Technological Fix: Sex Determination in India

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Prenatal diagnostic technologies have been used for the purpose of detecting sex—leading to abortion of female fetuses—and have posed new challenges to the already difficult question of social justice for women in India. This article reports findings from a case study conducted with 25 women who had used prenatal diagnostic technologies for sex determination. Against the common belief that Indian society is "improving" because of 21st-century medical technology, this case study shows that the social context has given a patriarchal value to such advanced technology in India. Furthermore, it sheds light on why prenatal diagnostic technologies have taken a different route in India. It shows that reasons for accepting the use of prenatal diagnostic technologies for sex determination by women are diverse and complex.

Prenatal diagnostic technologies—amniocentesis, chorionic villous biopsy, and ultra sonogram—are commonly known as sex determination technologies (SDT) in India because these techniques, in addition to determining genetic problems with fetuses, have also been used for the purpose of detecting sex and aborting female fetuses. SDT have been viewed as a promising technological fix for India's population, social, and economic problems. *Technological fix* means using the power of technology to solve problems that are nontechnical in nature (Volti, 1995; Weinberg, 1997).

It is generally argued that the rate of population increase in India could be effectively and rapidly reduced if people could be guaranteed the sexes of their children. With an opportunity to produce sons, Indians would not multiply so fast. Some economists view SDT as improving the status of women in the long run by reducing their numbers in subsequent generations. Such reasoning is based on the demand and supply model to predict the increased value of women when their numbers fall with SDT. The economic approach further focuses on the costs and benefits to parents of children of different sex. In India, sons are viewed as benefits, contributing to present and future family income, whereas daughters are seen as costs, draining family wealth. Pessimists view SDT as protecting women from subsequent exploitation. They believe that a bit of sexist prejudice is a less grave evil than poverty, neglect, malnutrition, or dowry deaths of women. Many herald SDT as creating reproductive choices, which were previously consigned to destiny or nature. They argue that SDT is liberating women from repeated pregnancies and the poor from the economic burden of raising daughters. They further view SDT as assisting parents to control the quality of the child by detecting disabilities at birth.

Many have opposed SDT on the grounds of discrimination against women and nurturing the patriarchy (Arora, 1996; Forum, 1994; Kapur, Khan, & Radhakrishnan, 1999; Kishwar, 1995; Lingam, 1998; Muzumdar, 1998). They argue that with SDT, India's existing sex ratio (the number of females per 1,000 males) of more men than women is going to increase further. In 1901, the ratio of females per 1,000 males in India was 972, and this had fallen to 946 by 1951, when the first census was taken in independent India. The recent Census of India (2001, p. 85) has counted 531 million males and only 496 million females, a sex ratio of 1,000 males : 933 females. Critics argue that the low sex ratio will have serious repercussions later in society such as increased incidences of rape, abduction, sexual assaults, or wife sharing. They further point out that the existing low sex ratio has not led to an improvement in women's status (e.g., dowry deaths, literacy rate, and wife beating). They argue that SDT are committing the greatest violence against women in India by denying the right of life to female children.

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Most important, they point out risks associated with the testing and late abortion on women's reproductive health.

In this article, I examine claims of technological fixes and reproductive choices from women's perspectives. Currently, experts in law, medicine, and social sciences dominate the existing literature on the practice of SDT, and women's own perceptions have been overlooked. I address the questions, What do women expect or not expect from SDT? How do they explain the medical procedures involved in SDT? How do they adjust to possible health complications associated with SDT? How do they understand the sex of the fetus? What makes them decide for an abortion? How do they cope with abortions conducted late in the pregnancy? Do they desire to reject abortion after the "bad news" of carrying a baby girl?

Method

I conducted a case study with 25 women who had used SDT. My sample was developed using personal networks because the use of SDT is a criminal offense. During my trip to India in 1999, I approached Vatsalya, a nongovernmental organization that has been working on women's health issues in Lucknow, Uttar Pradesh, and is primarily interested in advocacy at the grass-roots level (see, e.g., Vatsalya, 1998, 2000). I conducted in-depth interviews with its director, Dr. Neelam Singh. Her insights helped me design the questions used to interview women. During my next trip to India in 2000, I decided to interview women in Amritsar, Punjab. This state has one of the lowest sex ratios (874 females : 1,000 males) in the country even though it is economically well developed and has a high literacy rate. It is generally believed that prenatal diagnostic techniques for the purpose of sex determination were initially popularized in Amritsar by Drs. Prithipal and Kanan Bhandari, and from there they spread to other parts of Punjab. Furthermore, I have an established personal network with people in Amritsar. I approached five clinics in Amritsar that have the reputation of offering tests for sex determination. Three clinics were abandoned because they wanted to cash in. Once the remaining two clinics realized that I was not going to report to the police or condemn their actions, they let me talk to their patients and observe consultation as well as actual testing. Doctors or nurses introduced me to the women, and none of them declined to participate. I met privately in a public place with 8 women who had come for the tests and asked them to recall their experience of learning the sex of the fetus and going through an abortion. Interviews were unstructured and conducted in Hindi. Because of the ban on the sex determination tests, interviews were not recorded; instead notes were taken. Permission from the Institutional Review Board to interview was obtained prior to going to India.

All women interviewed were mothers and had had at least one daughter before they went through sex determination tests. Most had been married in their late teens and had their first child within a year of their marriage. All of them had finished 12th grade and had attended college as undergraduates, although many had not finished college because of their marriages. One had a master's degree. Three were working, respectively, as an accountant, an administrative officer, and a schoolteacher. One had just started a home business tailoring ladies' dresses. Economically, they belonged to the middle class, although some were rather well off. Socially, they belonged to the Hindu and Sikh religions.

Background

Patriarchy—a system of male dominance legitimized within the family and the society through superior rights, privileges, authority, and power—is rather strong in India (Basu, 1992). Patriarchy leads both men and women to internalize their respective positions within society and to define their role vis-à-vis the other sex. Basically, Indian tradition holds that a woman's place is under her father while she is unmarried, under her husband after her marriage, and under her sons if she is a widow. Lineage is carried by sons, who have specific ceremonial roles including funeral rites for parents. Most important, all property is vested in, exercised through, and transferred through patrilineal descent. A male is considered a sound investment who will compound the family wealth, whereas a female is considered a liability who will consume the wealth without adding to it. The dowry that must be provided with each daughter on her marriage places an enormous economic burden on families. Furthermore, there is a fear of loss of honor *(izzat)*: The daughter may have an affair and thus bring a bad name to the family. If the honor of a family's woman is lost, the family's entire public position is

considered lost. Patriarchy results in a strong preference for sons over daughters in India ("Is It a Boy?" 1990; Rajan, Mishra, & Vimala, 1996).

In the patriarchal system of India, female infanticide or the intentional killing of baby girls has existed for a long time (Krishnaswamy, 1988). Female feticide, the abortion of a female fetus, is a new practice developed after the introduction of prenatal diagnostic technologies that could detect the sex of the child before birth. Initially, amniocentesis and chorionic villous biopsy techniques were used to do chromosome analysis to find out whether a fetus was female (XX) or male (XY). Since the early 1990s, ultra sonograms have become the most widely used method of sex determination. The method of amniocentesis involves obtaining a small sample of the amniotic fluid (15 to 20 ml) from the amniotic sac that surrounds the fetus by inserting a needle through the abdomen. This procedure is carried out around 16 to 18 weeks into the pregnancy so that enough fluid is available for testing. The method of chorionic villous biopsy involves passing a plastic canula through the vagina up to the amniotic sac and removing a few chorionic cells from the placenta. This procedure is carried out between 8 to 10 weeks into pregnancy. Both amniocentesis and chorionic villous biopsy need to be performed under strict aseptic conditions by a doctor. Results of both tests take another 3 to 4 weeks because the cells have to be cultured. The technique of ultra sonograms, on the other hand, is noninvasive and requires no laboratory setup. It relies on the development and visualization of the external sex organs of the fetus. Thus, there is no waiting period for the results. This procedure is conducted around 14 to 16 weeks into pregnancy (Singh, 1998).

Both amniocentesis and chorionic villous biopsies can cause infection, bleeding, and spontaneous abortion. Ultra sonograms, on the other hand, do not appear to pose a health hazard for women. However, abortions following sex determination tests are carried out between 16 to 20 weeks into pregnancy and, thus, carry complications and risks to women's health. The death of a 20-weeks'-pregnant woman after an abortion following amniocentesis in Bombay illustrates such risks (Lingam, 1998). The accuracy rate for amniocentesis in India is 95% to 97%, for chorionic villous biopsies it is 94% to 96%, and for ultra sonograms it is 96% (Singh, 1998). The accuracy rate for ultra sonograms increases with time, the type of machine, and the competence of the doctor. At a time when the sex of the fetus cannot be detected for some reason or another, often it is reported that the fetus is female so that it can be aborted, and the mistake is not detected. This is especially true with ultra sonograms, because training and certification of the person conducting the test is not required (George & Dahia, 1998). In fact, the issue of SDT hit the headlines when a male fetus, whose father happened to be an influential government official, was erroneously aborted (Agnes, 1992).

The opening of clinics solely for the purpose of determining sex started in big cities and was embraced by middle- and upper-class Indians. Soon SDT proliferated to small cities and towns and among the lower-middle classes. SDT spread very quickly throughout India, mostly because of availability, advertisements, and cost. The number of clinics solely for determining the sex of the fetus multiplied manifold in cities. For instance, in Maharashtra state, the number of clinics increased from less than 10 in 1982 to 500 to 600 by 1986 (Ravindra, 1987). In small towns, weekly mobile services started offering the test. Furthermore, all nooks and corners had some information about SDT, such as the following: "Come for This Test so You Don't Have an Unwanted Daughter Born to You"; "Better Rs. 500 Now Than Rs. 500,000 Later" (referring to dowry); "Is It a Boy or a Girl? Find the Sex of Your Child Before It Is Born"; and "The Latest Imported Machine Tells the Sex of the Baby Before Birth." Most important, the sex determination tests are very inexpensive and are thus within the reach of many. They cost anything between Rs. 500 (approximately $12) and Rs. 1,500 (approximately $35) based on the place and the techniques. The economic liberalization in 1991 has led to the introduction of the lower priced portable models for ultra sonogram, which has mostly brought the cost of the sex determination tests down.

Women's groups, civil liberty groups, health movements, and concerned individuals were deeply concerned about the mushrooming of the sex determination clinics and tests and female feticides. In 1984, the Forum Against Sex Determination and Sex Pre-Selection was formed in Bombay, Maharashtra. It worked on many levels to create public awareness and political actions. For instance, its members demonstrated in front of the sex determination clinics, led marches in which celebrities walked with their daugh-

ters, focused on the girl child during children's programs, disseminated information in popular media, and filed petitions in courts for the prohibition of SDT (Forum, 1994). Like many campaigns against violence on women in the 1980s, new laws aimed at protecting women were offered on a silver platter by the government (Agnes, 1992). In 1988, the Maharashtra government passed a law banning the use and advertising of prenatal diagnostic technologies for the purpose of sex determination. Similar actions were taken in some other states. Soon the issue was brought into national focus, and it eventually culminated in the central government's bill, the Pre Natal Diagnostic Technique (PNDT) Act of 1994. The central act prohibits the use of prenatal diagnostic techniques, including ultra sonogram, for the purpose of determining the sex of the fetus. It further prohibits the advertising of such technologies for detection of sex. It punishes people conducting the tests as well as people seeking the test. The court presumes that the husband or relatives have compelled the woman to undergo sex determination tests unless the contrary is proven. Under the act, prenatal diagnostic techniques can only be used for the purpose of detecting abnormalities under certain conditions by registered institutions (Chauhan, 1998; Kapur, Khan, & Radhakrishnan, 1999; Kumar, 1994).

After the legislation passed, the practice of SDT went underground and the cost of tests went slightly up. There is a general consensus in India that SDT leading to female feticide are being practiced throughout the nation (Agnes, 1992; Arora, 1996; Booth, Verma, & Buri, 1994; Forum, 1994; George & Dahiya, 1998; Kakodkar, 1997; Kishwar, 1995; Lingam, 1998; Weiss, 1996). Legislation remains ineffective in deterring the practice. One estimate places the number of abortions related to SDT at around 200,000 per year. According to the Registrar General of India, in 1993 and 1994, 360,000 female fetuses were aborted in hospitals, mostly after going through SDT (Arora, 1996). The Census of India (2001) has revealed that the sex ratio of population in the 0 to 6 age group has declined from 945 in 1991 to 927 in 2001. For this age group, the sex ratio can best be explained by female feticide on a massive scale, if not by female infanticide and higher female child mortality rates (Bose, 2001).

Hardly anyone has been punished for breaking the law. For one thing, the government of India has launched a massive campaign of family planning to control population growth rate, and SDT tend to assist in it. For another thing, it is very difficult to establish a nexus between sex determination and selective abortions. Women go to a clinic for the test and then to another hospital for an abortion. Under the Medical Termination of Pregnancy (MTP) Act of 1971, it is difficult to prove that a woman is terminating the pregnancy merely on the ground of sex. Under the MTP, women have the right to terminate pregnancy due to a risk to their physical or mental health, which can be caused by poverty or contraceptive failure.

Reporting Women's Perspectives

In reading interview notes many times and paying close attention to both what the interviewees said and how they said it, the following themes appeared consistently throughout.

Rationalization of SDT

All women interviewed rationalized SDT as a benefit made available by science. They felt that traditional methods of ensuring a boy, such as having intercourse on even days of the menstrual cycle or soon after the cycle, are not reliable. In one woman's words,

> It is simple why I am having this test. We have a magical machine, which is accurate in detecting the sex of the baby before birth. I simply want to make a use of it. If I get the bad news, it will hurt me a lot. But, in the end, I will get the best.

Another said, "Science has given us new machines so we can decide what we should or should not have." One noted: "It is hard not to use ultrasound especially since it gives correct results." In other words, technology has converted unfounded folkways of choosing the sex of one's child to a guaranteed scientific method.

Most women found SDT as liberating them from the burden of repeated pregnancies in the quest for producing a son. They believed that most women would like to achieve the norm of a small family (two or three children) with at least one son. According to them, SDT serves those women who already have at least one daughter. The general sentiment was something like this:

> I have two daughters. Beautiful daughters. I did not want to have more than two children, one son and one daughter. Now I am going to have three children. I really do not want to take a chance and have four children.

The women who were financially well off showed more intensity for sons. As one said, "Do you think I should keep producing girls? I must have a son. Otherwise, who will perform our last rites? Who will continue our name? Who will look after us in our old age? Who will feed us?"

The women further viewed such sex planning as a benefit to the nation, which already has a billion people. For them, overpopulation is the root cause of poverty in India. Instead of producing many children and remaining poor, they believed that it is better to use SDT and control the population explosion in India. Women with higher education asserted that SDT should be viewed as one among many techniques used for family planning. As one woman said,

> My house servant has four daughters. Her husband works in a blanket factory. One daughter has also started cleaning some houses and washing utensils. Still, they are poor because she would not go though tests. She will not have operation either.

It is interesting that most respondents had not thought about permanent contraception after having their ideal family size and type. They preferred to use permanent contraception once they were confident that their children would survive, which meant waiting at least 6 to 7 years after the birth of their last child. When told that family planning can be done through contraceptives, whereas sex planning can only be done through abortion, the women with more education responded that "one day a drug would be invented which would allow us to choose the sex of the child before conception." Most noted that if abortions were really bad, doctors should not practice them and the government should not permit them.

Some rationalized SDT by using the language of pro-choice feminism, saying that women should have the right to choose abortion, the number of children, and the type of contraception. Most said something like this: "We should have the right to abort a baby of our choice because it balances the pressure we feel from the relatives and neighbors." They viewed SDT as increasing the status of women instead of victimizing women. The women with more education reasoned that "since abortion is legal in India, then how could they make aborting female fetuses illegal?" They further equated the ban on SDT with returning to "the dark ages" when women were not free to make choices about reproduction. They said that the ban on SDT punishes women for going through tests. One reasoned that by banning SDT, the government had made it difficult for doctors to use tests for other good things such as improving the human race by aborting problematic fetuses.

Most women viewed female infanticide as a criminal act, cruel to the child, and carried out by uneducated villagers. For them, abortion is modern and painless to the baby; it is a procedure carried out by doctors in the hospitals and sanctioned by the government. As one woman said,

> How could you murder an innocent child who has done nothing wrong to you? Educated people do not commit such crimes, only illiterate people kill their girls. I have heard a lot of stories how villagers put their newly born girls to death. Doctors perform abortions because child is not born yet. It is inside the body, and not outside.

In other words, technology has transformed an irrational practice of committing female infanticide to a rational practice of female feticide.

Pressure to Use SDT

The women represented in this study had marriages arranged by their families and appeared to be playing a submissive role in sexual relations. They had heard about family planning on the radio and seen it on television and the big screen, but either they or their husbands had started using contraceptives after the birth of the first child. Most couples wanted to wait for 3 to 5 years before having another child, but most women got pregnant within 2 years.

Most women felt pressured to produce a son, although some who were financially well off expressed their obsession for a son after giving birth to two daughters. Without producing a son, the women felt worthless in the eyes of their spouse, relatives, and neighbors. It appeared worse for those women who shared the house with a sister-in-law who had a son. When women were pregnant with their first daughter, some family members and neighbors had predicted that they were going to have a boy based on their appearance, morning sickness, and appetite. After the women had daughters, some consoled them by saying that they did not favor boys over girls. However, celebration after the birth of daughters, as stated earlier,

was not as grand. The women who gave birth to a second daughter found that people felt sorry for them. As one woman said,

> With the first daughter, the family had no problem. They were happy. But with the second one, there was a disappointment. No one said anything openly, but I could see in their eyes. With the third one, the family started showing their disappointment openly.

Most women said that at least one family member had indicated that, next time, the women should give birth to a boy. One woman even said that a family member had joked that her husband might desert her and bring another woman who would give birth to a boy. In other words, women are viewed as responsible for the outcome of their pregnancy, which means they have to do everything possible to produce a son.

Yet the decision to use SDT was not simple for most women. All of them knew about the tests. However, it was a conscious decision only for those women who ranked higher on income. Most were advised by family members or friends to have the sex determination tests, although some women found some family members insisting on it. No woman received any discouragement from her spouse or any other family member. None of the spouses even mentioned the possibility of going through with testing only if the woman wanted to. When some consulted with their mothers or siblings, the women received similar advice. The circle of people who advised the women of the tests claimed to have known others who had gone through the tests and were pleased. In one woman's words,

> I do not differentiate between boys and girls. I worry about my parents more than my brothers do. I feel my daughters will worry about me the same way. But, my mother-in-law wants me to have at least one son. She gave me her blessing for the tests two months ago. We live in a joint family. There is no way I could have said no to her.

Another said, "Every day, my mother-in-law will ask me when am I going to go to the clinic? Every day my mother will call me for the same thing. I got tired of daily conversation."

Most important, the women were told they were uneducated, backward, and irrational for not utilizing the knowledge generated by SDT. Technology was presented as helping them to have both a small family and a son. As one woman said, "I am going through the test because I do not want people to view me that I am not modern." Another said,

> Initially, I was little bit hesitant to go through the test. My sister told me that my parents had wasted their money in my education and rickshaw pullers are more educated than me. My best friend told me that I am old fashioned. My mother told me that my mother-in-law is more modern than me.

The women in the sample were going through sex determination tests because society and technology expected them to. If they had refused to take advantage of SDT, they were going to be at odds with their spouse, family members, and friends as well as with the technology. They felt compelled by the unspoken pressures to do everything possible to produce a son by utilizing SDT. There was no deep thinking about what they were getting into. All hoped for the desired results so they did not have to face the society and go through abortion.

Deception During Pregnancy

The women went through the extreme deception of the experience of pregnancy, the use of SDT, and subsequent abortions. They and their families could not announce pregnancies that might end in an abortion, and thus they missed celebrations and congratulations. However, it was hard to keep pregnancies private because, by the time tests were conducted, they had started looking somewhat pregnant. Different explanations for being incapacitated by nausea and gaining weight only made neighbors more suspicious. Some neighbors had started speculating that the women were hiding their pregnancies because they were planning to go through sex determination tests. As one woman said, "I have been using a shawl to cover myself so no one would know about my pregnancy. But, it is hard. Other day, *X* was inquiring. She tried to find out by telling me to go through the test."

During the consultation, when the women requested the tests, the doctors immediately asked how many daughters they had and why they wanted the tests. Most women said they desired to know the sex of the baby simply for the sake of finding out. Some mentioned that a family member had given birth to a

daughter with some learning disabilities. Doctors replied that they would find out whether the child was "healthy." The word *healthy* appeared to be used for protection from the law. Neither the doctor nor the nurse collected personal or family health histories to justify that the test was for health reasons.

Once there was the news of a male fetus, the women said they would announce the pregnancy right away. A couple of them who were better off financially said they would announce the sex of the fetus as well. Those who got the news of a female fetus indicated they would not share the news with others, even with close relatives. They felt that people would judge them for going through sex determination tests and abortion. As one woman said, "People do both. They want you to have the test. But, when you have it, they criticize you for having it."

Those who had come for the second or third time said that the earlier abortion(s) was explained as a miscarriage. They felt compelled to give some explanation because some knew that the women were expecting and neighbors needed some explanations for their being in the hospitals. All of them believed that there was a tendency to sympathize with miscarriage instead of an abortion. As one woman said,

> My in-laws are vegetarian, strict vegetarian. We are not allowed to cook meat at home. We can only eat meat outside. They did not want anyone to know about my abortion. What would people say? We believe in non-violence, but practice abortion. My mother-in-law simply told people that I slipped and lost the baby.

Before tests, the women were not sure whether they were carrying a boy or a girl. If it was a boy, then it was a blessing, which meant continuing the pregnancy. However, if it was a girl, then it was a mistake, which meant an abortion. Some of these women, therefore, tried not to get emotionally involved with their unborn child. Their attempt to separate themselves from the fetus growing inside their body was harder because they already had at least one child and knew about the changes during pregnancy. As one woman said,

> When [daughter] was to be born, I drank milk every evening. I do not like milk, but it is good for the baby. But, this time I have not had milk at all. I do not want to get attached to the baby before the tests.

Ignorance About Risks

The women in the sample were not counseled regarding the risks and benefits of various sex determination tests and late abortions. Without using medical vocabulary, doctors or nurses briefly described the sex determination procedures as not being painful or something to fear. The technology was presented as being accurate in detecting the sex of a fetus. Very little medical terminology was used.

None of the women in the sample had chorionic villous biopsy; 3 had had amniocentesis previously. The women recalled their amniocentesis test as a nurse giving local anesthesia and a doctor inserting a needle through the abdomen. Ultrasound monitoring during the piercing of the amniotic sac was not followed. The doctor used a stethoscope to locate the position of the fetus. They believed that the needle was inserted many times because the doctor was unable to get the fluid. During the test, the doctor had mentioned repeatedly that there were no side effects. When finished, the nurse gave them the fluid to take to a diagnostic center for testing, which they did before going home. These women did not know that they had faced risks of miscarriage or premature labor because amniocentesis was used without the use of ultrasound; accidental injury inflicted on the fetus by the syringe is generally responsible for such risks. They were also unaware that such procedures might have led to sepsis in the reproductive tract, hip dislocation, and respiratory problems. One did notice that her asthma had become worse after using amniocentesis, but she did not make any connection between the two.

In ultra sonogram tests, a nurse set up the ultrasound scanner and a doctor observed the location of the fetus. The monitor was not shown to the women. When the doctor announced the news of a male fetus, the women felt lucky and thanked god for making SDT available. When the women received the news of a female fetus, they went into depression. No one had prepared these women for a negative diagnosis, which would be delivered instantaneously. Some of them asked the doctor to "double-check," or else they asked whether they should come back at a later stage so the visualization would be clearer. The nurse told them that the doctor was an "expert" on ultra sonograms and was using a very "advanced imported machine." Both the doctor and the nurse consoled the women, saying that they would carry a boy next time and that it was good they found out now rather than later. Some women started

crying and mumbling, "How could I go outside and face my husband?" "How would my husband give the family the bad news?" "What would the family say about me?"

Women who got the news of a female fetus were advised to go through abortion as soon as possible. However, they were not told that abortion in the late stages of pregnancy might be difficult, painful, and dangerous. The women who already had abortion(s) mentioned that they did not seek much medical attention after abortion because they believed that many problems would go away by themselves. Some women relied on self-care and home remedies. All of them recalled having pain, backache, and excessive bleeding.

Facing the Ethical Dilemma

Once the news of a female fetus was revealed, the decision to have an abortion was made. Going through the sex determination tests implied the women's willingness to abort a female fetus. Yet the women had mixed feelings. One woman, when she heard the news of carrying a girl, said, "So what. I will have one more girl." However, the nurse immediately replied, "If you were not so sure then why did you come for the test?"

The women represented in the study did not make a distinction between a fetus and a baby. For them, they were carrying a child, not a fetus. Other than being scared about the surgical procedures involved in an abortion, they felt morally wrong about terminating the pregnancy. Some women were vegetarian and did not believe in taking life away. They viewed abortion as a sin for which god would punish them.

The women who had already had abortions indicated that the family was rather sure that the pregnancy had to be terminated. Most family members told them to be thankful for having learned about carrying a female baby before giving birth. When some women tried to talk about their options, spouses either kept quiet or just ignored it. The women were concerned about their marriage as well as the social environment in which they had to live. They already had an image of only carrying daughters. Their decision to abort a female baby was mostly because they did not want themselves devalued by having only daughters. Despite rationalizing or self-convincing, it was a forced choice for them. As one woman said, "Abortion was the hardest thing for me. I do not believe in taking life away. Abortion was wrong. I still cry for my daughter and pray for her forgiveness." Another said, "I always thought abortion was wrong. But, if I did not have an abortion and had another daughter, I would have suffered for a long time." One noted, "When I got the bad news last time, I knew right away what had to be done. It was a very bad choice. God forgive me. But there was no way out."

With the sex determination tests, the women appeared to be drawn into the process of deciding if an unborn female child makes life not worth living. These women already had at least one daughter who was being raised reasonably. Most respondents believed that women in India could reach any position provided they received educational and financial support. They know that women are discriminated against on the basis of sex. But they do not equate discrimination with lacking choices in life. They pointed out that women in India are getting educated, joining the workforce, starting businesses, making money, and running the country. With such beliefs, the decision to go through abortion of female fetuses brought psychological pain. These women were not carrying unwanted pregnancies; instead they were carrying wanted pregnancies that in the second trimester became a mistake.

Conclusion

This case study demonstrates that the social context in India has given a patriarchal value to the advanced prenatal diagnostic technologies. It shows that women's reasons for accepting and adjusting to SDT are rather complex. Even though the women justified SDT, going through sex determination tests and abortion of female fetuses were not easy for them. SDT provide a technological fix to women's choice of controlling the size and type of children. Yet SDT make women confront the very meaning of motherhood by controlling the choice of whether to continue a pregnancy with a female child. The SDT have created new problems in solving the old ones.

Technological fixes and reproductive choices are valued highly for the national progress of India and accepted uncritically. The adverse consequences of technical choices are not easily appreciated. Generally, it is argued that one should not blame technology but the aims and objectives of people who are using them ("Women Voice Concern Over Female Foeticide," 1998). However, once technology exists to detect the sex, ignoring it means being deprived of modern scientific advances. Modern technology in India is presented as helping people, as well as the

nation, to solve basic problems. Indian society is often judged as lacking education and scientific traditions, so many Indians are anxious to utilize modern technology. They do not want to be left behind in terms of the scientific superiority acquired by those more privileged than they. Because son preference is legendary, sex determination tests are perceived as a benefit made available by the technology. It is easier to reject the traditional practice of female infanticide than the technological option of sex determination leading to female feticide.

The sample in this study is rather small and not representative of women in Amritsar. It is a case study of urban, educated, and middle-class women in two clinics. Women with different incomes, education, religions, castes, and sites may have different opinions. Still, this case study shows that technological fixes have been responsible for increasing the status of women within the family and society as well as improving their self-esteem and self-worth. At the same time, SDT have intensified the problem for women. In the name of choices and technical literacy, men (or family) are controlling women's reproductive activities and health. Women undergo the sex determination tests and subsequent abortions either because of external pressure from family and society or because of internalization of patriarchal values. Women's choice of SDT and abortion can only be considered meaningful if there is gender equity.

There is no simple solution as to how to remedy this longtime injustice against female children. The ban on SDT does not appear to be the best solution. Proponents of technological fixes do not practice social fixes, which are viewed as impractical because it is difficult to get people to change their habits and attitudes. Still, a number of social fixes can be implemented. There is a need to raise social awareness through educational and cultural activities. Women should be raised and educated to become a part of the labor force. Voluntary organizations have been opposing the practice of female feticide and highlighting the positive role of daughters. Many states in India have also developed a plan of action to enforce the right of the girl child. For instance, Haryana State has introduced The Apni Beti Apna Dhan to improve the social acceptability of girls by making them financially independent. It gives Rs. 500 (approximately $12) within 15 days of each girl's birth and invests Rs. 2,500 (approximately $60) on behalf of the girl, which eventually matures to Rs. 36,000 (approximately $850) (Kapur, Khan, & Radhakrishnan, 1999).

References

Agnes, F. (1992). Protecting women against violence? *Economic and Political Weekly*, *27*, WS19-WS34.

Arora, D. (1996). The victimizing discourse: Sex-determination technologies and policy. *Economic and Political Weekly*, *31*, 420-424.

Basu, A. (1992). *Culture, status of women and demographic behavior.* Oxford, UK: Clarendon.

Booth, B. E., Verma, M., & Buri, R. S. (1994). Foetal sex determination in infants in Punjab, India: Correlation and implications. *British Medical Journal*, *309*, 1259-1261.

Bose, A. (2001). Census of India 2001 and after. *Economic and Political Weekly*, *36*, 1685-1687.

Census of India Series I. (2001). *India provisional population totals, paper 1 of 2001*. New Delhi, India: Registrar General.

Chauhan, B. (1998, March 20-21). *Socio-legal implications of Prenatal Diagnostic Techniques Act 1994*. Paper presented at the Workshop on Prenatal Sex-Determination and the Critical Aspects of Female Foeticide, Vatsalya, Lucknow, India.

Forum Against Sex Determination and Sex Pre-Selection. (1994). Using technology, choosing sex: The campaign against sex determination and the question of choice. In V. Shiva (Ed.), *Close to home: Women reconnect ecology, health and development worldwide* (pp. 527-534). New Delhi, India: Kali for Women.

George, S. M., & Dahiya, R. S. (1998). Female foeticide in rural Haryana. *Economic and Political Weekly*, *33*, 2191-2198.

Is it a boy? [Editorial]. (1990). *Lancet*, *336*, 87-88.

Kakodkar, P. (1997, June 5). Sex determination tests continue in Maharashtra. *The Times of India*, p. 7.

Kapur, D., Khan, S., & Radhakrishnan, A. (1999). *Female infanticide and foeticide: A legal perspective*. Banglore: National School of India.

Kishwar, M. (1995). When daughters are unwanted: Sex determination tests in India. *Manushi*, *86*, 15-22.

Krishnaswamy, S. (1988). Female infanticide in contemporary India. In R. Ghadially (Ed.), *Women in Indian society: A reader* (pp. 90-114). New Delhi, India: Sage.

Kumar, S. (1994). Legislation on prenatal sex determination in India. *Lancet*, *344*, 399.

Lingam, L. (1998). Sex detection tests and female foeticide: Discrimination before birth. In L. Lingam (Ed.), *Understanding women's health issues: A reader* (pp. 209-218). New Delhi, India: Kali for Women.

Muzumdar, K. (1998). Women and violence: A human rights perspective. In S. Kudchedkar & S. Al-Issa (Eds.), *Violence against women: Women against violence* (pp. 28-48). New Delhi, India: Pencraft International.

Rajan, S. I., Mishra, U. S., & Vimala, T. K. (1996). Choosing a permanent contraceptive: Does son preference matter? *Economic and Political Weekly*, *31*, 1980-1984.

Ravindra, R. P. (1987). Struggle against sex determination techniques: Unfinished battle. *Economic and Political Weekly*, *22*, 490-492.

Singh, N. (1998, March 20-21). *Technical session*. Paper presented in the Workshop on Prenatal Sex-Determination and the Critical Aspects of Female Foeticide, Vatsalya, Lucknow, India.

Vatsalya. (1998, March 20-21). *Workshop on prenatal sex-determination and the critical aspects of female foeticide*. Lucknow, India: Author.

Vatsalya. (2000). *People's perceptions on female foeticide in Uttar Pradesh: A study.* Lucknow, India: Author.

Volti, R. (1995). *Society and technological change*. New York: St. Martin's.

Weinberg, A. M. (1997). Can technology replace social engineering? In A. H. Teich (Ed.), *Technology and the man's future* (pp. 55-64). New York: St. Martin's.

Weiss, R. (1996, May 11). Anti-girl bias rises in Asia, studies show: Abortion augmenting infanticide. *The Washington Post*, p. A1.

Women voice concern over female foeticide. (1998, March 21). *The Times of India*, p. 14.

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