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A Microeconomic Analysis of the Market for Egg Donation – With Extension to the Indian Context

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Abstract: This paper discusses the interesting and under-explored subject of egg donation in India, the characteristics of the market thereof, the actions of the participants, and the possible role of the government. Legal, ethical, and sociological issues are touched upon, as they directly affect the functioning of the market. It includes information to better understand the biological phenomenon of female infertility and its incidence in India.

1. Introduction

The decision to become a parent and experience parenthood has been subject to a fair bit of economic analysis and modelling over the last few decades. Becker and Lewis (1973) have explored the subject of fertility choice, taking into consideration such factors as the level of education and income of parents (specifically that of the mother), the income elasticity of demand for children and the tradeoff between the quantity and quality of offspring. An extensive literature on child labour has reinforced fertility choice as based upon the role of children as supplementary bread earners for the family, especially for families living in abject poverty in developing countries.

Fertility choice and the decision to enter parenthood are broad domains, in which there is much scope for further study - both in a microeconomic sense to understand the quality of life for a family, and in a macroeconomic sense to study population growth and demographic composition. However, the issue of dealing with male or female fertility itself, or the availability thereof, is open to deeper probing, especially from an economic standpoint.

The concept of demand for children should give rise to the concept of a market for fertility, which is the ability to sire or give birth to children, and therefore also incorporate the concept of the supply side. The broad spectrum of health economics looks at all the aspects of healthcare through the lens of economic models, theory, and empirical techniques.

Being a highly specialized field, it is well equipped to understand crucial health care related issues in the market for fertility, including but not limited to the solutions for infertility. Both for medical and sociological reasons, the discussion surrounding female fertility has been complex.

It is important to examine the current medical issues faced by women regarding their fertility, namely the causes discovered so far and existing solutions.

2. Female Infertility: What it is, what are the causes and what are their corresponding solutions?

Female infertility is, very simply, the inability of a biological female to do one or more of the following - conceive a child, maintain a pregnancy, and carry the pregnancy to a live birth. For women who prefer to be mothers, infertility proves to be an obstacle that they wish to overcome.

WHO (1991) defines infertility as the failure to conceive despite two years of cohabitation and exposure to pregnancy. If the couple has never conceived despite cohabitation and exposure to pregnancy (not contracepting) for a period of two years, it is called primary infertility.

If a couple fails to conceive following a previous pregnancy, despite cohabitation and exposure to pregnancy (in the absence of contraception, breastfeeding or postpartum amenorrhea) for a period of two years, it is called secondary infertility.

The lack of uniform definitions has characterized the study of infertility, for medical studies usually refer to the inability to become pregnant whereas sociological studies refer to the childlessness of women who are married and cohabiting with husbands and not using protection.
It is important to understand the causes of female infertility, because different causes are solved by different solutions (if at all a solution is viable), and impact the quality of life for each affected woman differently.

There are generally two broad sources of female infertility, namely physiological malfunction and factors that are avoidable to a certain extent, such as the decision to postpone motherhood to an advanced age, drug abuse, stressful and hectic lifestyles, undergoing a surgery, or sexually transmitted diseases. There are of course cases where doctors are unable to explain the cause of infertility.
It is important to understand that often the symptoms leave a blurred line between avoidable and unavoidable causes, for example certain defects within the female body may occur naturally but also as the result of a traumatic surgery she underwent. The following are possible causes of female infertility. [1]

- **Tubal diseases:** This refers to blockages in the fallopian tubes that prevent safe passage of sperm to the eggs. Pelvic inflammatory disease, endometriosis, hydrosalpinges and tubal ligations are examples of tubal anomalies. These may be naturally occurring, or resulting from birth control procedures and sexually transmitted diseases. The symptoms are highly painful and may result in accumulation of blood and poisonous fluids.
- **Pelvic adhesions:** This refers to abrasion of the peritoneum (the lubricated tissue covering organs) due to surgical procedures or natural causes, thus affecting ovulation as well as tubal passages. They may result in tumorous growths known as fibroids and polyps.
- **Ovulatory dysfunction:** Very simply, this refers to anomalies in a woman's menstrual cycle, with regards to duration, regularity, excruciating pain, and abnormal discharges. There may be premature ovarian failure (also known as early menopause), resulting from certain autoimmune diseases or exposure to certain chemicals. There is the polycystic ovarian syndrome, a common condition where eggs do not mature properly because of hormonal imbalances.

Hyperprolactinemia is a condition whereby overproduction of the prolactin hormone leads to irregularity in menstrual cycles, and can even occur as a reaction to prescribed drugs. Lastly, hypothalmic amenorrhea is a condition which leads to diminished production of the follicle stimulating hormones and luteinizing hormones, affecting egg maturation.

- **Age:** This is perhaps the most crucial factor affecting a woman's fertility by directly affecting the reproductive quality of her eggs. The steady and periodic depletion of a woman's reserve of eggs reduces greatly her chances of conceiving after unprotected sexual intercourse, and infertility increases with her age. Not all eggs mature, and some along with age develop hard shells that prevent sperm from entering them. When the reserve of healthy eggs is depleted, a woman is said to have reached menopause.

Having understood the variety of causes of female infertility, we move on to the more relevant aspect, namely the existing solutions to this infertility. Solutions too vary in their applicability, cost and consequences or side effects. Our primary focus is egg donation; however, it is imperative to know the alternatives as well, especially since some of these even act as substitutes to egg donation.

• **Medication:** Certain prescribed medications help control and alleviate the causes of infertility. These include medications for ovulation induction (OI) to regularize a menstrual cycle or stimulate the development of eggs, and antibiotics to treat sexually transmitted diseases and soothe pelvic inflammations.

Medication is also used to help alleviate endometriosis by shrinking the tissue blocking the organs or temporarily shrink fibroids and polyps till a surgical procedure with more long-lasting effects is carried out.

Infertility patients may have clomiphene citrate to stimulate follicles and eggs, and supplement with other fertility drugs such as human chorionic gonadotropin (HCG) and human menopausal gonadotropin (HMG).

• **Surgery:** Laparoscopy is used to clean scar tissue, treat endometriosis, remove ovarian cysts and other pelvic adhesions, and repair the damage from other infections. Hysteroscopy is used to remove fibroids and polyps that are large enough to pose a threat, and clear blocked passages.

• **In vitro fertilization (IVF):** This is one of the most widely used and well-known solutions to infertility. The patient consumes drugs such as gonadotropins to stimulate egg production and maturation.

Mature eggs are retrieved using a vaginal ultrasound probe, and then fertilized in a dish. Several days later, the fertilized eggs or embryos are transferred back inside the patient's uterus using an intrauterine insemination catheter.

As per Society for Assisted Reproductive Technology and the federal Centers for Disease Control in the US, IVF along with egg donation may be the only viable solutions for age related infertility.

In cases of tubal diseases where blockages are too severe to be removed or repaired, or in the case of severe pelvic adhesions that cannot be removed via surgery, IVF is resorted to. Many medical experts are also of the opinion that IVF is the best option for women suffering from ovulatory disorders.

• Intracytoplasmic sperm injection (ICSI), a laboratory-based procedure, is used with IVF if the eggs have a hard shell and/or sperm problems are a factor. ICSI involves injecting a single sperm directly into the egg's core.

When IVF is an option and certain genetic abnormalities are suspected, preimplantation genetic diagnosis (PGD) – examination of a single cell from a developing embryo – can help identify affected embryos so they are not transferred.

• **Egg Donation:** This is the primary focus of the paper. The procedure is the same as IVF, except that the egg is retrieved from the donor and then inserted into the uterus of the recipient after fertilization. If a woman has a healthy uterus but ovarian disorders, she may opt to be an egg recipient.

For age related infertility, especially when a woman's eggs are depleted and the remaining eggs, if any, are of a poor quality, egg donation is sometimes the best and only option available. Similarly, in cases of premature ovarian failure, egg donation is sometimes the only resort.

• **Surrogacy:** This is arguably the most controversial of all solutions and does not even qualify as a medical remedy, since it entails a third party to carry the child on behalf of the infertile woman.

Henceforth, I shall be referring to infertile women who constitute the demand for eggs as egg seekers, and women whose demand is realized (that is, they actually undergo the required surgical procedure) as egg recipients. Fertile women who constitute the supply for eggs will be referred to as egg donors, even though the term donor is a misnomer, as no rational woman would undergo the invasive and hazardous process of egg extraction without compensation.

3. Female Infertility: What is the picture we see in India today?

It is estimated that globally 60-80 million couples suffer from infertility every year, of which probably between 15-20 million (25%) are in India alone. As per the study published at the end of the 2012 by WHO, one in every four couples in developing countries had been found to be affected by infertility. [2]

The following is the picture which emerges from bivariate and multivariate analyses done on the data from National Family Health Survey-2 (1998-1999) and National Family Health Survey-3 (2005-2006).

The overall rate of female infertility has decreased by 7.7% between the time periods of these two surveys. However, it has increased from 1.68% to 2.35% among women whose age at first marriage was less than 18 years as compared to those whose age at first marriage is above 18 years.

Infertility rate is higher among women living in urban areas as opposed to those residing in rural areas.

Hindus, Jains, Sikhs, Parsis, and Jews display a higher rate of infertility, whereas Christian and Muslim women display a higher rate of fertility.

Working women suffer from higher infertility than homemakers, and as per the latter survey, the infertility rates are 2.02% and 1.74% respectively. [3]

Special mention must be made of women belonging to tribal classes and scheduled castes, for even among all women living below the poverty line, these women particularly suffer from problems of physical health and development and overall nutrition – a direct consequence of discrimination and exploitation.

There are over 420 tribal groups in India, and even though the following study was done in 2005 for the Khairwar tribe in Madhya Pradesh, the results will not vary vastly for other tribes who are also subject to social and economic inequalities.

The average age of marriage for Khairwar women is 16.3 years and the proportion of infertile women in the sample surveyed was 17%. Tribal communities are even more vulnerable because they are isolated from mainstream resources such as safe and affordable maternity healthcare. [4]

4. Literature Review: Egg Donation

Egg donation is a niche area, with the interesting feature that though it is accepted and practiced in many countries over the world, academic literature in this regard is scarce, and economic analysis is rare. We shall be laying out not only the salient features of academic papers and the findings in publications, but will also be updating ourselves based on news reports and articles relating to egg donation and policies affecting the same. A modern and relevant perspective is required. Academic literature on egg donation is scarce because of the ambiguity in the attitudes of many countries towards this method; however, the available literature has valuable insights to offer.

Expensive Eggs: A Study of Pricing and Purchasing in the Egg Donor Market [5] touches upon many aspects of the American egg donation market that one would expect to find, and adds some more interesting findings. This paper focuses on the demand side, that is, egg seekers.

The number of IVF procedures using donor eggs multiplies by approximately 20% every year, so the author first surveyed a sample of over 350 participants and requested them to choose what they would consider to be the most attractive donor attributes.

The purpose of the exercise was to gain a better understanding of what drives the willingness to pay of egg seekers. Factors and attributes listed were race, religion, highest level of education attained and profession, among others. Through logit analysis, the following are her findings.

Depending on the attributes that are considered most attractive and hence demanded more often in a donor profile, the pricing of eggs is decided. The premium that a donor receives for her eggs above the state average is influenced by a few variables. The following are observed from what the participants reported.

Variables that are seen as directly affecting the quality of the off spring are history as a donor, educational background, age, and the body mass index. Successfully producing a child from a previous donation directly increases the probability of a woman's next donation being successful, and thus makes her eggs more valuable.

Women enjoy different levels of premium depending on their levels of education, with donors holding post graduate degrees enjoying a marginally higher premium. This is of course not surprising and reflects the belief that intelligence and the determination to work hard are carried forth by one's genes.

It is a well-established fact that a woman's fertility usually declines with age, and hence women at the prime of their fertility enjoy a premium. The appropriate ratio of height to weight determines whether the donor is within medically accepted boundaries of a body mass index, and hence determines the premium she may receive.

Quality match variables were religion, race, complexion, hair colour and eye colour. These refer to seeker preferences rather than being a direct indication of the actual quality of the offspring. People displayed an obvious preference for Caucasian and Asian races, and surmising that people generally tend to prefer children of their own race, it could indicate that American egg seekers are largely Caucasian and Asian.

An evolutionary psychologist has in fact pointed that blue eyes and fair skin were once associated with higher fertility, and hence this shows up in the demand for blue eyes and fair skin.

Jewish and Mormon donors received a premium, because the Jewish community is usually financially successful and well educated, and people perceive their genes to carry the same intelligence, while Mormons generally lead a healthy lifestyle and hence it is believed that their children are likely to be healthier.

The paper has specified family history of illness, lifestyle (consumption of drugs, tobacco and alcohol), and problems with the law to be control variables and has excluded them from the analysis. However, the major finding is that the demand for eggs is highly price inelastic, and egg seekers in general very unwilling to compromise on absolute quality, even if the eggs of a woman in her mid-30s are priced much lower than that of a woman in her early 20s who is likely to be far more fertile. This is not surprising, as the quality of a child is usually non-negotiable and a necessity, rather than a luxury.

Transforming 'Waste' into 'Resource': From Women's Eggs to Economics for Women [6], makes poignant sociological observations about the commodification of women's bodies, thus bringing in the question of ethics alongside an economic analysis. The paper takes a supplier side focus and elucidates on ethical issues such as the interests and welfare of the donors, how they may be cheated and intervention to find alternatives to their exploitation. It also focuses on aspects such as donor awareness and consent, in other words, the implications of compensation and imperfect information on their choices.

Reproductive technologies are not the sole focus of the paper, and it brings to light the usage of eggs for stem cell research and technologies designed to treat diseases. Embryonic cells regenerating into other cell types is a possibility that scientists and doctors have toyed with, and have led them to extract eggs not solely for reproductive purposes but also for regenerative purposes.

There is a shortage of eggs in the UK, because of which a lot of British women sought eggs from Eastern European donors, for example a prominent clinic in Bucharest had over 300 registered donors willing to donate to childless women in the UK and US.

The implications of racism and racial history on one's health is that according to the statistics, women of colour are more likely to suffer from infertility but are often required to settle for the eggs of Caucasian women. ?

With regards to compensation, there arises a debate on whether women should be given remuneration for their eggs over and above their expenses being covered (expenses being the medical costs of drugs and equipment associated with the procedure) or whether they should only receive compensation for the medical expenses. The former is referred to as coercion and commodification of eggs, the latter is simply exploitation, as after all, the egg extraction process is highly invasive.

The issue of informed consent on the part of the donors is highly controversial, and not as simple as informing a woman about the risks involved in the egg extraction process and then leaving the decision to her. The pharmaceutical industry has never carried out, nor been required by any government regulators to carry out, any studies into the short- and long-term health effects of taking the various hormonal drugs involved in egg retrieval.

Thereof arises the question over how an informed consent is given, since the doctors themselves are not always clearly aware of what may happen. Given how valuable healthy eggs are for reproductive or regenerative purposes, even if a woman gives her consent to be a donor, it is the prerogative of doctors to be honest despite the temptation to overstimulate her ovaries and obtain more eggs than she consented to provide.

Scientists have been mulling alternative sources of eggs other than willing adult donors, to find solutions that do not involve exposing women to strong drugs and invasive procedures. These solutions range from genetically engineering female foetuses to be born with the maximum number of eggs a woman is usually endowed with, to taking the ovaries of aborted female foetuses and attempting to mature their eggs in laboratories.

These are fairly uncharted territories but if research in these areas proves viable, it would have implications on the existing donor pool as a whole.

The paper concludes with policy prescriptions regarding patents for embryonic transplant research-related work and procedures and their implications for poor diseased patients in dire need of treatment. There is not really a mention of reproductive technologies in this case; however, a case for patents in similar work relating to less traumatic egg retrieval procedures is worth discussing.

Looking at events and news relevant to egg donation, we can place a finger on the pulse of this market. Fertility Economics: Egg Donor Boom, Stimulative Contraception, an article on the news website Business Insider, Australia, dated January 2009, states that the number of willing Australian egg donors applying to the Northeast Assisted Fertility Group has doubled. However, the surge in supply may not necessarily have been met with a surge in demand, as people were showing a tendency to postpone the decision to have children, and hence prices would most likely decline, ceteris paribus.

Japan seen lagging in creating egg donation system for infertile women, says the Japan Times on 26th March 2017, describing how the country struggles with the ambiguity in the regulations pertaining to donor-offspring relationships, despite a non-profit organization acting as a medium between willing donors and egg seekers.

Nearly a thousand women travel abroad annually to seek donors, despite the physical and financial burden, as private facilities in the country charge exorbitant intermediary fees.

Menopausal women of advanced age comprise the largest group among egg seekers; however as per the existing laws, they are ineligible to be egg recipients since their loss of fertility is not the result of early menopause or illness.

A professor at Kanazawa University speaks of the need for compensation based on overseas cases as well, if a full-fledged donation system is to be introduced. An honorary professor at Keio University

pointed out the need for a better legal framework if the same is to be accomplished. The infrastructure for egg donation is still at a nascent stage as it is only recently that news of an egg recipient successfully conceiving a child made waves across the country.

Victoria's changes to laws on tracing sperm and egg donors a sensible evolution, the report published on March 2nd 2017 in an Australian paper The Age, is of the opinion that the removal of donor anonymity is justified despite possibly causing donors discomfort.

As per the changes, now a donor's consent is not necessary to have her identity revealed to her off spring, if she donated her eggs after 1998. She may refuse contact and has legal protection in this regard, but she may no longer prevent her off offspring from discovering her identity.

This will have implications on supplier willingness, and we may see a shift in the corresponding supply curve in this region. However, many do feel that this legislation is necessary and in the interests of the off spring.

Dim economy drives women to donate eggs for profit, reads the blunt headline of a 2008 CNN report. The president of the agency Alternative Reproductive Resources discusses the financial burdens faced by women who flock to this centre to sell their eggs.

Most of the women are wives and mothers who work multiple jobs to feed and clothe their families, and the allure of supposedly easy money drives them to sign up as donors. Though their desire to help infertile women is genuine, it is apparent that most donors are often embarrassed to admit their financial difficulties are a motive.

Finally, we look at recent events from India. Fair Complexion Requested for Egg Donors. Photos Arrive on Phone Quickly. A Thomson Reuters Foundation report headline highlights only a few aspects of egg donation in India, namely a preference for fair skinned donors as well as the use of mobile technology to rapidly circulate information of donor identities for approval.

This has implications for privacy as well as price discrimination and the realization that the donor pool is far from homogenous, which will be discussed in depth later.

A deeper look into the article reveals that a poor woman in Mumbai who often needs money for sending her daughter to an English medium school or to open a small beauty parlour is even willing to settle for a 95% lower price for her eggs, than the usual prices offered in countries such as Japan, Australia and USA as discussed above.

A sociologist from the Delhi School of Economics speaks of the lack of awareness surrounding egg donation and the risks involved to donors, because of which women are rarely ever coerced into being donors. Hence it is of utmost importance to subject the Indian context to economic analysis.

5. Egg Donation: A Market for Fertility

Of all the existing medical solutions to female infertility, egg donation is the only one which involves market participants other than healthcare providers and patients seeking services of the same. There are three major market participants – the egg seekers, the egg donors, and the hospitals or clinics that offer IVF treatment using donor eggs.

Egg Donors: The role of egg donors has been the subject of some debate as far as economic analysis is concerned. Some socioeconomic studies have suggested that the process of egg donation be considered a labour input in the production process of extracting usable healthy eggs, and the compensation paid to egg donors be considered equivalent to wages paid for their time and the usage of their bodies. This seems to be an interesting argument, if one compares the situation of egg donors to temporary on-hire labourers who offer their services for completing a one-time job.

However, there is also a strong and convincing school of thought that egg donors deserve to be viewed and treated as the primary suppliers in the market for eggs, rather than labour suppliers or inputs in the process, and the IVF clinics and hospitals that offer fertility treatment are to be considered secondary suppliers or intermediaries.

It is the donor who directly supplies the product, with the necessary intervention of surgeons. It therefore seems appropriate that that egg donors be considered primary suppliers and decisionmaking units. Faced with the agency of considering all their options, the consequences and side effects and spillovers of each, to assess the available information, they accordingly decide their place in the market.

Every biological female is born with an approximate endowment of one or two million eggs, and this reserve of eggs should be considered a natural endowment of wealth, similar to any asset of economic value that a person may be endowed with by virtue of inheritance – whether or not the question of exchange arises.

Eggs have the feature of perishability, as with the progress of age the ability of an egg to give rise to an embryo diminishes, and hence the usefulness of this asset is perishable unless it is consumed or utilized within the correct time frame.

A second feature of eggs is uncertainty, as out of all the one or two million it is unsure which ones have the most durable health – and as a result will yield the best results if extracted.

In fact, from the perspective of an egg donor, the entire biological phenomenon of fertility is a matter of uncertainty. It is a well-established fact that fertility decreases with age and a woman's chances of retaining healthy eggs after the age of 30 greatly diminish – some doctors say it even diminishes by 90% - however, different women's bodies react differently to hormonal changes over time.

Some women reach menopause early, some women can still conceive and deliver a child but with painful complications, and some are blessed with the ability to have smooth pregnancies. Faced with uncertainty, the donor must consider her time horizon and plan the number of children she wishes to have alongside the number of children she already has – one or both of these numbers may even be zero.

The decision to donate eggs has two decision variables – how many, and when (or rather, at which time period of her life). The parameters are the number of children she already has, the number of children she desires, and the prices of eggs – though since the market for eggs is far from resembling perfect competition, prices are not always given.

As is the case in many games and decisions where the active player is uncertain about the nature of the other players and circumstances they will be facing (for example, the modified prisoner's dilemma game where the prisoner is unsure whether the other prisoner is saintly or cunning), this decision could be modeled into a static game of imperfect information.

The player beforehand is unsure of her biology and simply knows that the first and most crucial player, Nature, assigns her to one of three possible states – early menopause, usual menopause but with possibility of pregnancy complications after age 30 till menopause, and usual menopause with no pregnancy complications till menopause.

Statistically speaking the second state is the one that occurs the most, however the first two states cannot be ruled out.

The player must choose the number of eggs she wishes to donate – these range from zero to a realistic medically prescribed upper limit, and each of these actions has a certain payoff for her. She may have a prior belief about the state of her biology, and accordingly may assign probabilities to which fertility cards Nature has dealt her.

She also however has the option of paying for an expert medical opinion on the state of her body – however this will only serve to update her beliefs about the probabilities, and will not guarantee a certainty. Hence whether to pay for an informed opinion is another decision that alters her perceived probabilities and payoffs.

Egg donation has a few explicit monetary costs but mainly major implicit costs for the donor. The most obvious opportunity cost is the probability of menopause occurring earlier than expected, since even though it is by a small handful, a woman's endowment of eggs is still being depleted faster than at the natural rate, when the eggs are extracted from her body.

The most obvious direct cost is the risk of Ovarian Hyperstimulation Syndrome (OHS), which is painful and irritable inflammation of the ovaries, always resulting in vomiting and deep abdominal discomfort. The exact probability of this risk is not yet known as varied estimates range from 10% to 25%.

With very careful monitoring by a skilled physician, the probability is obviously lower, and hence it once again comes down the donor's perceptions of the skill level of the doctors she visits and her belief about the probability of this risk.

One may also argue however that in the world of surgeries, there is no procedure which is free from the risk of painful and messy complications, and egg donation should not be singled out. However, from the perspective of a donor, the risk of OHS cannot be ignored.

The explicit monetary costs involve the costs of traveling to a verified and reliable clinic, because unlike more common medical procedures whose practice is more widespread, IVF clinics are not always conveniently located.

Especially in the Indian context, and in the context of donors traveling from relatively remote and rural areas, the time and monetary costs of travel are significant. However, if the agency organizing the egg donation offers to compensate the donor for travel expenses, as is slowly and steadily becoming the norm, this may not be that significant a cost.

And finally, in the weeks following the procedure, the donor experiences symptoms exactly like what happens at the onset of menopause, because her natural menstruation cycle has been interfered with.

These symptoms include great physical discomfort such as hot flashes, heavy bleeding and painful cramps, and even more long-term effects such as rapid weight gain and hair fall. Consequences may also be psychological, such as mood swings.

Speaking in terms of the equilibrium quantity of eggs a donor wishes to donate, she will always behave rationally based on the available information, and donate that many such that the marginal cost of donating an egg equals the marginal benefit of doing the same.

The marginal cost is specifically the increased likelihood of early menopause and extended physical discomfort, as the other costs (namely the risk of OHS and the travel costs) are mostly invariant to the number of eggs extracted.

The marginal benefit is the price she receives, and her bargaining power over price determination shall be discussed next. In practice, the number of eggs extracted is usually a set specific bundle of ten or twelve eggs as decided by the clinic, and hence the equilibrium number of eggs should ideally be termed the equilibrium number of bundles she is willing to donate.

The bargaining power a donor has over deciding the price she deserves for her sacrifice, is dependent on several factors.

Firstly, a first-time donor receives a base compensation, whereas a woman who has already been a previous donor (and hence the vitality and fertility of her eggs is proven and established) has greater bargaining power. In fact, it is common to offer a pay structure based on experience.

Secondly, as explained in an article covered in the literature review, some donors feel psychologically pressured by embarrassment and hence hesitate to demand what they consider a fair compensation.

The belief that women should donate their eggs out of altruism and expect only coverage of their basic medical and travel expenses is still a very widespread belief, and donors face difficulty tackling this mindset. It is common for a woman to be made to feel ashamed for wanting a higher payment despite calling herself a donor.

Thirdly, the level of education and awareness a donor has significantly influence on her bargaining power, as knowledge is indeed power. An educated woman understands the biological consequences of egg donation even if the agency refuses to explain them clearly, and she will demand a fair compensation.

Moreover, she can easily avail of the internet and visit the websites of other fertility clinics all over the world and check the prices they offer donors, and demand a comparable compensation.

The information asymmetry however may affect women who are not as technologically well informed, do not have easy access to information over the internet, and do not possess an adequate understanding of how the process may affect their bodies. To better study awareness and the extent of information asymmetry among egg donors, Corion Fertility Clinic, Mumbai conducted a study of 25 egg donors. Six women who were more well educated and had access to the internet, revealed that they had already researched the procedure online instead of waiting for the doctors to explain everything. [7]

However, it is worth noting that there may be a case of adverse selection of donors as well, as above everything, health and lifestyle is of prime importance. For example, the clinic may conduct a full body checkup of the donor to deem her eligibility for the program, but this may not be free of blind spots. A chain smoker or an alcoholic will not reveal their lifestyle and habits, for the obvious fear of being rejected as an eligible donor.

Similarly, and this is a very serious case of adverse selection, women with genetic illnesses may be silent about the medical history of their families even if probed, because revealing the same will drastically lower their eligibility and may lead to their rejection. As a result, clinics and hospitals may end up accepting unfit donors with risky lifestyles and dangerous genetic illnesses that could cause problems for their offspring.

The typical profile of the Indian donor is that of either healthy young college going women, who have educational backing and age on their side and realise that egg donation may be very lucrative – or underprivileged women from poorer backgrounds who have the health and viability to be able to donate and would benefit from the money.

Unlike countries where egg donation is legally barred, India has no laws prohibiting this activity and hence the pool of eligible donors is large, the supply side is abundant.

However, considering other non-legal barriers, namely sociocultural barriers and lack of awareness, despite there being a large pool of eligible donors, the pool of prospective and actual donors is significantly smaller.

Hospitals and Fertility Clinics: In an important departure from traditional health economics, these institutions are not the primary suppliers and in this case, play the role of intermediaries. However, despite not constituting primary demand or primary supply, they hold more market power over the other two groups of agents involved.

Hospitals, one may argue, embody the markets for exchange of healthy eggs. They have at their disposal a vast amount of resources that smaller unorganized units of egg donors or egg seekers do not ordinarily have access to.

From organizational and managerial skills, to medical professionals and surgical resources, to databases of information on donors (both actual and prospective), hospitals are arguably the players without whom a market for eggs would not exist.

Eggs are complex products, and unlike the selling of most products which do not necessarily always need an intermediary, the transaction of eggs always needs the intervention of medical professionals. Direct contact between the egg donors and egg seekers is neither necessary nor sufficient – and this amplifies the market power that hospitals hold.

The proliferation of IVF clinics across India speak of the benefits of specialization in the line of fertility treatment that specifically uses eggs as solutions. In line with the economies of scale that underlie health economics and the decisions taken by hospitals, the market for IVF treatments (whether by own eggs or donor eggs) is strong enough to encourage dedicated IVF clinics, rather than confining the treatment to services offered by a general hospital.

There are two sources of the market power that intermediaries hold. The first is the vast amount of resources they command, from medical expertise and surgical skill to equipment, space, monetary and material resources. This is an advantage that a single egg donor cannot hope to replicate, and is therefore entirely dependent on the intermediary for a successful transaction.

The second source of market power, which in fact gives intermediaries the power to determine and dictate prices and terms to a large extent, is asymmetry of information. This arises in two ways.
Firstly, there exists a dangerous possibility of moral hazard on part of the intermediary, with respect to the donor. While the donor is sedated for surgical extraction of eggs, the doctors have an incentive to overstimulate the ovaries to obtain more eggs than she agreed to provide – and the marginal costs of sacrificing eggs have already been discussed above.
Also, the donor may not be adequately apprised of the dangers involved in the procedure, the surgeons may tend to incompletely inform her of the risk she is undertaking and downplay the seriousness.
Secondly, information asymmetry is to the advantage of the hospitals and clinics while negotiating prices with egg seekers. Women may seek certain characteristics of a donor and the hospital may promise to provide them with the same.
However due to privacy and anonymity clauses there is never any guarantee that the egg seekers are receiving the eggs of exactly the kind of donor they sought, and therefore they may be cheated of a fair bargain. The intermediaries alone have information pertaining to the characteristics of the donor whose eggs are being used.
Due to the valuable yet perishable nature of eggs and the uncertainty of their supply, hospitals and clinics perhaps use a complex system of inventory to determine the optimum number of eggs they should extract and preserve. This determines the packages they offer donors.
To sum it up, by their nature as utterly necessary intermediaries, hospitals and clinics command the market power and can extract a lot of surplus, especially in enhancing and capturing the difference between what they pay the donors and what the seekers pay.
Egg Seekers: The pool of egg seekers, as hinted at when describing causes and solutions to female infertility, consist of women with healthy uninjured wombs but whose eggs are unviable, for whatever reason. The entire superset of infertile women in a country does not constitute a demand for eggs specifically.
Speaking in a societal context, women are caught in a tug of war between opposing forces – the censure and sorrow that comes with being unable to bear a child, and the perceived dissatisfaction at bringing up the child of another woman. However, the former usually wins out and women desire to be mothers, even if the only solution available is using the eggs of another woman.
However, it would appear that egg donation is the last resort and a woman who is suffering from infertility would prefer to explore all other options which are financially feasible, because of a psychological preference for one's own genes. We shall explore the complex workings of genetics a little further ahead.
Surrogacy in India is wrought in legal wrangles and complications and is on the way to being banned (according to plans drafted by the Government of India in 2016) and hence egg donation is the only and best option available to women whose own eggs are not healthy.
Moreover, from the perspective of a surrogate, the emotional, psychological, and physical costs of bearing a child for another woman far surpass the costs and sacrifices of being an egg donor. In fact, the physiological discomforts of pregnancy and child birth, and the possibility of emotional distress upon parting with the child, can act as deterrents.
And from the perspective of an egg seeker, a woman may desire the physical experience and emotional security of pregnancy and giving birth, which she loses out on in a surrogacy contract. Therefore, there are often purely psychological reasons that a woman chooses to be an egg recipient, as the joy of motherhood by way of carrying a child and nursing it, cannot be replicated by any other method such as adoption or surrogacy.
Based on the existing literature reviewed (though it pertained to other countries) as well as an understanding of the general sociocultural context of India, egg seekers are very price inelastic in their demand for attributes of a donor. Almost no woman is willing to settle for a donor of inferior health

for a lower price. An egg seeker consciously or unconsciously has a list of characteristics and attributes on a ranked priority list.

Firstly, everyone desires a healthy strong donor with a safe non-risky lifestyle and clean history of health in the family. If hospitals strictly screen donors and the latter are completely truthful, egg seekers may not have to worry much about having this requirement fulfilled.

Secondly, education and intelligence hold great importance, especially the middle and upper classes of egg seekers (who presumably constitute the major demand). It is natural and expected that seekers are in fact willing to pay a premium for donors with high levels of education or at least a minimum basic level of education, as well as for donors who hold successful and prestigious jobs. For example, Go IVF Centres India is a chain of clinics that offers a "premium" category for donors with graduate and post graduate degrees. [8]

Finally, tertiary importance is given to such attributes as physical appearance, caste, sect, and religion of the donor. Even though these may not be as important as health and intelligence, they are still extremely important in the sociocultural context of India and do not rank very far behind the two most important attributes. Given the damaging caste consciousness that permeates our societal fabric, it is highly expected that an upper caste Hindu woman would not be willing to accept the eggs of a lower caste donor.

Similarly, given the deep seated and deeply divisive sectarianism among Muslims, it is highly expected that a Sunni woman would not be willing to receive the eggs of a Shia donor. Of course, these considerations come into play if at all these women are willing to opt for something as unorthodox as egg donation.

Finally, regardless of religion, sect or caste, seekers will show a strong preference for fair skinned donors – even if genetics does not guarantee that her off spring will have the same complexion.

A further note on genetics is important for the decision that the egg seeker takes, and in fact epigenetics is the term scientists use to describe any possible effects the DNA of the egg seeker may have on the child she is carrying.

The child receives all its genetic information from the father (or sperm donor) and the biological mother (the egg donor), and the DNA of the carrying mother has either an extremely miniscule effect in very rare cases, or no effect at all in most cases. Gaps in the placenta may enable a few stray cells of the carrying mother to come into contact with the child. However, given the trillions of cells of the egg donor, these stray cells have little to no effect. If however they persist, scientists refer to this phenomenon as fetomaternal chimerism. [9]

However, scientists and researchers have not given up on the hopes of egg recipients, and there has been research on how to pass on genetic information from an infertile woman to a child born of another woman's egg. For example, a study involving 20 participants at IVI Valencia, a Spanish fertility clinic, found that there is genetic information in the endometrial fluid surrounding the embryo. [10]

Molecules known as MicroRNAs that are secreted in the mother's womb can change the genetic information of the child, the researchers claim. The carrying mother's DNA significantly influences the development of the embryo, and even though it is far from being the same as gene inheritance, this discovery goes a long way in reducing heartache for egg seekers. [11]

In summary, egg donation is usually the last resort for an infertile woman who has the time and money to explore other options, due to the phenomenon of preferring one's own genes. Nonetheless, it is the best and only option for a woman with a healthy womb whose eggs are not viable by any means but who has the desire to experience pregnancy. Seekers display a high affinity for healthy and educated donors as well as a strong rigid preference for one's own religion, caste, or sect. However, given new discoveries and advances about passing on genetic information, egg donation may become a more attractive option and lead to a shift in the demand curve.

6. A Window for the Government

Having considered the market for egg donation, it is worth exploring an alternative view whereby the efficiency of such a market depends heavily on the level of government intervention. Here is a quick review of all the sources of inefficiency in the market that prevent the donors from getting their full due or seekers from getting what they desire.

Asymmetry of information (on many accounts) and high transaction costs and indirect costs (the cost of travel as well as the cost of drugs to cope with the after effects of egg extraction) are the two major barriers to efficiency.

With respect to transaction costs, the government could offer to shoulder the costs of travel up to a specified maximum, for donors making the trip to the fertility centre and back home. This transfers the burden from the primary supplier to the government and acts as a travel subsidy.

Some clinics and hospitals themselves offer to cover the costs of travel, however, it solidifies their incentives if they can transfer this burden to the government. This eliminates to some extent the distortions in the incentives and actions of intermediaries.

The government bearing the cost of travel will be especially helpful to prospective donors living in remote parts of India who do not have easy access to a general hospital, let alone having easy access to a fertility clinic. Economics of scope and scale do not justify building IVF clinics in remote areas where the market is thin, and hence the next best and most viable option is to lubricate travel.

However, to curtail the fiscal burden it is advisable for the government to accurately identify marginal donors – donors to whom the cost of travel is so significant that it changes their decision to be a donor at all.

Therefore, the government need not pay the taxi fare for a salaried woman who lives a few blocks from her chosen IVF clinic. But if it can pay the train and taxi fares of a poor woman who has barely ever stepped outside the confines of her village, it could change her mind.

Finally, the government can play a very powerful role in tackling information asymmetry to further eliminate distortions. There are many ways in which this asymmetry arises, as already discussed and therefore appropriate mechanisms can be developed.

First, it is important to educate prospective donors on the risks involved in the process, to make accessible to them the statistics of the occurrence of these risks, thus enabling them to update their information set and their beliefs.

It could be made mandatory for clinics and hospitals to direct donors to government websites displaying the necessary information, or to show them presentations with the same, prior to agreeing to undergo the procedure.

Second, the government could evolve a mechanism of random checks and balances to ensure that egg seekers are being given the eggs with the exact attributes they desire, as far as physical health and intelligence are concerned at the very least.

There need not be intervention to ensure that there is a match of caste or sect, or at least most responsible sensible economists would not advocate such an intervention, however on moral grounds and on grounds of efficiency, seekers deserve to receive healthy eggs of the quality they are paying for.

In the majority of cases the donor demands anonymity, and even when she does not, the hospital or clinic insists on anonymity to maintain the asymmetry of information. Evolving a mechanism to tackle this, to protect the donor's identity while ensuring that the seeker's most prioritised demands are met, requires a great deal of thought and deliberation.

Random unannounced checks and balances by government health officials is one such possibility, but there needs to be a more sophisticated and foolproof system in place.

7. Reservations About a Market in egg donations

Sarah Sexton's paper (as covered in literature review) already speaks of the commodification of women's reproductive systems, and while academic literature is scarce, a moral argument against egg donation is found in many societies.

Firstly, since it is an extremely unorthodox means of making money, many donors keep their donation secret. Their desire for anonymity is not simply to protect their identity from the recipient of their eggs, but also to conceal their activities from their families and society at large. A perfectly healthy and well-educated woman with a clean lifestyle and easy access to an IVF clinic, may still be unwilling to be an egg donor, if she does not have sufficient independence from her family.

Secondly, and most importantly, many intermediaries (hospitals and clinics) are uncomfortable with women whose motives are not purely altruistic. Since they hold the most market power, their stamp of approval is of the utmost importance. There is already a school of thought that vehemently opposes the market mechanism and says that a woman's eggs should be gifts to help an infertile woman, and she should not be compensated for any more than the surgical and related expenses.

This school of thought favours altruism over profit, and all websites of clinics or agencies that organize egg donation claim to only cover the basic expenses of time, effort, and costs of the donor. In fact, in many countries such as Australia, selling eggs is illegal and hence a "market" cannot legally exist. For example, Egg Donors Australia, came under fire for reportedly offering a very high sum of money to cover the expenses of donors, even though the administration swears that they only accept altruistic donors [12].

Thirdly, there is hesitation and judgement on the part of infertile women as well, as already mentioned above – egg donation is the last resort if at all it is an option. From being an unorthodox treatment for infertility to a traditional preference for one's own genes, there does exist a mental block among potential egg seekers.

Fourthly, many believe that the procedure is not urgent for seekers and too dangerous for donors, grouping it with other possibly dangerous and seemingly unnecessary medical procedures such as cosmetic surgery, circumcision, or laser correction for poor eyesight.

Moreover, they believe that a donor can never be truly compensated for something they perceive as highly exploitative. Even though they do not constitute the demand or supply or even the intermediaries, their opinions may hold sway over government decisions. They stand as a counter to those who believe that egg donation should be donation, and not a market.

Finally, many have moral objections to market imperfections. The information asymmetry that potentially robs donors and seekers of their due has come under great censure. Moreover, this is reflected in divergence in prices received by donors across countries, with regular Indian donors being offered between Rs. 25,000 and Rs. 40,000 [13], and American donors being offered between $5,000 and $10,000 for a bundle of eggs. [14]. The divergence is of concern, even with adjustments for market imperfections and differences in demand, purchasing power parity, inflation, and other factors.

8. Legal Aspects of Egg Donation in India

Egg donation in India has been gaining visibility and popularity in the new millennium, and therefore the laws and statutes on egg donation are flexible, allowing the parties involved the freedom to negotiate their terms. Nonetheless, it is recommended that the contracts between any two or all of the three parties (donor, intermediary, recipient) be explicit.

Many practices followed are however governed by the guidelines of the Indian Council of Medical Research, and the standards set by the international medical community. The Assisted Reproductive Technology (ART) Bill was drafted in 2010 to govern the grey area of infertility treatment, and though it was not passed Parliament, it drafted guidelines for ART clinics and professionals. It is important to note that guidelines are not statutes, and while the medical community may exercise considerable

influence, the enforceability of these guidelines is not absolute. The crucial aspects are as follows. [15]

First and most importantly, with regard to rights over and duties to the offspring, the donor waives all her parental rights or duties and this must be clarified in every document she signs. The offspring will be the legitimate child of the recipient and her legally wedded spouse at the time, with all the attendant rights of parentage, support, and inheritance.

Second, there are no commonly practiced guidelines for donor anonymity in India. In the interests of donors, the following is recommended and advised: "No information about the treatment of couples provided under a treatment agreement may be disclosed to anyone other than the accreditation authority or persons covered by the registration, except with the consent of the person(s) to whom the information relates, or in a medical emergency concerning the patient, or a court order. It is the above person's right to decide what information will be passed on and to whom, except in the case of a court order.

The information about the donor (including a copy of the donor's DNA fingerprint if available, but excluding information on the name and address – that is, the individual's personal identity) should be released by the ART clinic after appropriate identification, only to the offspring and only if asked by him/her after he/she reaches the age of 18 years, or as and when specified and required for legal purposes, and never to the parents (excepting when directed by a court of law)."

It is common and understandable for egg seekers to do their own research, and approach their own friends and acquaintances to be egg donors. One major reason for this is of course to have certainty over issues such as physical appearance and background. In such cases, if the donor is deemed admissible, her identity is obviously not a secret to the recipient.

However as far as intermediaries are concerned, the contract between the intermediary and the donor must explicitly specify the provisions for confidentiality and anonymity. For example, an assisted reproductive techniques agency, New Life India, maintains a very transparent database of donors along with photographs and identifying information, and therefore hopes to attract more demand. Other agencies, such as Infertility India, maintain strict anonymity. Hence whether the donor is comfortable with disclosure of her identity should be explicitly considered, and she should choose an agency that meets those needs. The contract must be strict and provide against violations of the confidentiality clause. However, most agencies maintain that the intermediary is not responsible if anyone obtains confidential information through unauthorised means.

Third, apart from confidentiality, another important right of the donor is that she must be protected against unethical medical malpractices such as overstimulation of her ovaries or an overdose of hormones. There are still no explicit guidelines in this regard, since as mentioned before when discussing the role of the government, it is extremely important to keep checks and balances on intermediaries.

Fourth, contracts between the donor and the intermediary must explicitly specify the terms and conditions of compensation. Profit is taboo, altruism is virtue - this is a principle that everyone is supposed to follow. Nonetheless, the contract must make it mandatory to pay the donor the full compensation mentioned, upon completion of the procedure, regardless of the number or quality of eggs extracted. The donor may receive partial compensation in case of premature termination of the procedure, but these terms must be specified and honoured. [16]

9. Conclusion

The market for eggs has the peculiar characteristic of being an emerging and thriving market, perfectly legal and widely accepted, despite social consciousness and pre-existing regulations being unwilling to accept the commodification of women's eggs. Eggs are no different from assets that a woman is endowed with, that have a shelf life, yield utility to her but may also be traded for profit.

Unlike most markets, this market is characterized by an intermediary whose presence is crucial for any successful transaction to take place between the direct supplier and the direct consumer. Each of the three economic agents involved – the egg donor, the recipient, and the doctor (or to be more accurate, the clinic or hospital) – has different determinants of their actions, faces different constraints, has different levels of market power, and has a different profile.

In the interests of optimising both supplier and consumer welfare - giving recipients their due and protecting donors – there is room for government intervention, and further room for planning how to achieve this efficiency. The actions of the government may directly shift the demand and supply curves, and incentivize intermediaries to reduce the gap between what they pay the donor and what they charge the recipient.

Egg donation itself, in general, is mired in legal, ethical, and sociological issues. Ethically it is an unorthodox source of income and a high stakes game of returns for the donor, even though she is endowed with such an invaluable resource. There is scope for higher inclusivity and bringing poorer women into the fold of donation.

Similarly, it is usually a last resort for infertile women, and certain motivations such as the joy of physically experiencing motherhood and certain preconditions such as a healthy womb, differentiate egg donation from its substitutes. Sociologically, issues such as donor background and the powerful contribution of her genes, play a role. Scientific discoveries about the contribution of the recipient's genes to the child, may impact behavior of all future egg seekers.

Finally, legally, the laws in India may be silent and flexible, but the standards set by the international community and the recommendations of the Indian Council of Medical Research are adhered to by most clinics. Explicit contracts between two or more of all three parties are essential to protect rights, define areas of responsibility, and advise on remedies against misuse of these regulations. Better legitimization of egg donation will however cement the market and help bring about more uniformity in issues such as pricing and confidentiality policies.

Egg donation, by and large, is deserving of deeper and further studies in the Indian context, and within the general domain of health economics.

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