w_g) + P(R) * (MPS * w_t) * R + T_t \quad \text{for } t = 16.8$$

The final compounded income potentially earned by the household over 16.8 years, from the contraction of CKD to death, comes to around INR 36,10,548, if CKD is not contracted by the household.

Now we consider the introduction of costs into the model. There is the obvious opportunity cost of potential income lost in pursuing medication or cure, in addition to loss of savings and other out of pocket expenditure (OOPE) for said medication. Alternatively, there is the cost of transplantation to be considered. All variables have associated probability distributions. We have the underlying presumptions, as for income figures, to estimate costs.

- Recent figures suggest about 200,000 people in India have CKD progressed to a stage that they need kidney transplants, but only about 9,000 transplants actually take place [1]. That translates to about 4.5%: the key assumption to be made for our model is that those without transplants, about 95.5% of those who need it, get by on medication until death.
- About 63% of India resides in rural regions, according to World Bank data. Furthering our simplistic assumptions, we can assume that of the 200,000 in need of kidney transplants in India, about 1,26,000 are from rural households.
- Assuming dialysis to be the most common treatment for CKD, the primary form of medication is assumed to be only the dialysis cost: miscellaneous expenses of medicines, transport to and from the dialysis centre, and other costs may be aggregated to a ballpark figure of 10% of dialysis costs themselves: this is a strict approximation and not based off of data. Thus, this figure is not included in the model and may only be included with such precaution.
- Accordingly, for a household requiring two dialysis treatments a week - the minimum - the eight sessions for the month may range between INR 8,000 and INR 30,000. For the rural household, however, it is likely that assuming the nearest district hospital is the only source of dialysis is a fair assumption: private players have little incentive to set up shop in rural areas, and public outreach is restricted only to the district level. Accordingly, the prices of dialyses might be biased toward the lower end, and an average of INR 8,000 is a fair assumption for the rural household. The figure is assumed to be inflation-proof owing to government pressures for the test period of the rural household.
- The household does not earn during the treatment. Interest income is also normalized to zero arising from zero incomes; all expenses are borne out of savings, and interest incomes earned from previous savings are negligible in the face of the expenditure. This endowment assumption is possibly one of the most realistic ones in the model.
- In the authors' paper, about 32% of the sample had medical insurance. This figure is considerably higher than actual figures reported in literature [30], which suggest only about 14% of rural households

having any kind of medical insurance at all; this is the figure to be used in the model for our ideal of realism.

- In 2020, the average medical insurance policy covered up to about INR 5,00,000 [31]. The figure is also consistent with Ayushman Bharat allocations for the period. It is assumed that expenses beyond this amount are borne out of pocket by the household. Additionally, it is assumed that the insurance is provided entirely by the government as a welfare provision and no insurance premium is paid by the household to avail it.
- The minimum cost of a kidney transplant is assumed to be INR 2,00,000 (for BPL households in select states) to INR 5,00,000 [32].
- There is tremendous variation in wait times across the country: from a few months in a few public hospitals to several years at other public hospitals. The average of 4 years is taken as the wait time for a kidney transplant from a deceased donor in India [33]. The figure is consistent with how corruption and bureaucratic delays affect wait times.

Accordingly, we have the cost function as

$$C = Tr + W * (d + Y) - P(I) * I \quad (2)$$

C is the entire cost incurred by the rural household due to contracting CKD and living with it. The equation captures the expected economic cost encountered by the household provided it secures a transplant, accounting for lost income and cost of dialysis - the prescribed medication - for the duration of the wait-time, and the cost of the transplant itself. d is the cost of annual dialyses, at about INR 8,000 * 12 = INR 96,000. Tr is the cost of the transplant itself, assumed to be INR 3,50,000 for simplicity, and W is the number of wait-time years, or time spent in waiting for the transplant, taken to be equal to 4 - simplistic, realistic average as sustained by relevant literature. The figure is considerably lower for if there is a compatible living donor. Y is the income of the household from (1) before, and accounts for the income lost while in treatment or waiting for a transplant.

P(I) is the probability that the household has medical insurance, given by 0.141, and I is the amount of the insurance itself, taken to be INR 5,00,000.

Accordingly, (2) yields a total expected economic cost borne by the rural household of around INR 15,23,148. The sum includes accounting costs, opportunity costs lost in potential incomes from (1), as well as probable insurance coverage.

While separate figures for rural patients contracting CKD or requiring kidney transplants is not available, we can further draw a conclusion regarding the national expected economic cost of CKD and kidney transplants. For this we have assumed only rural household costs as urban household costs will be significantly higher for the entirety of the population impacted by CKD. Accordingly, the expected economic cost of CKD leading up to the requirement of kidney transplants runs into INR 30,463 crore, or about \$3.58 billion for the country, for the entirety of the model.

Averaging into annual figures, the rural household spending on medication during wait time and eventually securing a transplant, inclusive of insurance, bears an economic cost of INR 3,80,787 per year, amounting to INR 7,615.75 crore (\$896 million) economic cost borne by the country annually.

4.2 Scenario 2: The rural household does not secure a transplant

In spite of the calculations in the preceding section accounting for a scenario where the household does get a transplant after a wait-time of about four years on average, in which period the household incurs medication (dialysis) costs. Here, we estimate the same model but for if the household does not get a

transplant, which the relevant literature suggests to be highly probable in most rural households as 95.5% don't get a transplant in India.

Accordingly, the cost function takes the shape of (3), where the remaining lifespan (16.8 years on average) is spent on dialysis treatments. Additionally, the afflicted individual is unable to earn while diagnosed with CKD and undergoing medication, and loses potential income for each disease-affected year.

$$C = 16.8 * (d + Y) - P(I) * I \quad (3)$$

Accordingly, the household incurs costs equal to about INR 1.84 crore, significantly higher than if the household had been able to secure a transplant, for which the figure was about INR 15 lakh. The national economic cost runs into INR 3,68,000 crore (\$43.29 billion) or about INR 21,904 crore (\$2.58 billion) annually.

4.3 Comparative analysis: transplantation versus medication

To summarize the above, it costs approximately INR 15 lacs for a household to undergo a transplant whilst living with organ failure and not undergoing a transplant increases the costs 12 times to INR 1.84 crores. The models discussed in both scenarios above describe simplistic ideals using aggregated data and averages of expectations. One such simplifying assumption was the use of dialysis costs as the only form of medication for a person awaiting or unable to get a transplant. Additional costs otherwise significant to a household, especially the representative rural Indian household, like transport costs, other medicines, relapse costs, doctor consultation fees, and associated costs have all been ignored, assuming dialysis takes up the lion's share of costs and thus may be approximated to be equal to total medication cost in such an aggregative study.

However, just the cost of dialysis in itself accounts for an over-12-times increase in costs faced by the household compared to if it had been able to procure a transplant. It might be mindful to note that our experiment involves kidneys, one of the relatively "cheaper" organs to procure and transplant.

It is thus without a shadow of doubt that it can be said that, from a policy perspective, it would be much more efficient to ensure policies and infrastructure that helps easy retrieval, delivery, and transplantation of organs as opposed to pushing afflicted individuals toward medication.

5. The fallout of Economic Costs: India's Black Market for Organs

The economic costs associated with medication as shown above are so high that individuals and households are often pushed to the brink in a bid to survive an organ failure. The demand far outweighs the supply, and the gap is often met by unscrupulous acts of organ harvesting, harboring a human trafficking crisis in the world's most populous country. As such, the underground economy of organ donation in the nation requires separate attention.

The black market for organ donation in India represents a harrowing intersection of poverty, medical exploitation, and systemic corruption, operating as a multi-thousand-crore-rupee industry that preys on the country's most vulnerable populations. With over 200,000 Indians requiring kidney transplants annually and fewer than 10,000 legal procedures conducted, the demand-supply gap fuels a thriving underground trade. This illicit network, often shielded by complicit medical professionals and bureaucratic loopholes, has been exposed through high-profile scandals that reveal its global reach and human cost.

In Punjab's 2003 kidney racket, Kakkar Hospital orchestrated one of India's largest organs trafficking operations, exploiting migrant laborers from Uttar Pradesh and Bihar. Donors were paid a mere INR 25,000–50,000 (approximately \$324–648) per kidney, while recipients - largely affluent Indians and foreigners - were charged up to INR 10 lakh (\$12,950), with doctors and middlemen pocketing INR 150

crore (\$19.4 million) over five years. The scandal implicated Dr. Parveen Kumar Sareen, a transplant surgeon, and Dr. O.P. Mahajan, chairman of the state's Authorization Committee tasked with preventing commercial transplants, revealing how regulatory bodies were weaponized to certify fake "love and affection" donor-recipient relationships. Postoperative neglect led to multiple donor deaths, with police uncovering 1,522 illegal transplants at Kakkar Hospital alone, though most records featured fabricated addresses to evade scrutiny [34].

A decade later, the 2008 Gurgaon scandal exposed an even more sophisticated international operation. Spearheaded by Dr. Amit Kumar, this racket performed approximately 600 illegal kidney transplants over a decade, targeting impoverished laborers lured with fake job offers. Victims were drugged, coerced into surgery, and left with minimal aftercare, while foreign clients from the U.S., U.K., and Greece paid up to \$37,500 per transplant. Kumar's network extended across 10 laboratories and two hospitals in Delhi's satellite cities, with bribes ensuring his repeated release after prior arrests in Andhra Pradesh and Maharashtra. The case underscored India's role as a hub for "transplant tourism," where global demand converges with local desperation [35].

Cross-border trafficking further complicates the crisis. A 2024 investigation revealed Myanmar nationals, impoverished by post-coup economic collapse, being recruited via Facebook groups and smuggled into India under tourist visas for kidney removal. Similarly, Nepali citizens are trafficked through open borders with promises of employment, only to wake up in Delhi hospitals missing organs. These victims, often unaware of the surgeries until afterward, receive paltry compensation-typically 10% of the INR 30–40 lakh (\$36,000–48,000) charged to recipients-before being abandoned. In Jaipur's 2023 scandal, police thwarted 184 such transplants by infiltrating a network that forged Aadhaar cards, family trees, and even photoshopped images to fabricate donor-recipient relationships. The bust exposed collusion among hospitals, agents, and bureaucrats, with traffickers netting INR 30–40 lakh (\$36,000–48,000) per procedure while donors received INR 3–4 lakh (\$3,600–4,800). Private hospitals frequently serve as nexuses for these crimes.

Mohali's 2024 Indus Hospital scandal involved DNA report tampering to match donors with unrelated recipients, charging INR 25 lakh (\$30,000) per transplant while paying donors INR 5 lakh (\$6,000). The hospital's transplant coordinator and managing director faced arrest, though similar institutions nationwide continue to flout the THOA with impunity [36].

Victims, predominantly daily wage earners and slum dwellers, endure lasting consequences: 79% of trafficked donors in Tamil Nadu reported worsened financial stability post-surgery due to health complications, while 91% of those interviewed in a 2012 study described irreversible psychological trauma.

Efforts to curb this trade remain hamstrung by corruption and infrastructural gaps. Authorization Committees, designed to vet transplants, often rubber-stamp fraudulent cases, as seen in Punjab where the committee chairman himself was arrested. Meanwhile, India's deceased donation rate stagnates at 0.8 per million population-among the world's lowest-due to cultural myths and inadequate ICU facilities.

While NOTTO aims to streamline registries, its reach is limited, allowing the black market to persist as a \$1.62 billion (INR 13,800 crore) industry. Legal reforms, including stricter penalties under the THOA Amendments, have done little to deter traffickers, who exploit judicial delays to secure bail and resume operations.

This crisis demands a multi-pronged approach: expanding deceased donation programs, digitizing donor-recipient matching to prevent document fraud, and enforcing mandatory audits of transplant centers.

Public awareness campaigns, particularly in rural areas, could reduce reliance on traffickers, while international collaboration is crucial to dismantle cross-border networks. Until systemic poverty and healthcare inequities are addressed, India's organ trade will remain a grim testament to the commodification of human desperation.

6. The Ethics of Organ Donation in India: a cultural standpoint

Organ transplantation in India is a vital but ethically challenging aspect of healthcare. As more people suffer from organ failure and the number of patients waiting for transplants rises, the country continues to struggle with issues of fairness, consent, exploitation, and cultural sensitivities. Despite having a legal framework in place, organ donation in India is often influenced by social, economic, and religious factors that complicate the process. The ethical challenges are not just about laws and policies, they also touch on human emotions, beliefs, and the real-life dilemmas faced by families and doctors.

India's main law governing organ donation is the Transplantation of Human Organs and Tissues Act (THOA), introduced in 1994 and later amended. The law allows for both living and deceased organ donation, if proper consent is given. But in practice, getting that consent isn't always straightforward. In most deceased donations, it's the family who makes the decision. Often, they're dealing with the shock of sudden loss and may not fully understand the concept of brain death. This can lead to emotionally charged decisions, sometimes under pressure. This process of getting heirs approval reduces the transplant rate significantly.

One real-life example comes from Tamil Nadu in 2017. A young woman was declared brain dead after a car accident. Her family initially refused to donate her organs. However, after speaking with trained counselors who explained the situation and the potential to save lives, the family agreed. Her organs went on to help several people. This case shows how sensitive and emotional the decision-making process can be. While it ended positively, it also raises questions about how families are approached during such vulnerable times and whether their decisions are truly free from pressure.

Exploitation is another major concern in India's organ donation landscape. While the sale of organs is illegal, the country has seen multiple cases where poor people are manipulated or forced into selling their organs. A well-known case occurred in 2008 in Gurgaon, where a massive illegal kidney trading ring was uncovered. Poor laborers were promised jobs, kidnapped, or tricked into undergoing surgery, only to wake up missing a kidney. These kinds of incidents highlight how poverty and desperation can be exploited, turning organ donation into a black-market business. Even when someone agrees to donate an organ, if their decision is driven by financial need, we must question whether that decision is truly voluntary.

The ethical dilemma deepens when we consider the gap between rich and poor patients. In theory, organ distribution should be based on medical need and fairness. In reality, people with money and connections often have better access to organs, as some of the relevant literature discussed already mentions. In fact, the wait-time of four years on average for kidney transplants - as used in the empirical estimation above - might have been significantly lower if we were to assume similar socioeconomic conditions of all patients requiring transplants, or at the very least if an absence of corruption was assumed. At any rate, such corruption may extend to practices which are not strictly illegal as well, where coercion by more politically connected or wealthy patients helps them move up the list of those awaiting transplants.

Echoing a similar scenario is a 2016 case, where a liver transplant case in Delhi sparked outrage when a wealthy businessman received a liver even though others with greater medical need were still waiting.

Though everything was legally above board, the incident raised serious concerns about how decisions are made and whether the system treats everyone equally.

Cultural and religious beliefs add another layer of complexity. India is home to a wide variety of religious communities, each with their own beliefs about the body, life, and death. Some Hindus believe in the idea of preserving the body for the soul's journey, while others see donation as an act of selfless charity. Similarly, interpretations vary within Muslim and Christian communities. Religious leaders have, in many cases, encouraged organ donation, but fears and misconceptions still persist. In a morally disquieting case from Karnataka in 2014, a family refused to donate the organs of their young son who was declared brain dead. They believed that donating his organs would disturb his soul's peace. Despite explanations from doctors, they stuck to their beliefs. While it's easy to wish they had chosen to donate, it might also be necessary to respect their deeply held convictions. This case shows how organ donation isn't just a medical issue—it's also tied to personal and spiritual values.

There's also a lot of confusion around brain death in India. Many people don't fully understand what it means. Some think it's the same as being in a coma and hold on to hope for recovery. This misunderstanding can lead families to reject organ donation, believing their loved one might yet wake up. For doctors, this creates an ethical and emotional conflict. They have to explain the irreversible nature of brain death while being sensitive to the family's grief and hope.

To improve the situation, many hospitals now have transplant coordinators who are trained to speak with families compassionately and clearly. Public awareness campaigns have also helped people understand brain death and the importance of organ donation. But building trust in the system is a long-term effort. People need to know that their loved one's organs will be used fairly and ethically, and that no one is taking advantage of them during a painful time. Additionally, the transplant coordinators, although sanctioned by NOTTO and THOA, are often missing at key SOTTOs and ROTTOs, as discussed previously.

7. Conclusion

Organ failure rates are increasing at an alarming rate in India. The cost of organ transplants is 12 times cheaper than living on medication only and not undergoing a transplant.

Ultimately, the ethics of organ donation in India are not just about rules and regulations. They're about fairness, compassion, and respect. Laws like THOA are essential, but they need to be supported by a healthcare system that treats all patients equally, protects vulnerable donors, and honors the wishes of families and individuals. Organ donation should be an act of generosity and humanity, not something shaped by wealth, pressure, or fear.

Organ donation should be taught formally in schools and college curriculums so that children are aware of the positives of organ donation. Capturing the imagination of children at a young age will help the coordinators in future as organ donation becomes more mainstream in the country.

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