

Evaluation of ICT Led Initiative to Address Declining Sex Ratio in Kolhapur, Maharashtra

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ABBREVIATIONS

STBG	Save The Baby Girl
SIOB	Silent Observer
USG	Ultra Sono Graphy
PCPNDT	Preconception Prenatal Diagnostic Techniques
SHSRC	State Health Systems Resource Centre
UNFPA	United Nations Populations Fund
ANM	Auxillary Nurse Midwife
AWW	Angan Wadi Worker
LHV	Lady Health Visitors
PHC	Primary Health Centre
ICT	Information & Communication Technology
GB	Giga Bytes
MTP	Medical Termination of Pregnancy
AA	Appropriate Authority
GOI	Government Of India
ANC	Ante Natal Care
GPS	Global Positioning System
GPRS	General Packet Radio Service
SRB	Sex Ratio at Birth
MGIMS	Mahatma Gandhi Medical Institute of Medical Sciences
IIPS	International Institute of Population Sciences
HMIS	Health Management Information System
CEO	Chief Executive Officer
IMA	Indian Medical Association
IRIA	Indian Radiological and Imaging Association
AMOGS	Association of Maharashtra Obstetrics and Gynaecological Societies
FOGSI	Federation of Obstetric and Gynaecological Societies of India
FGD	Focus Group Discussion
SC	Sub Center
NGO	Non Government Organisation
DASS	Doctors Against Sex Selection
MBBS	Bachelor of Medicine and Bachelor of Surgery
BAMS	Bachelor of Ayurvedic Medicine and Surgery
EMI	Electro magnetic Interference
USB	Universal Serial Bus

Executive Summary

Son preference and discrimination against the girl child is almost universal in India and manifests it in many ways. The most shocking, however is pre-birth elimination of female fetuses. According to the 2011 census, India recorded a sex ratio of 940 females per 1000 males. In Maharashtra, the sex ratio has declined from 934 females per 1000 males in 1991 to 922 females in the 2001 census and went up marginally to 925 as per the 2011 census. The sex ratio for the 0-6 years age group, known as child sex ratio, has shown a sharp decline from 945 in 1991 to 914 in 2011 for the country. Maharashtra recorded the highest decline in Child Sex Ratio from 946 in 1991 to 883 in 2011. Sex Ratio at Birth defined as the number of girls born for every 1000 boys born is a more accurate and refined indicator of the extent of pre natal sex selection. According to the Sample Registration System, India in 2006-08 recorded a sex ratio at birth of 904 and Maharashtra a sex ratio at birth of 884 as against 883 and 887 in 2001-03 respectively.

The issue of survival of the girl child is a critical one and needs to be addressed systematically at different levels. Several efforts have been made by Government and Non Government organizations to address this issue. One such effort to address the issue of declining number of girls was a project titled save the baby girl initiated in Kolhapur district of Maharashtra. This initiative evolved a unique ICT led solution in the form of a dedicated web portal- www.savethebabygirl.com. As part of this initiative, login ids were provided to all sonography centers in the district and it was mandated that they register online. All centers were required to fill in online, all standard forms as per the PCPNDT Act on a daily basis. All information fed in is collected on a centralized web server and applications have been designed to generate various reports and statistics, in order to identify key indicators and check performance of each center. The information, especially F Forms are processed and displayed using an online dashboard, which reveal summary status of sonographies conducted. Simultaneously individual logins are provided to various levels of district administration so that concerned authorities can view reports on their personalized dashboards. Analysis of information generated could pinpoint the erring centers. This initiative impressed upon the doctors that the district administration was watchful and that lapses would be noticed. The limitation of the initiative was that it was not able to pinpoint no reporting, underreporting or wrong reporting of sonography tests. As a next step, another technology based solution was developed – The silent observer. This device fitted on a cable connecting the machine and monitor could capture videos and images displayed on monitors of sonography machines. The silent observer

collects all images that pass through the cable and stores these on the hard disc of the device. Hence, it was felt that it would become easier for the district administration to get the entire record of each and every sonography test performed even if not reported online on the web portal. It is believed that the twin ICT led solutions in the form of web portal and the silent observer would reverse the declining sex ratio in a period of one year in Kolhapur district.

The Government of Maharashtra was very keen to replicate this initiative across the State. However, before up scaling, it was decided that the initiative should be evaluated for its potential to reverse the declining trend in sex ratio. Government of Maharashtra hence requested UNFPA to provide financial and technical support for the evaluation study. It was decided that the study will be conducted by a multi disciplinary team of consultants (demographer, sociologist, public health and electronics/ instrumentation expert) and coordinated by the State Health Systems Resource Center.

The broad objective of the study is to evaluate various aspects of the ICT led initiative consisting of the web portal and silent observer in Kolhapur, to assess its impact in terms of improvement in sex ratio at birth and analyze whether the initiative has facilitated improvement in reporting systems as mandated under the PCPNDT Act. The study also aimed to assess the technical and financial efficacy of the web-portal and SIOB and its potential for replication.

For the study on Evaluation of ICT Led initiative of Kolhapur, data from various sources was collected, factual data about registered USG centers, number of births (rural and urban) number of MTPs (rural and urban) and sex ratio at birth was collected from district administration. In addition to this, medical officers, health workers (ANMs, LHV, AWWs) were interviewed. Other stakeholders like members of professional medical bodies (IMA, IRIA, and AMOGS), appropriate authorities, sonologists, civil society organizations, media representatives, representatives of NGOs and women in the 18-50 years age group were contacted for the study. For comparison purposes, a control district was selected giving equal weightage to urban rural population, female literacy and per capita income. Based on the above criteria, Aurangabad district was found to be closest to Kolhapur and was hence selected as the control district. Considering that because of the ICT led initiative in Kolhapur and the deterrent created, women might go to neighboring districts for determining the sex of the unborn foetus, information from Sangli and Belgaum district neighboring Kolhapur was also collected.

The study revealed that there is no significant change in sex ratio at birth in Kolhapur, one year after the initiation of the ICT led initiative. It was however felt that the impact, if any of the initiative would be visible only after around a year and a half of its initiation.

The study analyzed if there has been any improvement in reporting of F forms as a result of the initiative. Study findings reveal that reporting of F forms have increased both in the study and control districts. The study team perceived that increase in reporting of F forms could be due to efforts carried out by NGOs and Government of Maharashtra for effective implementation of the PCPNDT Act. Hence, there is no conclusive evidence of increase in reporting of F forms in Kolhapur because of the ICT led initiative. The study team tried to analyze improvement in quality of filled in 'F' forms but this could not be judged because of inadequate data prior to initiation of the ICT led initiative. However, the general perception was that completeness of data in the F form has improved as the online entry does not accept F forms unless all fields are filled in. The study team however felt that just installation of the device cannot verify correctness of the information provided in the F form. Further, F forms filled online do not bear the signature of the doctor and the consent of the client. It would hence be necessary to verify the validity of such forms as evidence in court of law.

The Kolhapur District Administration mentioned that electronically filled in 'F' forms of "Vulnerable" clients (clients with one or two daughters and women above 35 years of age) are frequently examined to ensure, one that clinics report correct diagnosis and two to identify clinics that are possibly indulging in sex selection. These F forms are then correlated with images captured and copied from SIOB. However, in spite of repeated requests the study team did not receive any proceedings of meetings organized or any documented proof to review 'F' forms and correlating it with the images captured in the SIOB. Therefore, it seems that the electronically filled in 'F' forms are not being examined regularly. Further, as regards copying of images and linking these with form F, only around 10% of the sonologists interviewed stated that images were copied from their SIOB and that too only once since the inception of the project.

The images whenever copied are copied on an external device like a pen drive. Such images are liable for tampering and hence would not stand as evidence in the court of law. Further, it was observed that there is no full proof way to link image and form 'F'. It was also observed that the procedure of copying the image is not as per standard legal procedure of collecting evidence. It would also be important to mention that no follow up action has been initiated by the Appropriate Authority of Kolhapur based on linking F form with images captured on the SIOB.

The current capacity of the SIOB (500GB) device for storing videos and images is claimed to suffice for a period of six months of average usage, the PCPNDT Act however mandates that records need to be maintained for a period of two years, hence these two need to be coterminous.

The interventions of sealing the wire connecting the SIOB to the USG machine, to make it tamper proof is not tamper proof in the true sense as the study team observed that the seals were thin stickers, which were not numbered and a large number of spare stickers were seen at the USG centers. It was also observed that some machines have an on off button which can be used to bypass the device.

Discussions with stakeholders regarding their perceptions of the ICT led initiative revealed that, the device has definitely helped to create a fear in the minds of sonologists that they are being watched and hence the intervention has had a deterrent effect. It was however mentioned that SIOB is not a requirement under the PCPNDT Act. There were a lot of issues related to ethical concerns regarding disclosing client details to persons other than Appropriate Authority and treating physician. Sonologists also mentioned that the initiative had overburdened them because they were required to not only fill F forms online but also maintain them physically. Most stakeholders felt that while the device might have created a deterrent it has not succeeded in curbing the practice of sex selection as they feel clients wanting sex determination services might be going to neighboring districts to seek these services.

The direct cost of the SIOB device is Rs. 28,500/-. However implementing the initiative would involve costs other than the direct cost like setting up of the STBG web portal, its maintenance, setting up of a unit for copying the images and monitoring the program, maintenance of SIOB devices and cost of appointment of a team of specialists to match F forms with images captured on the SIOB device.

The study team also felt that even in case of Kolhapur, where the district collector was extremely motivated, the implementation of project activities is not happening as planned and proposed. Secondly no case has been filed in the court of law as a result of this initiative. In this background, in districts where the district administration may not be as motivated as district collector of Kolhapur the implementation of this initiative, if up-scaled may not show desired impact.

Thus the study concludes that:

- *There was no indication of reversal in sex ratio at birth in Kolhapur because of the SIOB initiative.*
- *The reporting of the F form in terms of numbers has improved both in the study district as well as in the control district. Thus there is no evidence to show that this initiative has led to a significant increase in reporting of F forms.*
- *The study reveals that the SIOB is not a full proof device, as it can be tempered with. The evidence generated may not stand in court of law.*
- *The SIOB devise is seen as a deterrent by the district administration but no action has been taken by the districts based on the evidence generated by it since the inception of the project(for which district administration has some reasoning). While many stakeholders also perceive that the initiative has been able to create a fear because of the of monitoring of f forms and correlating them with images, it does not address the issue of sex selection as clients seeking sex determination services go to neighboring districts for the same.*
- *The Radiologists feel strongly that SIOB is not a requirement under the law and there are issues regarding breach in confidentiality.*
- *Apart from the direct cost of web portal and the direct cost of the SIOB devise is about Rs. 28,500/- per piece, there are indirect costs involved (which could be huge) in its implementation.*

The decision regarding replication of the ICT led initiative may be taken keeping the study findings as well as the direct and indirect cost involved in implementation.

Chapter 1

Introduction

1.1 Background

Son preference and discrimination against the girl child is almost universal in India and manifests it in many ways. The most shocking, however is pre-birth elimination of female fetuses. Sex ratio, the number of females per 1000 males is an important social indicator to measure the extent of prevailing equity between males and females in a society. It is also a sensitive indicator of development. According to the 2011 census, India recorded a sex ratio of 940 females per 1000 males, which is the lowest amongst the ten most populous countries of the world. In Maharashtra, the sex ratio has declined from 934 females per 1000 males in 1991 to 922 females in the 2001 census and went up marginally to 925 as per the 2011 census. The sex ratio for the 0-6 years age group, known as child sex ratio, has shown a sharp decline from 945 in 1991 to 914 in 2011 for the country. Maharashtra recorded the highest decline in Child Sex Ratio from 946 in 1991 to 883 in 2011.

Sex Ratio at Birth defined as the number of girls born for every 1000 boys born (globally it is defined as the number of boys born for every 100 girls born) is a more accurate and refined indicator of the extent of pre natal sex selection. According to the Sample Registration System, which regularly collects data on sex ratio at birth, India in 2006-08 recorded a sex ratio at birth of 904 and Maharashtra a sex ratio at birth of 884. In 2001-03 the statistics were 883 and 887 respectively. Globally, the Sex Ratio at Birth is observed to vary between 950 to 975 girls per to 1000 boys.

The issue of survival of the girl child is a critical one and needs to be addressed systematically at different levels. Several efforts have been made by Government and Non Government organizations to address this issue. All these efforts have yielded different results. Maharashtra was in fact, the first state to enact the Maharashtra regulation of use of Pre Natal Diagnostic Techniques Act in 1987, which led to the enactment of the Prevention of misuse of Pre Natal Diagnostic Techniques (PNDT) Act in 1994 and the amended Pre conception and prenatal diagnostic techniques (PCPNDT) Act in 2003. Other interventions have aimed at creating

awareness on the issue and effective implementation of the PCPNDT Act. One such effort to address the issue of declining number of girls was a project titled, “ save the baby girl” initiated in Kolhapur district of Maharashtra. This initiative evolved a unique ICT led solution in the form of a dedicated web portal- www.savethebabygirl.com. As part of this initiative, login ids were provided to all sonography centers in the district and it was mandated that they register online. All centers were required to fill in online, all standard forms as per the PCPNDT Act on a daily basis. All information fed in is collected on a centralized web server and applications have been designed to generate various reports and statistics, in order to identify key indicators and check performance of each center. The information, especially F Forms are processed and displayed using an online dashboard, which reveal summary status of sonographies conducted. Simultaneously individual logins are provided to various levels of district administration so that concerned authorities can view reports on their personalized dashboards. Analysis of information generated could pinpoint the erring centers. This initiative impressed upon the doctors that the district administration was watchful and that lapses would be noticed. The limitation of the initiative was that it was not able to pinpoint no reporting, underreporting or wrong reporting of sonography tests. As a next step, another technology based solution was developed – the “silent observer” (SIOB). This device fitted on a cable connecting the machine and monitor could capture videos and images displayed on monitors of sonography machines. The silent observer collects all images that pass through the cable and stores these on the hard disc of the device. Hence, it was felt that it would become easier for the district administration to get the entire record of each and every sonography test performed even if not reported online on the web portal. It is believed that the twin ICT led solutions in the form of web portal and the silent observer would reverse the declining sex ratio in a period of one year in Kolhapur district.*

The Government of Maharashtra is very keen to replicate this initiative across the State. However, before up scaling, it was decided that the initiative should be evaluated for its potential to reverse the declining trend in sex ratio

* www.savethebabygirl.com

Government of Maharashtra hence requested UNFPA to provide financial and technical support for the evaluation study. In consultation with the Department of Public Health, Government of Maharashtra, it was decided that the study will be conducted by a multi disciplinary team of consultants (demographer, sociologist, public health and electronics/instrumentation expert) and coordinated by the State Health Systems Resource Center.

1.2 Details of the ICT led initiative

Save the Baby Girl (STBG) Web portal:

The STBG web portal was launched in district Kolhapur on 15th August 2009 and was run on a pilot basis from then through 30th September 2009. After a successful trial, the initiative was up scaled to cover the entire Kolhapur district from 3rd October 2009. The initiative has been undertaken as a Public Private partnership in which a private organization called Magnum Opus has developed the web portal. The broad objectives of creating the STBG web portal were: effective and close monitoring of USG centers in Kolhapur district and to address the under reporting or false reporting from USG centers.

Key features of STBG:

- All sonography centers or clinics with a USG machine have been given a unique login id and password.
- These centers fill online data on a daily basis, in formats as prescribed by the government. The most important Forms amongst these being the Form F.
- Form F is filled on line for all pregnant women undergoing sonography. Completeness of the filled in Form F is mandatory by each centre, as incomplete entries are not accepted by the portal. The centers are also required to keep a physical copy of the F form and maintain this record for a period of two years as prescribed under the PCPNDT Act.
- The information on MTPs and institutional deliveries is also collected online through this portal.
- Automated monthly reports are generated through the web portal, which makes analysis of the data easier.

- The information is analyzed and monitored by the Appropriate Authorities (AAs) at the Block and District level. All AAs in the district are given login ID and password so that they could see the analysis and reports generated by the portal.

Data which is available under the STBG:

- Number of USG centers across Kolhapur district.
- Rural and urban USG centers.
- Details of USG machines in these centers.
- Details of Radiologists at each center.
- Date of registration and date of renewal of registration of the centers.

Thus attempts are being made to follow each pregnancy to find out if it resulted in abortion or birth of a child.

Silent Observer (SIOB):

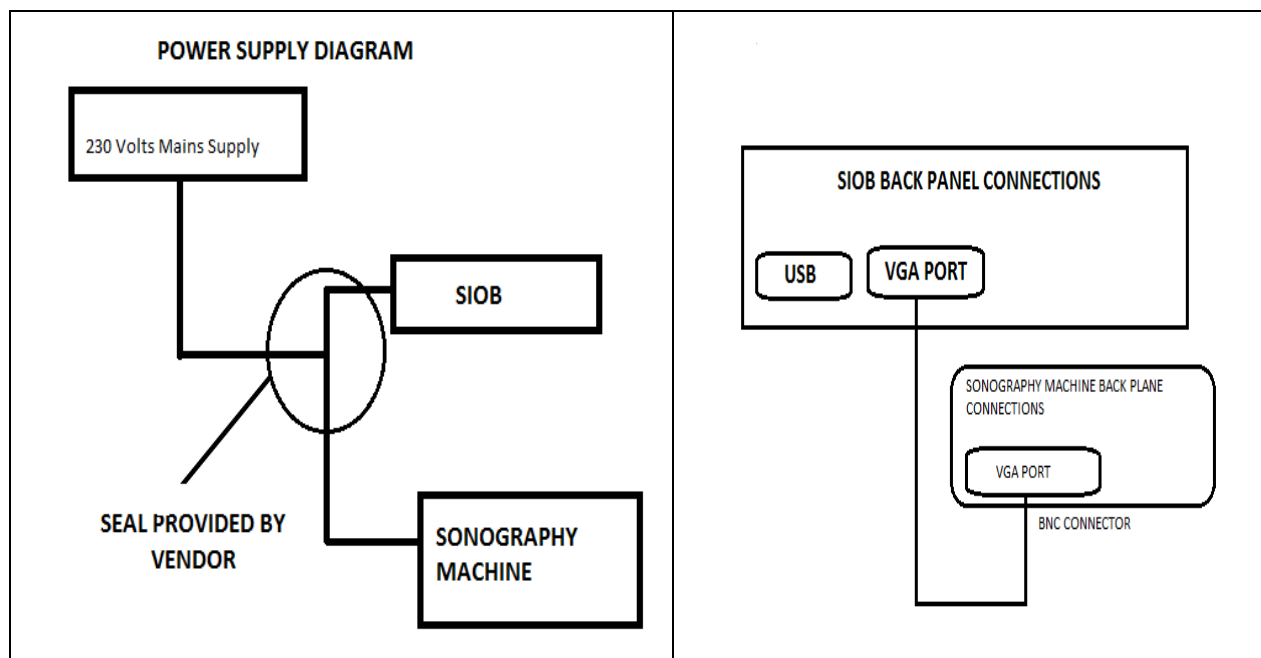
The Silent Observer a device which if attached to the ultrasound machine can capture images of ultra-sonographies done was developed to validate the STBG data. This initiative was launched on 5th March 2010. SIOB is used to record all videos and images of sonographies carried out at the registered USG clinics. The main objective for establishing SIOB was to cross check the data from the F forms filled online. It intended to curb the under reporting or false reporting of sonographies carried out at the registered centers. Thus, it acts as a validation tool for the data generated through the STBG online portal. The parameters and indicators for closer scrutiny of F Forms with SIOB images undertaken by the District Administration include:

- Pregnant women with one or more girls.
- Pregnant women of age 35 and above.
- Pregnant women with history of birth abnormalities/anomaly.

Key features of SIOB:

- The SIOB device is connected externally through cables to the USG machine.
- It starts automatically when the USG machine is switched on.
- It has a hard disc of 500 GB capacity. Considering average usage, the SIOB can store video images for up-to a period of six months. However this may vary depending upon the workload at the center.
- The SIOB has no delete option.
- SIOB Stores data in an encrypted and compressed manner, with a secure username and password.
- The device auto generates log reports.
- The device has an inbuilt GPS and GPRS unit to track USG movements, if any.
- It is possible to check the software and hardware functioning of the SIOB through GPS and GPRS.
- Images of suspected cases can be copied for viewing.
- Stores the data of all sonographies performed at the centers.

Diagram 1
Line diagram of Silent Observer



Benefits of the ICT led initiative as claimed by district administration:

The District administration of Kolhapur claims that the ICT led initiative consisting of STBG and SIOB has the following benefits:

- Tracking of all ANC casess and USG centers is possible.
- SIOB data i.e. images along with F forms may act as evidence in the Court of Law.
- The data generated through the web portal can be used for various research studies.
- The initiative acts as a deterrent and hence has reversed the trends in sex ratio at birth in the district.



1.3 Objectives of the study:

The broad objective of the study is to evaluate various aspects of the ICT led initiative consisting of the web portal and silent observer in Kolhapur, to assess its impact in terms of improvement in sex ratio at birth. In particular, the research study would aim to:

- Evaluate usefulness of the web-portal and silent observer in terms of improving sex ratio at birth
- Study whether the initiative has facilitated improvement in reporting system as mandated under the PCPNDT Act
- Study the technical and financial efficacy of the web-portal and SIOB and its potential for replication

- Assess the perceptions of various stakeholders (Radiologists, Gynecologists, Medical Associations, Legal Experts, Appropriate Authorities, Civil Society, potential users etc.) regarding utility of web-portal and SIOB

1.4 Research Questions:

The following research questions will be examined as part of this evaluation study:

- Whether Sex Ratio at Birth (SRB) in Kolhapur district has improved over the last one year period since the implementation of the ICT led initiative?
- Is there any improvement in reporting of Form F in the district after the implementation of the ICT led initiative?
- Are there improvements in the content of reporting of Form F? Are there any evidences of increase in pregnant women migrating out of the district for getting ultrasound done?

Chapter 2

Methodology

In order to firm up the research design, the research team visited Kolhapur had preliminary discussions with the District Administration and officials involved in implementation of the ICT led initiative in Kolhapur District. This included the District Collector, District and Sub District Appropriate Authorities and representatives of Magnum Opus, the organisation which has developed and maintains the ICT led initiative. As part of the discussions, the District administration provided the research team along with representatives of UNFPA and SHSRC with details about the initiative and progress made thus far. The CEO of Magnum Opus described the key features of the STBG web portal and SIOB. District Collector shared his experiences of introducing such an intervention. As part of the visit to Kolhapur, the research team also visited registered centers participating in this project to get first-hand information about the working of this project. Subsequent to the initial visit, the research team finalized the research design and tools to undertake the study.

2.1 Research Design

The evaluation team adopted a before and after study design with case and control approach. Evidences on key aspects were gathered before implementation of the initiative in Kolhapur district and after the innovation had been implemented. For comparison purposes, a control district was selected based on the following criteria giving equal weightage:

- Urban Rural population
- Female Literacy
- Per capita income

The data from 5 districts: Pune, Aurangabad, Sangli, Satara and Solapur were compared with that of Kolhapur. A composite index was formed on the above mentioned data and analysis was done. The district closest to Kolhapur on the basis of the above mentioned parameters was found to be Aurangabad. Hence, Aurangabad was selected as the Control district.

It was felt that as a result of the ICT led initiative in Kolhapur and the deterrent created, women might go to neighboring districts to determine the sex of the unborn foetus, information from Sangli and Belgaum districts, neighboring Kolhapur was also collected.

Both quantitative and qualitative methods were used for collecting data for the study. Secondary data from various sources was collected to gather evidences for examining the research questions. The sources of secondary data included Civil Registration System, so as to get the sex composition of births during the study period, trends in number of abortions reported before and after implementation of the initiative and analysis of Form F information. Factual data about registered USG centers was also collected from district administration. Using the above data, month wise Sex Ratio at Birth was estimated before and after the initiation of the ICT led initiative.

Qualitative methods involving in-depth interviews of stakeholders were undertaken to understand their perception, viewpoints and experiences. The stakeholders included members of professional medical bodies (IMA, IRIA, AMOGS), Appropriate Authorities, Principle District and Sessions Judge, elected representatives, sonologists, civil society organizations, media representatives, representatives of NGOs, Medical officers, health workers like Auxillary Nurse Midwife's (ANMs), Anaganwadi workers (AWWs) and Lady Health Visitors (LHVs). In addition, a few focus group discussions among community members were conducted to elicit communities' perspective on sex selection practices and their opinion about the initiative. Groups with whom FGDs were conducted included: women in the reproductive age group, currently pregnant women and mothers- in-law who act as key decision makers regarding undergoing sex determination. In all four FGDs were conducted in Kolhapur, three in Sangli and four in Belgaum. Table 1 shows the data sources for each of the research questions.

Table 1

Data source for study:

Sr. No.	Objective	Data source	Nature of data
1.	Improvement in reporting system	Web portal	Secondary
2.	Technical feasibility and financial implication of SIOB	Interviews of stake holders	Primary
3	Perceptions of various stakeholders	In depth interviews of stake holders	Primary
4	Usefulness of web portal and SIOB	Sex ratio at birth from all possible sources and data on MTP	Secondary

2.2 Sample size and sampling

There are 243 registered USG centers that are part of the initiative and use the STBG web portal and SIOB. Of these, 124 are in rural areas and 119 are in urban areas which means they are almost equally distributed. It was decided to undertake the study in minimum 10% of randomly selected centers. For accommodating non response 30 ultrasound centers were randomly selected in the study district after giving proper representation to the geographical spread of these centers within the district. Information about their spread was collected before drawing samples. In the selected centers, in depth interviews were conducted with the director / owner, radiologists and gynecologist (if not attached to the centre, the one which refers maximum cases of pregnant women).

It was decided that FGDs need to be conducted in at least four villages to understand the perceptions of people. For selection of the villages, multistage sampling was used. Kolhapur district has a total of 12 blocks out of which four were selected by simple random sampling. A random number from the first digits of any random currency note was drawn to select the blocks. A list of villages was available from each of these 4 blocks. Again a random number was selected using the above method to draw a list of villages where the FGDs would be conducted. The following blocks and respective villages were selected:

- Lakhampur village, block Gagan Bavada
- Hupri village, block Hathkanagle.
- Methge village, block Kagal.
- Dasevadi village, block Bhudargarh.

Considering that due to the deterrent impact of the SIOB initiative in Kolhapur district, there could be a possibility that women might go for sex selection in the fringe areas of neighboring districts, Sangli and Belgaum. These districts were also included for conducting focus group discussions. The following adjacent blocks and villages from Sangli and Belgaum district were selected:

Sangli:

- Bahadurwadi, block Walwa
- Malewadi, block, Shirala
- Tandulawadi, block, Walwa

Belgaum:

- Manikwad, block Chikodi
- Chikkodi, block chikodi
- Manjriwadi, block chikodi
- Pattankudi, block chikodi

2.3 Scope of work

The task under the study involved collection and analysis of secondary data on SRB, MTP, etc. The secondary data for a period of more than one year was obtained from various sources to examine before and after trends, the scope of work also included conducting validation and quality checks of the data and its interpretation. In addition, information generated from qualitative enquiry was also analyzed. The technical aspects of the SIOB device were also examined including the possibility of manipulation, tempering etc. The financial considerations of the intervention were also examined in view of up scaling.

2.4 Constitution of evaluation team:

It was decided that the study would be coordinated through the State Health Systems Resource Centre. An interdisciplinary team consisting of a social scientist, electronics/ instrumentation expert, a demographer and a public health expert were appointed to undertake the study. The interdisciplinary team selected to undertake the study is shown in Table 2. The study team made an initial visit to Kolhapur to understand the context and details of implementation of this initiative, which helped in finalization of the research tools. Once the research tools were finalized, data from various sources pertaining to the objectives was collected. For this purpose, a team of two research associates were also engaged by the coordinating agency. In addition to this, Professor P. M. Kulkarni a senior demographer from Jawaharlal Nehru University of Delhi was specially invited to draw samples and to review and finalize the study tools. Staff of UNFPA provided technical support for undertaking the study, analysis of data and finalisation of report.

Table 2
Details of interdisciplinary research team

Sr. No.	Particulars of expertise	Details
1.	Team Coordinator	Dr. P. P. Doke, Executive Director, SHSRC, Pune
2.	Social scientist	Prof. R. K. Mutatkar, President, Maharashtra Association of Anthropological Sciences, Pune
3.	Demographer	Dr. F. Ram, Director International Institute for population Sciences, Deonar, Mumbai
4.	Public Health Expert	Dr. B. S. Garg, Dean , MGIM, Sevagram, Wardha
5.	Instrumentation engineer	Dr. S. D. Agashe, Head Department of Instrumentation, College of Engineering, Pune

Chapter 3

Observations

3.1 Sex Ratio at Birth

For the purpose of the evaluation of the ICT led initiative, secondary data on month wise births was analyzed to study trends in Sex Ratio at Birth before and after the initiative. Sources of this data included Civil Registration System. The data was collected for both the study and control districts, Kolhapur and Aurangabad respectively. Data for the rural area of district, Corporation and other urban areas was collected separately.

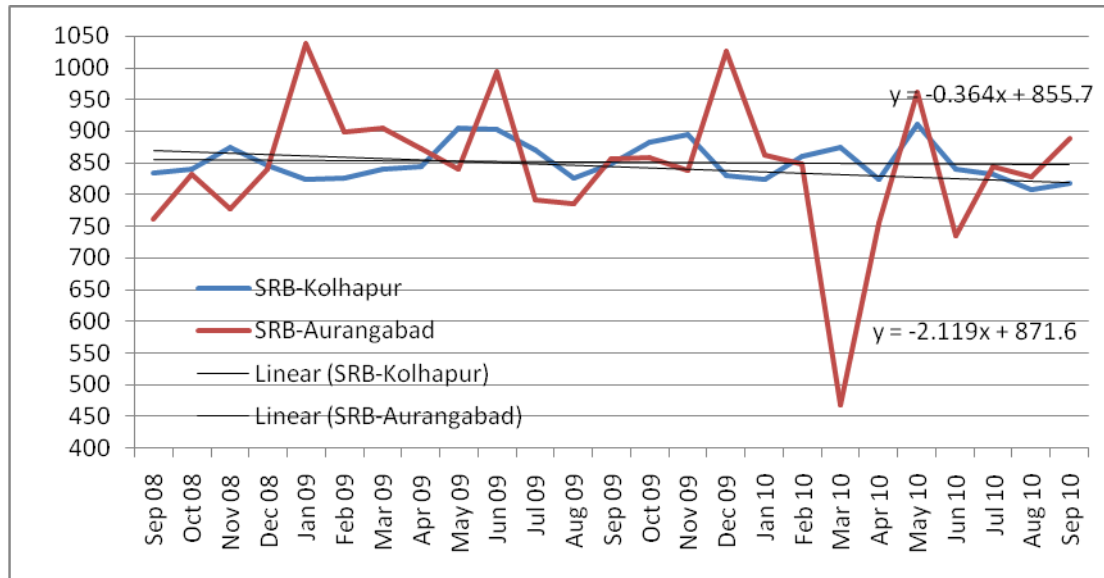
The sex ratio at birth for urban areas of Kolhapur and Aurangabad, other than Kolhapur Municipal Corporation and Aurangabad Municipal Corporation is given in Table 3. This includes data for one year prior to launch of the STBG portal (October 2009) and one year after the launch of the same. In the study district the number of registered male births range from 1621 to 2187 before the intervention and 1589 to 2116 after the intervention. The female births range from 1339 to 1686 before and 1341 to 1665 after the intervention respectively. The average Sex Ratio at Birth in urban areas of Kolhapur district before and after the intervention was 854 (SD 28, S.E. $\bar{x}$ 5.6) and 850 (SD 34, S.E. $\bar{x}$ 6.8) respectively with wide variation by month. In Aurangabad, the control district the number of registered male births range from 239 to 393 during the corresponding period before the intervention and 322 to 585 after the intervention. The female births range from 202 to 317 before and 229 to 373 after the intervention respectively. The average Sex Ratio at Birth in urban areas of Aurangabad district before and after the intervention was 869 (SD 80, SE $\bar{x}$ 16) and 826 (SD137, SE $\bar{x}$ 27.4) respectively with wide variation by month.

The Sex Ratio at Birth in urban Kolhapur shows an almost flat trend over the project period. A similar trend is visible in Aurangabad, although the pace of improvement is marginally lower. However the correlation of Sex Ratio at Birth and improvement over the months is weak. (Refer Figure 1). The average sex ratio in Kolhapur after the STBG intervention is 850 which falls within 95% confidence limits of SRB before the intervention. The impact of the STBG intervention which was launched in October 2009 will be visible from June 2010 onwards on Sex Ratio at Birth. When the Sex Ratio at Birth is compared with the Sex Ratio at Birth of corresponding months of the previous year, there is a decline.

Table 3
Number of registered births in urban areas of Kolhapur and Aurangabad
by month, September 2008-September 2010

Months	Kolhapur			Aurangabad		
	Male	Female	Sex Ratio	Male	Female	Sex Ratio
Sep 08	1773	1478	834	367	279	760
Oct 08	1811	1520	839	299	249	833
Nov 08	1801	1575	875	260	202	777
Dec 08	1759	1488	846	255	214	839
Jan 09	1721	1418	824	235	244	1038
Feb 09	1621	1339	826	245	220	898
Mar 09	1806	1516	839	282	255	904
Apr 09	1832	1545	843	282	246	872
May 09	1863	1686	905	280	235	839
Jun 09	1714	1547	903	292	290	993
Jul 09	1813	1578	870	393	311	791
Aug 09	1839	1520	827	390	306	785
Sep 09	2187	1853	847	370	317	857
Oct 09	2116	1867	882	346	297	858
Nov 09	1826	1633	894	322	270	839
Dec 09	1818	1510	831	300	308	1027
Jan 10	1685	1389	824	307	265	863
Feb 10	1589	1366	860	270	229	848
Mar 10	1904	1665	874	585	274	468
Apr 10	1846	1520	823	315	238	756
May 10	1693	1543	911	356	342	961
Jun 10	1597	1341	840	373	274	735
Jul 10	1748	1456	833	371	313	844
Aug 10	1949	1574	808	450	373	829
Sep 10	1761	1440	818	380	338	889

Figure 1
Sex Ratio at Birth in urban Kolhapur and Aurangabad
(Other than Kolhapur and Aurangabad Municipal Corporation)



The sex ratio at birth for rural areas of Kolhapur and Aurangabad is given in Table 4. This includes data for one year prior to launch of the STBG portal (October 2009) and one year after the launch of the same. In the study district the number of registered male births range from 807 to 1045 before the intervention and 836 to 1078 after the intervention. The female births range from 752 to 909 before and 702 to 914 after the intervention respectively. The average Sex Ratio at Birth in rural areas of Kolhapur district before and after the intervention was 825 (SD 55, SE x 11) and 850 (SD 49, SE x 9.8) respectively with wide variation by month. In the control district the number of registered male births range from 1209 to 1617 before the intervention and 1291 to 1726 after the intervention. The female births range from 1005 to 1174 before and 986 to 1386 after the intervention respectively. The average Sex Ratio at Birth in rural areas of Aurangabad district before and after the intervention was 827 (SD 43, SE x 8.6) and 810 (SD 27, SE x 5.4) respectively with wide variation by month.

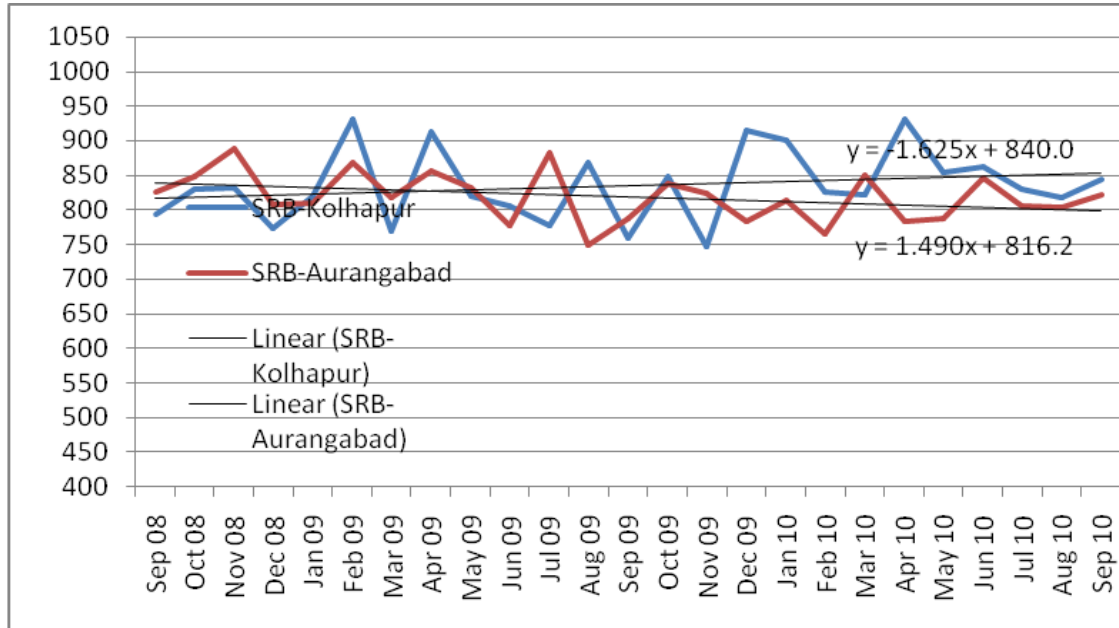
The Sex Ratio at Birth in rural Kolhapur shows an improving trend over the project period. While in Aurangabad, a declining trend is visible. However there are wide variations and the correlation is weak. (Refer Figure 2)

Table 4
Number of registered births and SRB in rural areas of Kolhapur and Aurangabad
by month, September 2008-September 2010

Months	Kolhapur			Aurangabad		
	Male	Female	Sex Ratio	Male	Female	Sex Ratio
Sep 08	1199	952	794	1626	1344	827
Oct 08	1002	832	830	1413	1198	848
Nov 08	1045	870	833	1557	1382	888
Dec 08	1032	799	774	1445	1167	808
Jan 09	966	792	820	1287	1041	809
Feb 09	807	752	932	1331	1155	868
Mar 09	1143	880	770	1417	1158	817
Apr 09	864	789	913	1197	1025	856
May 09	921	755	820	1209	1005	831
Jun 09	1019	820	805	1447	1125	777
Jul 09	1139	886	778	1329	1174	883
Aug 09	1047	909	868	1551	1163	750
Sep 09	1019	773	759	1617	1275	788
Oct 09	1078	914	848	1375	1153	839
Nov 09	1055	788	747	1529	1259	823
Dec 09	992	907	914	1502	1176	783
Jan 10	920	829	901	1291	1050	813
Feb 10	923	763	827	1373	1051	765
Mar 10	972	798	821	1334	1135	851
Apr 10	836	778	931	1368	1072	784
May 10	860	734	853	1252	986	788
Jun 10	963	831	863	1445	1222	846
Jul 10	968	804	831	1495	1205	806
Aug 10	859	702	817	1726	1386	803
Sep 10	1043	880	844	1550	1275	823

Figure 2

Sex Ratio at Birth in rural Kolhapur and Aurangabad

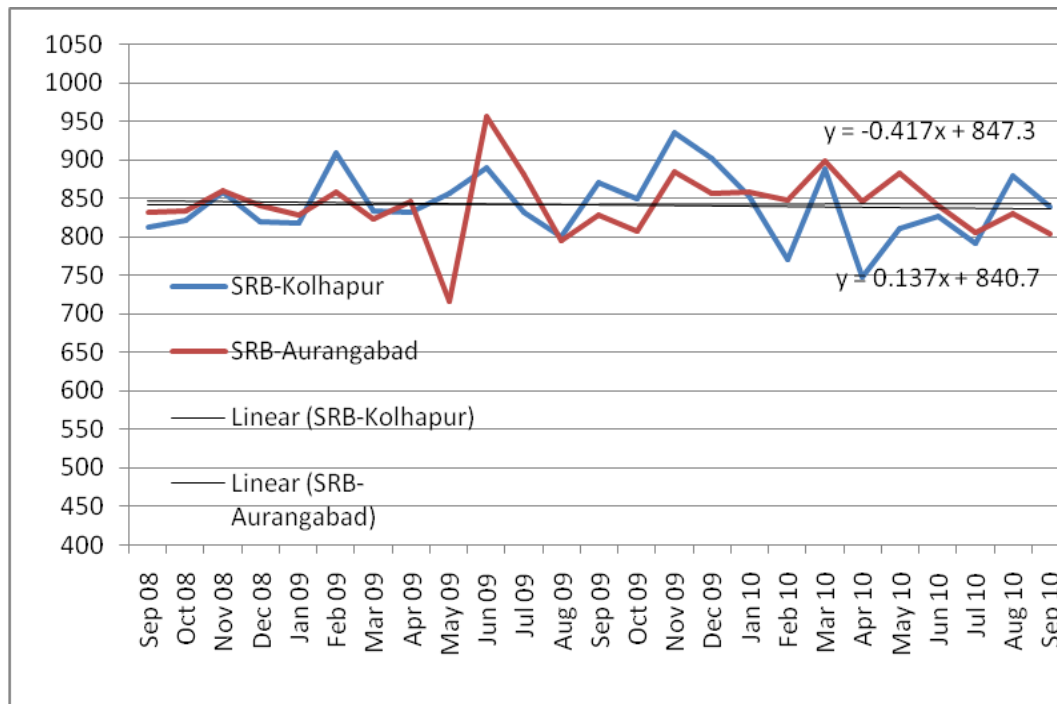


The sex ratio at birth for Kolhapur and Aurangabad Municipal Corporations is given in Table 5. This includes data for one year prior to launch of the STBG portal (October 2009) and one year after the launch of the same. In Kolhapur Corporation the number of registered male births ranges from 400 to 990 before the intervention and 270 to 454 after the intervention. The female births range from 320 to 867 before and 223 to 386 after the intervention respectively. The average Sex Ratio at Birth in Kolhapur Corporation before and after the intervention was 843 (SD 32, SE x 6.4) and 841 (SD 55, SE x 11) respectively with wide variation by month. In Aurangabad Corporation the numbers of registered male births range from 982 to 2956 before the intervention and 1119 to 2657 after the intervention. The female births range from 781 to 2462 before and 902 to 2351 after the intervention respectively. The average Sex Ratio at Birth in Aurangabad Corporation before and after the intervention was 840 (SD 56, SE x11.2) and 879 (SD 32, SE x 6.4) respectively with wide variation by month. The Sex Ratio at Birth in both Kolhapur and Aurangabad Corporations show a marginal upward trend over the project period. (Refer Figure 3)

Table 5
Number of registered births and SRB in Municipal Corporations of
Kolhapur and Aurangabad by month, September 2008-Septemver 2010

Months	Kolhapur			Aurangabad		
	Male	Female	Sex Ratio	Male	Female	Sex Ratio
Sep 08	893	726	813	2384	1982	831
Oct 08	990	814	822	2956	2462	833
Nov 08	971	834	859	1701	1463	860
Dec 08	934	765	819	1347	1133	841
Jan 09	913	746	817	2236	1854	829
Feb 09	810	736	909	1690	1450	858
Mar 09	931	777	835	1725	1420	823
Apr 09	998	831	833	1448	1226	847
May 09	967	828	856	2473	1771	716
Jun 09	974	867	890	1448	1385	956
Jul 09	879	731	832	1682	1483	882
Aug 09	400	320	800	982	781	795
Sep 09	525	457	870	2294	1902	829
Oct 09	454	386	850	1305	1053	807
Nov 09	338	316	935	2657	2351	885
Dec 09	314	283	901	1978	1694	856
Jan 10	325	277	852	1750	1501	858
Feb 10	315	243	771	1601	1356	847
Mar 10	351	312	889	2045	1838	899
Apr 10	360	269	747	1266	1071	846
May 10	276	224	812	1858	1639	882
Jun 10	270	223	826	1768	1488	842
Jul 10	283	224	792	1119	902	806
Aug 10	350	308	880	1244	1032	830
Sep 10	342	287	839	1393	1120	804

Figure 3
Sex Ratio at Birth in Kolhapur and Aurangabad Municipal Corporations



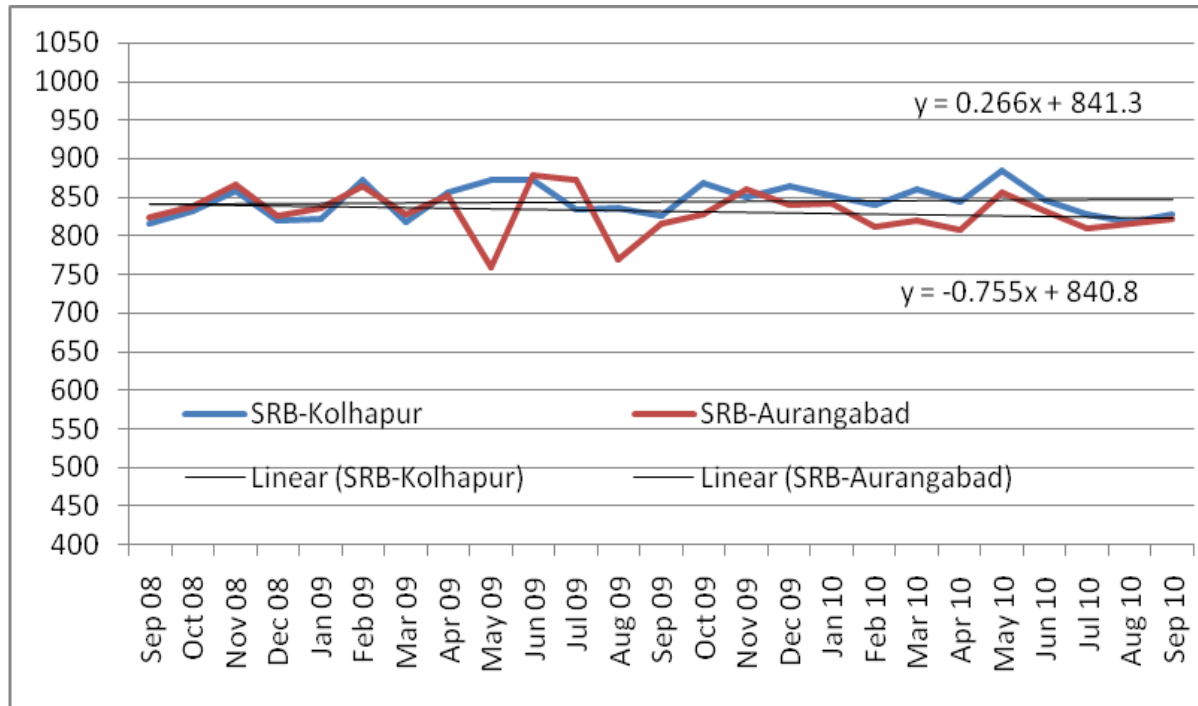
The sex ratio at birth for Kolhapur and Aurangabad districts as a whole is given in Table 6. This includes data for one year prior to launch of the STBG portal (October 2009) and one year after the launch of the same. In Kolhapur the number of registered male births ranges from 3803 in October 2008 to 3238 in Feb 2009 before the intervention and 3648 in) October 2009 to 2827 in Feb 2010 after the intervention. The female births range from 3279 in November 2008 to 2749 in August 2009 before and 3167 in October 2009 to 2372 in February 2010 after the intervention respectively. The average Sex Ratio at Birth in Kolhapur before and after the intervention was 844 (SD 11, SE x 2.2) and 849 (SD 12, SE x 2.4) respectively with wide variation by month. In Aurangabad the numbers of registered male births range from 4668 in October 2008 to 2923 in August 2009 before the intervention and 4508 in November 2009 to 2949 in April 2010 after the intervention. The female births range from 3909 in October 2008 to 2250 in August 2009 before and 3880 in November 2009 to 2381 April 2010 after the intervention respectively. The average Sex Ratio at Birth in Aurangabad before and after the intervention was 834 (SD 14, SE x 2.8) and 829 (SD 11, SE x 2.2) respectively with wide variation by month.

The trend in Sex Ratio at Birth in both Kolhapur and Aurangabad Corporations is more or less flat indicating that there is no or very little improvement in Sex Ratio at Birth in Kolhapur district after the intervention (Refer Figure 4)

Table 6
Number of registered births in Kolhapur and Aurangabad
By month, September 2008-September 2010

Months	Kolhapur			Aurangabad		
	Male	Female	Sex Ratio	Male	Female	Sex Ratio
Sep 08	3865	3156	817	4377	3605	824
Oct 08	3803	3166	833	4668	3909	837
Nov 08	3817	3279	859	3518	3047	866
Dec 08	3725	3052	819	3047	2514	825
Jan 09	3600	2956	821	3758	3139	835
Feb 09	3238	2827	873	3266	2825	865
Mar 09	3880	3173	818	3424	2833	827
Apr 09	3694	3165	857	2927	2497	853
May 09	3751	3269	872	3962	3011	760
Jun 09	3707	3234	872	3187	2800	879
Jul 09	3831	3195	834	3404	2968	872
Aug 09	3286	2749	837	2923	2250	770
Sep 09	3731	3083	826	4281	3494	816
Oct 09	3648	3167	868	3026	2503	827
Nov 09	3219	2737	850	4508	3880	861
Dec 09	3124	2700	864	3780	3178	841
Jan 10	2930	2495	852	3348	2816	841
Feb 10	2827	2372	839	3244	2636	813
Mar 10	3227	2775	860	3964	3247	819
Apr 10	3042	2567	844	2949	2381	807
May 10	2829	2501	884	3466	2967	856
Jun 10	2830	2395	846	3586	2984	832
Jul 10	2999	2484	828	2985	2420	811
Aug 10	3158	2584	818	3420	2791	816
Sep 10	3146	2607	829	3323	2733	822

Figure 4
Sex Ratio at Birth for Kolhapur and Aurangabad



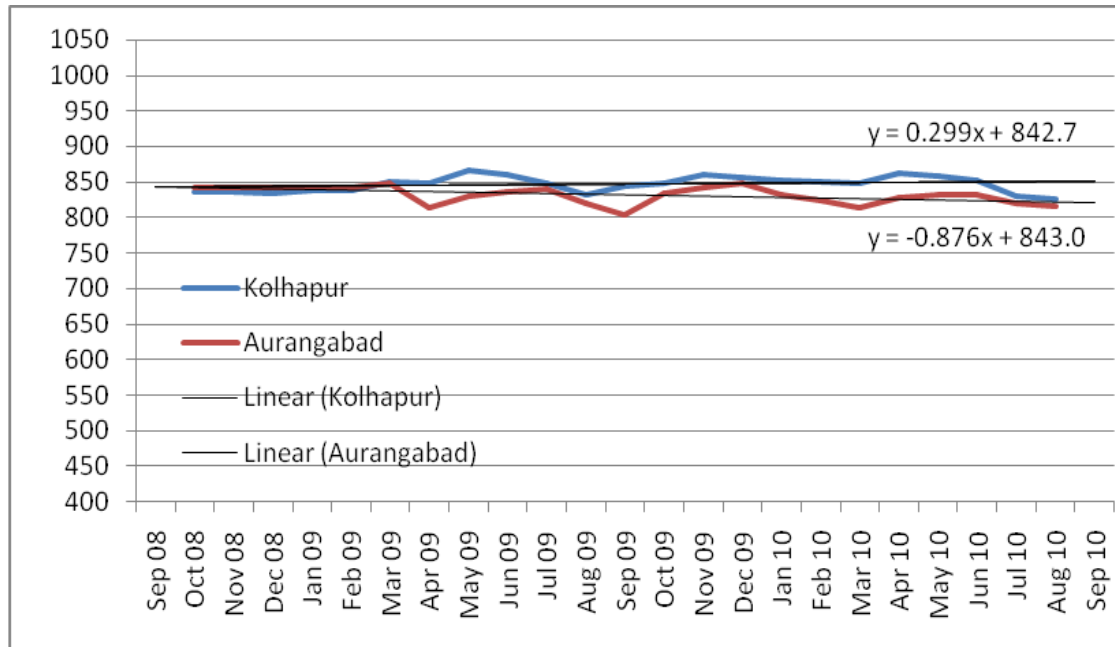
As there is wide variation in the monthly data for male and female births and sex ratio at birth, three monthly moving averages for sex ratio at birth was calculated for both Kolhapur and Aurangabad. The moving average of sex ratio at birth is presented in table 7 shown below.

Table 7**Three monthly moving averages for Sex Ratio at Birth for Kolhapur and Aurangabad**

Months	Kolhapur			Aurangabad		
	Male	Female	Sex Ratio	Male	Female	Sex Ratio
Sep 08	3865	3156	817	4377	3605	824
Oct 08	3803	3166	833	4668	3909	837
Nov 08	3817	3279	859	3518	3047	866
Dec 08	3725	3052	819	3047	2514	825
Jan 09	3600	2956	821	3758	3139	835
Feb 09	3238	2827	873	3266	2825	865
Mar 09	3880	3173	818	3424	2833	827
Apr 09	3694	3165	857	2927	2497	853
May 09	3751	3269	872	3962	3011	760
Jun 09	3707	3234	872	3187	2800	879
Jul 09	3831	3195	834	3404	2968	872
Aug 09	3286	2749	837	2923	2250	770
Sep 09	3731	3083	826	4281	3494	816
Oct 09	3648	3167	868	3026	2503	827
Nov 09	3219	2737	850	4508	3880	861
Dec 09	3124	2700	864	3780	3178	841
Jan 10	2930	2495	852	3348	2816	841
Feb 10	2827	2372	839	3244	2636	813
Mar 10	3227	2775	860	3964	3247	819
Apr 10	3042	2567	844	2949	2381	807
May 10	2829	2501	884	3466	2967	856
Jun 10	2830	2395	846	3586	2984	832
Jul 10	2999	2484	828	2985	2420	811
Aug 10	3158	2584	818	3420	2791	816
Sep 10	3146	2607	829	3323	2733	822

Figure 5

Three monthly moving averages for Sex Ratio at Birth for Kolhapur and Aurangabad



Average sex ratio at birth in Kolhapur is 844 (SE 3) before and 849 (SE 4) after the intervention. While the sex ratio at birth is 834 (SE 4) before and 829 (SE 3) after the intervention. The 95% confidence limits before and after the intervention overlap indicating that the observed difference is not significant. The trend also confirms the above observation. (Refer Figure 5).

The analysis of sex ratio data before and after the ICT led initiative for district Kolhapur does not indicate any significant change in trends in Sex Ratio at Birth. This may be due to the fact that this study covers a period of only part of one year after the launch of the intervention.

Since sex detection is possible and hence mainly done in the second trimester of pregnancy. Due to deterrent action it was believed that there will be reduction in number of terminations carried out in 12-20 weeks gestation. Data on MTP between 12 and 20 weeks of gestation was collected and analysis done to understand if reported number of MTPs have any correlation with SRB. No significant correlation was observed between MTP during 12 and 20 weeks of gestation and Sex Ratio at Birth. Correlation coefficient was -0.36 and p value > 0.05

3.2 Analysis of F forms

The PCPNDT Act mandates that all Genetic laboratories, genetic counseling centers and genetic clinics including ultrasound clinics and imaging centers maintain certain mandatory records. Off these, genetic clinics and ultrasound/imaging centers are mandated to maintain Form F. This form records identification data of the clients, menstrual history, history of genetic diseases, indications for pre natal diagnosis, the procedure/investigation conducted the result of the procedure and medical advice. It also records the declaration of the pregnant woman and of the doctor conducting USG regarding not asking and revealing respectively sex of the unborn foetus. This form is an important document which is used for monitoring the genetic and ultrasound clinics for understanding violations under the Act.

Online entries of form 'F' on save the baby girl (STBG) web portal were initiated in Kolhapur district since October 2009. The district administration claims that because of the STBG web portal and SIOB, under reporting and incomplete reporting has been eliminated in the district. It is also claimed that the quality of the information provided in the F form has improved. In order to examine this, the study team collected information on number of F forms submitted by the registered centers online between October 2009 and December 2010. The information on F Forms submitted was also collected from the control district. The data is presented in Table 8

Table 8

Ratio of Form 'F' and total births in District Kolhapur and Aurangabad

Months	Kolhapur			Aurangabad		
	Total births	F forms	Ratio	Total births	F forms	Ratio
Oct 09	6815	9902	1.45	5529		
Nov 09	5956	10349	1.74	8388		
Dec 09	5824	10882	1.87	6958		
Jan 10	5425	7203	1.33	6164	3604	0.58
Feb 10	5199	9828	1.89	5880	3259	0.55
Mar 10	6002	12357	2.06	7211	4883	0.68
Apr 10	5609	11316	2.02	5330	4220	0.79
May 10	5330	11202	2.10	6433	4484	0.70
Jun 10	5225	11887	2.28	6570	5417	0.82
Jul 10	5483	13695	2.50	5405	6039	1.12
Aug 10	5742	14052	2.45	6211	4573	0.74
Sep 10	5753	13331	2.32	6056	4376	0.72

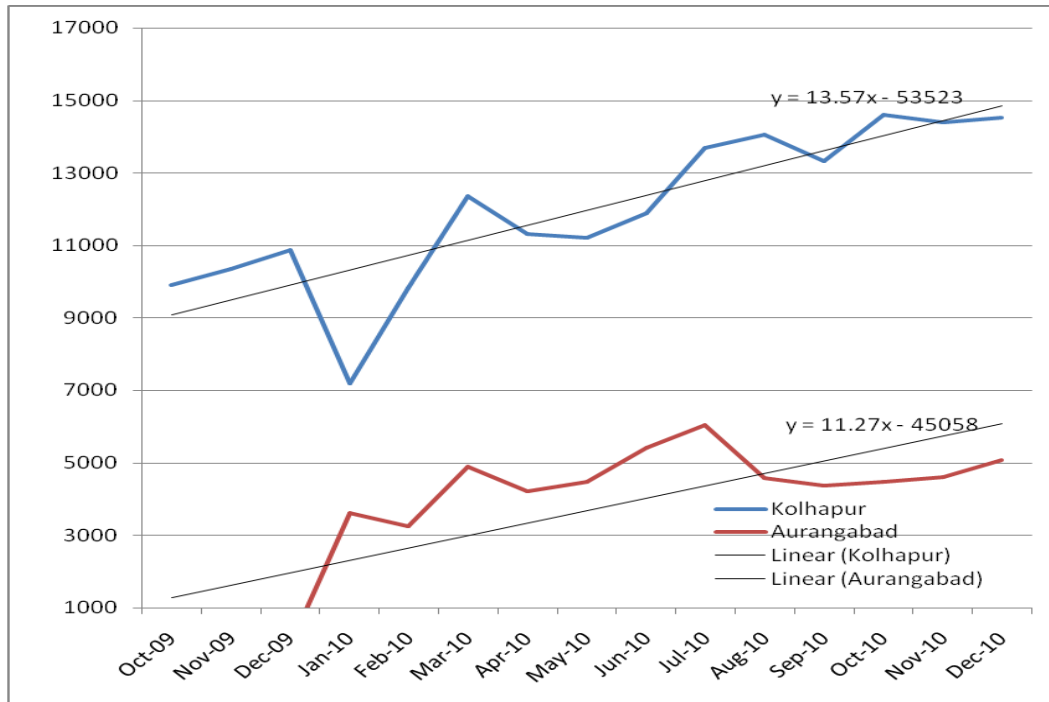
Ratio of Form 'F' and total births in District Kolhapur and Aurangabad

Months	Kolhapur			Aurangabad		
	Total births	F forms	Ratio	Total births	F forms	Ratio
Oct 09	6815	9902	1.45	5529		
Nov 09	6815	10349	1.74	8388		
Dec 09	6815	10882	1.87	6958		
Jan 10	6815	7203	1.33	6164	3604	0.58
Feb 10	6815	9828	1.89	5880	3259	0.55
Mar 10	6815	12357	2.06	7211	4883	0.68
Apr 10	6815	11316	2.02	5330	4220	0.79
May 10	6815	11202	2.1	6433	4484	0.7
Jun 10	6815	11887	2.28	6570	5417	0.82
Jul 10	6815	13695	2.5	5405	6039	1.12
Aug 10	6815	14052	2.45	6211	4573	0.74
Sep 10	6815	13331	2.32	6056	4376	0.72
Total	81780	136004	1.956126	76135	40855	0.722589

In district Kolhapur 9902 forms were submitted in October 2009 as against 14523 forms in December 2010. This shows an improvement of 47 percent during the period since the inception of the web portal. Similarly the numbers of F Forms submitted in Aurangabad has increased from 3604 in January 2010 to 5078 in December 2010, an overall increase of 41 percent. The data indicates that reporting of F Form has improved in both the study and control districts, although it is marginally higher in the study district. It is also important to note that there are variations and fluctuations in the reporting by month in both the districts. See Figure 6. Hence, there is no conclusive evidence of increase in 'F' forms because of the project. The study team perceives that increase in the numbers of form 'F' in both the study and control districts could be due to increased awareness of the PCPNDT' Act and other efforts carried out by NGOs and Government of Maharashtra. However some stakeholders like civil surgeon, medical superintendent of rural hospitals and the Collector perceive that under reporting has almost stopped in Kolhapur since the initiation of the project. The data indicate that on an average in Kolhapur district each pregnant woman is seeking sonography services 2.3 times after the intervention which is higher than the average of 1.45 after the intervention. It is also noteworthy that in the control district pregnant women were seeking sonography services less than one time in the corresponding time frame.

Figure 6

Number of F Forms submitted, Kolhapur and Aurangabad



The improvement in quality of filled in 'F' forms could not be judged because of inadequate data prior to initiation of the ICT led initiative. It is perceived that the completeness of the data in the F form has improved as the online entry does not accept the form unless all fields are filled in. However the correctness of the information cannot be ensured.

The Kolhapur District Administration mentioned that electronically filled in 'F' forms of "Vulnerable" clients (clients with one or two daughters and women above 35 years of age) are frequently examined to ensure, one that clinics report correct diagnosis and two to identify clinics that are possibly indulging in sex selection. These F forms are then correlated with images captured and copied from SIOB. However, in spite of repeated requests the study team did not receive any proceedings of meetings organized to review 'F' forms and correlating it with the images captured in the SIOB. Therefore, it seems that the electronically filled in 'F' forms are not being examined regularly. Further, as regards copying of images and linking these with form 'F' only around 10% of the sonologists interviewed stated that images were copied from their SIOB and that too only once since the inception of the project.

It would also be important to mention that no follow up action has been initiated by the Appropriate Authority of the district based on the above system that has been introduced in the study district as part of the ICT led initiative. This reaffirms the above observation.

As regards variations in the reporting on the F forms and images captured from SIOB, many sonologists were of the view that since most sonologists and USG centers provide images along with the report, this is a wasteful exercise. They also mentioned that there is a possibility of difference of opinion of experts on the findings.

The study team observed that since F forms are filled online they do not bear the signature of the doctor and the consent of the client. It would hence be important to verify the validity of such forms as evidence.

3.3 Findings from In-depth interviews and Focus Group Discussions:

Qualitative methods involving in-depth interviews of stakeholders were undertaken to understand their perception, viewpoints and experiences. The stakeholders included members of professional medical bodies (IMA, IRIA, AMOGS), Appropriate Authorities, Principle District and Sessions Judge, elected representatives, sonologists, civil society organizations, media representatives, representatives of NGOs, Medical officers, health workers like Auxillary Nurse Midwife's (ANMs), Anaganwadi workers (AWWs) and Lady Health Visitors (LHVs). In addition, a few focus group discussions among community members were conducted to elicit communities' perspective on sex selection practices and their opinion about the initiative. Groups with whom FGDs were conducted included: women in the reproductive age group, currently pregnant women, and mothers in law who act as key decision makers regarding undergoing sex determination. The numbers of in-depth interviews and Focus group discussions conducted with different stakeholders are shown in Table 9

Table 9**In depth interviews conducted with stakeholders****I. Medical Persons**

Sr.No.	Category	No. Interviewed	Remarks
1.	Members of technical association	12	Two state level and two district level officials of IMA, IRIA and AMOGs respectively.
2.	Appropriate Authorities	4	Civil surgeon (Kolhapur, sangli and Balgaum), 2 Medical Superintendents of rural hospitals in Kolhapur, MOH (Kolhapur Municipal Corporation)
3.	Registered sonologists	30	12% sample of total 243 clinics using TBG and SIOB
4.	MOs & LHVs	14	20% of the total 72 PHCs, randomly selected from PHCs in Kolhapur
5.	Health workers AWWs ANMs	60 60	5% of 1200 Anganwadi Centers selected randomly and ANMs corresponding to these villages

II. Non Medical persons and representatives of civil society and legal community

Sr.No.	Category	No. Interviewed	Remarks
1.	Legal experts	1	Principal, District and session judge.
2.	Elected representatives	4	2 women from Zilla Parishad and 2 women members from Municipal Corporation including Mayor.
3.	NGOs	2	
4.	Media representatives	2	Editors of local newspapers

Given below are the findings from the in-depth interviews and focus group discussions

In-depth interviews with members of Technical Associations

All members of professional and technical associations like IMA, IRIA and AMOGS who were interviewed as part of the study were aware about the decline in sex ratio. According to them this practice was mainly due to widespread preference for sons and daughters being considered a liability, mainly because of the practice of dowry and because investments in them are wasteful as they have to be married away and would ultimately leave the parental home.

Secretary IMA (Maharashtra State Chapter) informed that IMA has taken up the issue of addressing the skewed sex ratio. They have trained doctors from their district chapters and have constituted committees called Doctors Against Sex Selection (DASS) in the last few years. The DASS committee members voluntarily visit all USG centres to verify if they are PCPNDT compliant and also undertake training and capacity building of medical college students and IMA members on the issue of sex selection and PCPNDT Act.

All members of technical associations interviewed were aware about the PCPNDT act. According to them there is a need for stricter implementation of the PCPNDT Act. They however felt that clients seeking sex determination services should also be punished in addition to erring doctors, as currently there are very few cases registered against couples/families seeking sex determination services. They were of the opinion that the Act alone may not be able to address the issue, there was a need to change deep-rooted mindsets where girls are considered as a liability and address cultural practices like that of dowry. An interesting fact that came out of the discussions was that stricter implementation of the Act in a small area would not have major impact as clients seeking services would go to the peripheries or neighboring areas to get these services. They felt that a well defined program to address the issue which included awareness generation, changing and addressing deep rooted prejudices, and effective implementation of the Act has to be taken up on a war footing over a long period of time.

IRIA representatives who were interviewed felt that the PCPNDT act needs to be reviewed and modified. They commented that government should implement the Act in its true spirit as in many cases doctors involved in the practice get away while others are troubled for minor mistakes. They mentioned that authorities should stop harassing doctors for petty issues like reporting of wrong address in the Form f as doctors only report what they are told by the client. Minor mistakes are considered as major offences. They also felt very strongly that SIOB was not a requirement as per the law. They said that the SIOB has been currently forced on the radiologists and that they had to bear the cost of the device, which is quite high. The cost of the device is Rs 28,500/-. They however said that if the government wants to implement such an initiative, they should fit the device free of cost.

Members of AMOGS appreciated the SIOB and STBG initiative and said that it would definitely act as a deterrent for those doing sex determination tests, as the SIOB gives a recording of all sonographies done, which can act as evidence. In contrast to the above, IMA members, Maharashtra state chapter were not aware of SIOB and STBG- web portal.

Some members of technical associations believe that due to the fear created in Kolhapur because of the ICT initiative, people may be going to the neighbouring towns in Karnataka or Sangli to get sex determination done from these places. Thus the ICT led initiative may have little or no impact in curbing the practice of sex determination. The members also believed that there could still be unregistered machines especially in the peripheral areas of the district.

The ethical issue regarding disclosing patient's details on public domain was raised during interaction with some members of the radiological association. They felt that this was a breach of confidentiality.

Members of IRIA also informed that since USG centers were required to maintain both physical and online F forms, their workload has increased. Hence, the STBG web portal does not serve any significant purpose in terms of reducing the workload of ultrasonography centers, as is the claim. They also informed that various problems are encountered by members while filling F-forms online like not opening of website, server down, etc. This has also increased the workload of USG centers.

IMA secretary also made a point that SIOB may not work in some areas because people do Chorionic Villi Biopsy for foetus less than 12 weeks and then go for DNA testing. Hence, all cases undergoing sex determination cannot be identified with this measure.

The representative of AMOGS perceived that since more and more providers are using medical abortion which goes unreported, it would be very difficult to correlate MTP with sex selection

In-depth interviews with Appropriate Authorities

The Appropriate Authorities felt that the deeply rooted discrimination against women and male domination have got further aggravated with the invention and easy availability of the ultrasonography machines, as this made it possible to determine the sex of the unborn foetus

and eliminate it if found to be female. They felt that in Kolhapur this practice was very high because the district is fertile and the heart of the sugar growing belt. Hence, while on the one hand people have disposable income to be able to access services, on the other hand because of the demand, the number of machines in the district is also very high. Thus, both the ability and willingness to pay combined with availability of services is responsible for adverse sex ratio in the district.

Civil surgeon, Kolhapur, the District Appropriate Authority felt that health providers were responsible for popularizing the sonography as those who refer clients for sonography receive a percentage of the cost in the form of a 'cut' for every referral. Other reasons for adverse sex ratio mentioned by Appropriate Authorities included the preference of sons because of reasons of lineage and the belief that salvation can be attained only if son performs the last rites. They also mentioned that increasingly families are adopting the one child norm where the preference for a male child is much higher. Consequently, women end up adopting sex selection to eliminate the female foetus.

According to Collector, Kolhapur, there is nexus between demanding clients and unethical practitioners. These practitioners create an artificial demand for this facility and it has become a vicious cycle of demand and supply.

The taluka appropriate authority felt that the PCPNDT act was an appropriate tool to address the declining sex ratio, if implemented in its true spirit, while the civil surgeon, the district Appropriate Authority felt that the act was a tool without teeth to it. According to him the Act overburdens the civil surgeon who has several other responsibilities in addition to PCPNDT Act implementation. He felt that physical verification of Forms F is a troublesome and time intensive process. He added that while discharging duties as an Appropriate Authority his dutifulness sometimes gets compromised because of other responsibilities. He however felt that The PCPNDT act has become more effective with STBG and SIOB. According to him, with on line reporting of Forms F on the STBG web portal, monitoring has become easier as it saves lot of time and energy which would otherwise be wasted in physical visits to the clinics. Hence, he does not need to go for physical verification. He at his leisure can open the web portal and review the 'suspected' cases.

According to Collector Kolhapur the SIOB and STBG, will work as a deterrent upon doctors. He feels that if the supply is curtailed the demand will also come down. He said that SIOB and STBG have saved lot of time and resources of Appropriate Authorities. It is now much easier for them to monitor USG centers. Various other advantages of the ICT initiative were listed by appropriate authorities, these included the fact that SIOB can store data for a period of six months, it would reduce underreporting of sonographies conducted, with SIOB all MTPs can be retrospectively tracked and video images of sonographies can be correlated with F-forms as conclusive proof.

The civil surgeon also informed that the main hurdle with respect to the web portal is the problem of power failure. This has lead to errors in the on line entry of F forms. These errors have been detected during the physical verification visits by the civil surgeon. During the visits, manual forms were checked with that of online forms.

The issue of confidentiality of patient data raised by members of technical associations was shared with District AA. His views on this issue were that the ICT led initiative does not violate confidentiality of patient information as the data and images collected are examined and seen by the experts in presence of AA for the purpose of validation.

The possibility of migration of clients from Kolhapur district to neighbouring districts for sex selection due to the fear created in Kolhapur, was also discussed with AAs of neighbouring districts. The Appropriate Authority of Sangli District perceived that there may be a marginal migration of pregnant women from Kolhapur to Sangli district for sex determination tests as Kolhapur district had implemented the ICT led project. Appropriate Authority of Belgaum district felt that he does not perceive that there is any migration for sex selection tests from Kolhapur to Belgaum city but felt that people may be going to Nipani a town bordering Kolhapur for sex determination. However, they had no relevant data to validate their impressions.

In-depth interviews with sonologists:

While all sonologists interviewed, were aware of the practice of sex selection, only 57% had correct information regarding the current child sex ratio. Sonologists attributed declining sex ratio to the prevailing socio cultural norms such as affluence and ability to afford cost of services, son preference, dowry, male domination, lack of education and other social concerns such girls being considered paraya dhan. Around 4% of the sonologists were not aware about the provisions of the PCPNDT Act.

The opinion of sonologists about usefulness of STBG and SIOB was also sought. Majority (68%) of the sonologists was of the opinion that SIOB and STBG is useful device and would act as a deterrent. When asked about their opinion regarding the impact of SIOB and STBG in terms of improving sex ratio, 84 % of the sonologists responded positively about its impact. Many sonologists did not welcome the procedure of electronic filling in of F- forms as it increases their workload. Around 63% of sonologists preferred manual filling in of F- forms. As per PCPNDT act it is mandatory to maintain physically filled in F-forms, all sonologists said that they were filling F forms both online and physically and this is time consuming.

To understand whether SIOB has any impact on the number of clients visiting ultrasonography clinics, sonologists were asked about the impact of the device on their clientele. 77 % of the sonologists felt that SIOB has no impact on the number of clients visiting their centers.

33% of sonologists perceived that clients may be migrating to neighboring districts from Kolhapur for sex determination. Some sonologists reported that the STBG, SIOB initiative in Kolhapur district has created so much of a fear among the professionals, that a few of them are denying USG services to women having one or two daughters.

In-depth interviews with Medical Officers

Out of 14 medical officers interviewed, 79% were MBBS and remaining 21% were BAMS doctors. All of them reported that they are aware about the adverse sex ratio in Kolhapur district. However, when asked about the child sex ratio of Kolhapur district only 31% of the Medical Officers could rightly answer that it is below 850.

As regards perception of MOs regarding the reasons for adverse sex ratio, 64% of the MOs felt that this is due to easy availability of and affordable technology. Illiteracy (21%), social practices such as dowry, safety of girls, son being a helping hand in agriculture (8%) and son preference for reasons of lineage (7%) were the other reasons put forward for adverse sex ratio by them.

The perception of Medical Officers with regard to the Socio economic status of people who opt for sex selection was also examined. 71% of the medical officers were of the opinion that sex selection is practiced by people belonging to higher economic class. 14% of MOs believe that sex selection is practiced by both people belonging to middle as well as high socio-economic status.

All medical officers were aware about the STBG web portal. As against this, awareness regarding SIOB was a little less as only about 86% of the medical officers were aware about SIOB. Further, the opinion of medical officers about effectiveness of both STBG and SIOB in terms of improving sex ratio was also sought. 93 % of the medical officers reported that STBG and SIOB will have a positive impact in terms of improving sex ratio and 79 % of the medical officers think that it has already had certain impact.

The medical officers were further probed regarding their perceptions on the kind of impact initiative has or would have. 55% of the medical officers were of the opinion that the initiative has created fear among doctors and people, 27% of medical officers conveyed that ANC tracking has become easier with the initiative and 18% of the medical officers felt that malpractices have stopped due to strict implementation.

On the other hand 11% of MOs perceived that clients might go to neighboring districts for sex selection.

In-depth interviews with LHVs, ANMs and AWWs

Knowledge of sonography and its indications were studied among ANMs, AWWs and LHVs. It was observed that all ANM and LHVs mentioned that they knew about sonography whereas only 95% of AWWs said that they knew about sonography.

When asked about various indications for sonography during pregnancy, 27% of the ANMs reported monitoring of foetal growth and deformity as indications for sonography as against only 9% of AWWs who mentioned this as an indication. 83% of the LHVs mentioned that sonography is done to monitor the foetal growth as against about 17% who noted that sonography is done to detect both growth and foetal deformities.

The infamy with regard to the use of sonography for sex determination was examined among ANMs and AWWs. Majority of ANMs (71%) and AWW (80%) agreed that sonography is used for sex determination. On the other hand, when asked if they knew of any center providing sex determination services, very few ANM (18%) and AWW (19%) mentioned that they knew of such centers. As against this, 33% of LHVs reported that they knew of centers where sex determination is practiced. Further, a question regarding cost of sex determination services was asked but this was left unanswered by LHVs, ANMs and AWWs.

To assess the knowledge of health workers about MTP, a question regarding the gestational age upto which MTP is permitted under the MTP Act, 1972 was asked. Three fourth of the ANMs and around 45% of AWWs answered that MTP is permissible up to 12 weeks. 12% of ANMs and 22% of AWWs felt that MTP is permissible between 12 and 20 weeks. 92% of LHVs responded that MTP is permissible up to 12 weeks.

Any initiative started at policy and planning level will only be effective when it percolates to the grass root level functionaries. In view of this, health workers were asked if they were aware about this initiative. It was observed that 44% of the ANMs, 25% of AWWs and 92% LHVs were aware about the initiative. Those who were unaware about SIOB initiative were briefed about it. Further, the health workers were asked about their opinion about effectiveness of SIOB. Most of the ANM (88%) and AWW (78%) felt that the initiative would be effective. Health workers were also asked whether this initiative will prevent the practice of sex determination. All ANMs and LHVs and 96% of AWWs perceived that the initiative will be effective in preventing sex determination.

Opinion of ANMs, AWWs and LHV's was also sought on possibility of migration of clients to other district for sex selection because of the fear of the ICT led initiative. The health workers reported that prior to the initiative also women were going to neighbouring districts for sex determination and this practice continues even after the initiative. Further, health workers were also asked about the places where clients go for sex selection from Kolhapur. They mentioned that women go to Belgaum, Nipani, Sangli and other districts of Karnataka bordering Kolhapur.

In-depth interviews with Principal district and session's judge

The Principal district and sessions judge from Kolhapur was aware about the declining sex ratio in Kolhapur district. According to him sex selection was a problem of the affluent and upper middle class groups. The main reasons for the practice of sex selection in affluent and upper middle classes according to him, was the division of family property following the amended Hindu Succession Act and huge expenditures on marriage and dowry.

The Principal District and Sessions judge was asked about the admissibility of electronic evidence, collected through the SIOB. He mentioned that electronic evidences are admissible in the court provided proper procedures as laid down in the evidence Act are followed for their collection. The PDSJ was however concerned regarding the procedure adopted for copying the images on a portable device from the SIOB. He mentioned that whenever images are copied are copied from the SIOB on an external device like a pen drive such images are liable for tampering and hence would not stand as evidence in the court of law. This is because the procedure of copying the image is not as per standard legal procedure of collecting evidence. (While copying the images from the hard disk of the SIOB on a pen drive, the pen drive should be sealed and signed by both the doctor, the authorized representative of the AA and a witness and a similar procedure should be carried out while opening the seal)

In depth interviews with representatives of media

Editors of two of the leading dailies were interviewed to get their perceptions on the issue of sex selection and the ICT led initiative. When asked about the reasons for adverse sex ratio, both the editors said that sex selection is a reflection of the low status of women in society and a patriarchal mindset steeped in son preference. The editor of Sakal further added that couples

these days desire to have small families but not without sons, which consequently results in sex selection. Prosperity in the Kolhapur region coupled with affordability and easy access to technology was another important reason for the prevalence of this practice especially in Kolhapur. According to the editor of Lokmat, the practice of sex selection is mainly due to discrimination against women and girls. Both the editors were aware about the ICT led initiative. Although the editors appreciated the project, they felt that it would be very difficult to implement such a project. Regarding effectiveness of this intervention in Kolhapur they felt that if implemented properly it could impact the practice of sex determination.

In-depth interviews with elected representatives:

The elected representatives were familiar with the declining sex ratio. On probing about the reasons for sex selection, the elected members felt that girls are considered a liability because of the practice of dowry and high expenses of marriage, because it is perceived that a girl is *parayadhan* and would be married off into another family and because there are social restrictions on girls due to safety and security concerns, especially if they are unmarried.

Elected representatives felt that doctors were to be blamed for the practice of sex selection. The ZP member who was interviewed communicated that USG centers indulging in sex determination are known to people. Strict action as per law should be taken against such violators. The Mayor of Kolhapur also echoed a similar perception. According to her the ICT led initiative started in Kolhapur district is good, however, she perceived that this should be implemented throughout the State; otherwise people would go to neighboring areas for sex selection. According to the elected representatives educating girls, helping them to become independent will help resolve the problem of declining sex ratio to some extent. They also said that strict implementation of PCPNDT is equally important. Schemes felicitating the mother giving birth to a girl child could also help felt the Mayor.

In-depth interviews with NGOs

In-depth interviews were conducted with representatives of two NGOs to gather their perception regarding the ICT led initiative. NGO representatives were of the opinion that while the initiative might have had a marginal impact, unregistered and mobile USG centers continue to be functional, which are not covered under the project. According to one NGO

representative who is a medical doctor, merely online filling of F-form would not address the issue as there is no way to validate if information provided by the clients is correct or not. Further there is a duplication of work as both hard and soft copies of F forms need to be maintained. It was also mentioned that the seals are being tampered with and sex determination continues to happen. Confidentiality was another issue discussed by the NGO representatives. One of the representative also mentioned that the project was forced down upon radiologists and their consent was not sought in the true sense.

NGO representative also perceived that since SIOB initiative has created fear among people, clients go to Karnataka for sex determination. Hence, the device has been successful in creating fear but not stopping the practice of sex determination.

Findings from Focus Group Discussions

Focus group discussions among community members were conducted to elicit communities' perspective on sex selection practices and their opinion about the initiative. Groups with whom FGDs were conducted included: women in the reproductive age group, currently pregnant women and mothers-in-law who act as key decision makers on undergoing sex determination. In all four FGDs were conducted in Kolhapur three in Sangli and four in Belgaum.

In order to ensure sensitive and ethically sound way of inviting women in the child bearing years, to participate in the FGDs, a two-step process was adopted. Researchers visited respective PHCs and explained the purpose of FGDs to the Medical Officers and other health care staff at PHCs. The staff then visited these villages and briefed village level functionaries like AWWs and ASHAs regarding the purpose of the exercise and participation criteria. The AWWs and ASHAs helped in organizing the FGDs. Each FGD was conducted by a team of two researchers, a facilitator and a notes taker. Each Focus Group Discussion lasted between 1 to 1.50 hours.

The topics discussed during the FGDs included: practices during antenatal care, health seeking preferences for antenatal care, knowledge about USG and its use in pregnancy, decision making and family support, notions about ideal family size and composition, perceptions/concerns about having a daughter or son. Researchers prepared a summary note for each FGD.

FGDs with women in Kolhapur district revealed that they were aware of misuse of sonography for illegal sex determination. While exploring reasons for banning the sex determination the responses were "Mulgi aahye mhanun padutat, mhanun bandi keli aahaye. Ashyane muli kami hotil." (Because they are female foetuses they are aborted due to this there is decline in number of girls and hence it is banned.) Women from Methge village in Kolhapur mentioned that women from their village go to Nipani and get sex determination done during fifth month. The fees for this was rupees 2700/-. As against this, women from Lakhnapur in Kolhapur responded that they can't afford the cost of sex determination as it involves other costs like travel, medicines etc. They said that only people who are well-off can afford sex determination using sonography. However, some women in the groups felt that sex determination has stopped in Kolhapur district. It was surprising to understand that women knew about the repercussions of declining sex ratio. The responses in this regard were "Muli nako aasa kasa mhanaycha, mag pudhe kasa honar?" "Aai, bahin, bayako milnar nahi. Bai aahye mhanun pudhye chhale aahye". (How can we say that girls are unwanted, what will be the future then? We will not have anybody in the role of mother, sister and wife. Lineage is because of women).

Contrary to this strong son preference was observed among the women. While talking about son preference in Sangli district one of the woman responded " Poorvichya sanskrutitil baryach padhati badlya aaheyt, pan hi ekch sanskruti chalu rahili aayhe" (The whole culture has changed except for the practice of son preference). Thus, son preference is a major issue within the community. When probed about the reasons for son preference, women responded " Mulga ha adhar asto. Mulgi hi parki aste. Mulga ha waras asto, vanshacha diva asto". (A son is required to support to the family. A girl can not always be with her parents. A boy is heir of the property and carries the family name forward). Thus family support and family lineage were found to be the main reason for son preference among women. One of the women also said that the practice of dowry is another reason for preferring sons over daughters. However, all women did not agree to this view. The views put forth by these women contradicted the above thoughts. They stated "Muli kami padtil, mag lagnala muli milanar nahi. Jag pudhe kasa chalnar, muli naslaya tar. Gharat ek mulgi havich, Mulgi aslyashivay gharala sukh nahi." (There will be shortage of girls as a result of son preference. There will be scarcity of girls for marriages. How will the community propagate then? At least one daughter should be there in a family. A family would be incomplete / discontented without a girl.)

Women from Belgaum district shared few examples like "Droupadi" and talked of Jain community which is already facing the problem of missing girls, Jain community is not finding brides of marriageable age, they added.

3.4 Observations on the technical aspects of SIOB

Technical features of SIOB and its specifications have been described in the first chapter. These features were discussed with the members of technical associations, district administration, sonologists and representatives of Magnum Opus to assess the technical efficacy and security of the device. The device is attached to the sonography machine and has a common power supply with on and off switch in some SIOB machines, the device automatically starts when the sonography machine is switched on, the device is capable of recording videos and images of all sonographies conducted in an encrypted form and there is no delete option. The device has a built in hard disk of 500 GB which is estimated to be able to store images for up to six months of average usage. Once the device is full the images are recorder by deleting the earlier images. The district administration has put a seal on the wire attaching the SIOB with the USG machine in order to make it tamper proof.

The following points were observed through a careful study of the instrument and visit to various sites where the SIOB was installed.

- The overall hardware seemed to be rugged and sturdy for remote locations. Although, standard procedures were followed while developing the unit it is just a proto-type and needs more intensive testing and CE certification before deployment.
- Although technically the SIOB device is compatible with portable sonography machines, the study team observed and doctors reported instances where the device was fitted with portable sonography machines, but did not work.
- The device has a USB port and data once copied on an external devise can be altered or tampered.
- Although the wire connecting the device with the USG machine has been sealed, the study team observed that the seals are not numbered and extra seals were found at USG

centers. Further no record of these seals was maintained. This type of sealing is meaningless.

- Though no certification is required for the unit as the same is being used externally, design needs to be validated by third party for EMI and EMC so that it does not interfere with other medical equipment.
- It was reported that during voltage fluctuations the device does not function as it requires stable voltage.

The following issues emerged during discussions with stakeholders:

The gadget cannot give the evidence of the disclosure of sex of the foetus by the doctor. The sonologists are the main users of web portal and the gadget. Hence their views about using the device and web portal as evidence of sex determination were examined. Few (14%) sonologists were of the opinion that the web portal and the gadget can be used as full proof method for collecting evidence regarding sex determination. Other sonologists criticized the device and pointed out various loopholes in it such as possibility of tampering and by passing the device (42% of the sonologists). Use of unregistered machines or portable machines for sex determination was also communicated by few sonologists.

During the discussions with sonologists it was pointed out that the images captured cannot be linked with F form. Although the device is capable of generating the log of all sonographies done, which will have only date and time. In case of a very busy center it will be difficult to link images with a corresponding F form in the absence of a common identifier.

According to the district administration F forms are analyzed based on pre determined criteria's and for suspected cases the images of corresponding sonographies are retrieved by an authorized person. Presently however a team from the Private Company selling and maintaining the SIOB (Magnum Opus) has been given the responsibility of copying images and handing them over to the Appropriate Authority, whenever it is done. Several stakeholders raised objections regarding this practice and mentioned that this procedure should be undertaken by a staff from the office of the Appropriate Authority.

3.5 Financial consideration

The district administration reported that the sonologists in Kolhapur have agreed voluntarily to participate in the ICT led initiative and partly bear the cost of the device. In addition to the direct cost of the device which is Rs 28,500/- per SIOB, the district administration is spending money on the setting up of a support unit by outsourcing it to Magnum Opus. Further a team of gynaecologists and radiologists have been constituted to review the images collected in suspected cases. In addition the cost of developing and maintaining the STBG web portal is also being borne by the district administration.

During interactions with different stake holders the study team explored their views on the question of bearing the cost of the device. The responses are as follows:

Some radiologists/sonologists mentioned that it was imposed on them by district administration, whether or not they have obstetrical or gynaecological practice. Further in cases where a USG centre had more than one machine, the cost went up accordingly as this device was made mandatory for every registered machine.

Some sonologists also mentioned that they had to incur additional expenditure for data entry operator as the workload has increased and they are required to maintain both manual and online F forms.

Chapter 4

Conclusions

For the study on Evaluation of ICT Led initiative of Kolhapur, data from various sources was collected, factual data about registered USG centers, number of births (rural and urban) number of MTPs (rural and urban) and sex ratio at birth was collected from district administration. In addition to this, medical officers, health workers (ANMs, LHVs, AWWs) were interviewed. Other stakeholders like members of professional medical bodies (IMA, IRIA, and AMOGS), appropriate authorities, sonologists, civil society organizations, media representatives, representatives of NGOs and women in the 18-50 years age group were contacted for the study.

For comparison purposes, a control district was selected giving equal weightage to urban rural population, female literacy and per capita income. Based on the above criteria, Aurangabad district was found to be closest to Kolhapur and was hence selected as the control district.

Considering that because of the ICT led initiative in Kolhapur and the deterrent created, women might go to neighboring districts for determining the sex of the unborn foetus, information from Sangli and Belgaum district neighboring Kolhapur was also collected.

ICT led initiative consists of two components i.e. Save the baby girl (STBG) web portal the key feature of which is on line entries of form 'F' and installation of silent observer (SIOB) to capture images of sonographies done. Information pertaining to F Form was collected from the study and control districts.

The study reveals that sex ratio at birth in Kolhapur, shows no appreciable change one year after the initiation of the ICT led initiative. The study team however feels that the impact, if any of the initiative would be visible only after around a year and a half of its initiation, hence it is too premature to comment upon impact of the initiative on reversing the trends in sex ratio at birth.

Online entries of form F on save the baby girl (STBG) web portal were initiated in Kolhapur district since October 2009. The study examined whether there has been any improvement in reporting of F forms as a result of the initiative. The study reveals that the reporting of F forms have increased in Kolhapur district. However a similar improvement in reporting of F forms was observed in the control district. The increase in reporting of F forms could be due to increased awareness of the PCPNDT Act and other efforts carried out by the NGOs and Government of Maharashtra for effective Act implementation. Hence, there is no conclusive evidence of increase in reporting of F forms in Kolhapur because of the ICT led initiative. However some stakeholders like civil surgeon, medical superintendent of rural hospitals and the Collector perceive that under reporting has almost stopped since the initiation of the project. This is because they believe that images of all sonographies conducted are recorded in the SIOB, therefore the clinic cannot escape reporting a corresponding F Form.

The improvement in quality of filled in 'F' forms could not be judged because of inadequate data prior to initiation of the ICT led initiative. However, the completeness of the data in the F form has improved as the online entry does not accept the forms unless all fields are filled in. The study team however feels that just installation of the device cannot verify correctness of the information provided in the F form.

The study team observed that since F forms are filled online they do not bear the signature of the doctor and the consent of the client. It would hence be important to verify the validity of such forms as evidence.

The Kolhapur District Administration mentioned that electronically filled in 'F' forms of "Vulnerable" clients (clients with one or two daughters and women above 35 years of age) are frequently examined to ensure, one that clinics report correct diagnosis and two to identify clinics that are possibly indulging in sex selection. These F forms are then correlated with images captured and copied from SIOB. However, in spite of repeated requests the study team did not receive any proceedings of meetings organized to review 'F' forms and correlating it with the images captured in the SIOB. Therefore, it seems that the electronically filled in 'F' forms are not being examined regularly. Further, as regards copying of images and linking

these with form F, only around 10% of the sonologists interviewed stated that images were copied from their SIOB and that too only once since the inception of the project.

The images whenever copied are copied on an external device like a pen drive. An in depth interview with the Principle district Judge revealed that such images are liable for tampering and hence would not stand as evidence in the court of law. Further, it was mentioned that there is no full proof way to link image and form 'F'. It was also mentioned that the procedure of copying the image is not as per standard legal procedure of collecting evidence (while copying the images from the hard disk of the SIOB on a pen drive, the pen drive should be sealed and signed by both the doctor, the authorized representative of the AA and a witness and a similar procedure should be carried out while opening the seal).

Presently a team from the Private Company selling and maintaining the SIOB has been given the responsibility of copying images and handing them over to the Appropriate Authority, whenever it is done. Several stakeholders interviewed raised objections regarding this practice and mentioned that this procedure should be undertaken by a staff from the office of the Appropriate Authority.

It would also be important to mention that no follow up action has been initiated by the Appropriate Authority of Kolhapur based on linking F form with images captured on the SIOB.

The storage capacity of the device is 500 GB, the study team was informed that this would normally suffice for storing scans conducted for around six months. However, the storage would exhaust much earlier in case of large hospitals or diagnostic centers where turnaround of clients is high. In ideal situation the storage capacity of SIOB should be co terminus with the legal requirement of storing F forms for two years.

The study team observed and was also informed that the SIOB fitted to portable USG machines did not work. Around 10% of USG machines in Kolhapur are portable and hence remain out of the gamut of the project.

Several stakeholders perceive that the SIOB device is not fully “secure” and is liable to tampering because of the following reasons:

- Some SIOBs have an on – off button and hence can be bypassed
- The district administration has put a seal on the wire attaching the SIOB with the USG machine; however the seal is a thin sticker. The stickers are not numbered and are not monitored. During visits to some sonography centers, the study team found several such stickers available at the centers raising doubts that the seal is liable for easy tampering.

The study team perceives that since the SIOB can be tampered with, the claim that under reporting of F Forms has been stopped may not be valid.

Most of the stakeholders interviewed appreciated the SIOB device as being a deterrent because of which doctors in Kolhapur do not indulge in this practice. These stakeholders also feel that this device does not address the issue of sex selection as clients seeking sex determination services go to neighboring districts for the same.

Further if the SIOB device indeed had a deterrent impact in terms of reducing the numbers of sex selective eliminations, this would be reflected in the reduction in numbers of MTPs particularly after 12 weeks, however no such reduction was observed. In fact, the “fear” of the device has led some gynecologists/radiologists refusing ultrasound services to clients having one or two daughters. Stakeholders also perceived that while “fear” has been created because of the SIOB device, if no action is taken as is currently the case the fear factor may also disappear in the long run.

Further in depth interviews with key stakeholders in the neighboring districts of Sangli and Belgaum revealed marginal increase in women coming from Kolhapur to seek ultra sonography services for sex determination.

In depth interviews with members of professional medical associations and bodies revealed that if Government is keen to implement the initiative, the Government should bear the cost.

As regards cost efficacy, the study team felt that the ICT led initiative is a costly affair, because the SIOB device cannot be looked at in isolation, the cost of save the baby girl web

portal, cost of having a dedicated team to implement the project and cost of regular monitoring of the sonography centers which is human resource intensive need to be factored in. The total sum of these costs is extremely high. Further, stakeholders also mentioned that Government of India has developed software for online reporting of form 'F', which is available free of cost. The same can serve the purpose of the STBG initiative.

The study team also felt that even in case of Kolhapur, where the district collector was extremely motivated, the implementation of project activities is not happening as planned and proposed. Secondly no case has been filed in the court of law as a result of this initiative. In this background, in districts where the district administration may not be as motivated as district collector of Kolhapur the implementation of this initiative, if up-scaled may not show desired impact.

Some stakeholders especially the radiologists expressed concerns regarding confidentiality of patients' personal data. They feel that confidentiality is breeched if the patient data is seen by persons other than the treating physician. They even feel that recording images is not as per the present legal requirement under the act. They also objected to the viewing of images by persons other than the designated AA. On these issues, the AA feels that other experts are viewing these images on behalf of AA hence there is no question of breach in confidentiality. In the state the F forms are being analyzed by students of social work as part of monitoring by the AAs. According to AA this issue is not a very serious concern. The team however feels that legal opinion must be sought for resolving this issue.

Thus the study concludes that:

- There was no indication of reversal in sex ratio at birth in Kolhapur because of the SIOB initiative.
- The reporting of the F form in terms of numbers has improved both in the study district as well as in the control district. Thus there is no evidence to show that this initiative has led to a significant increase in reporting of F forms.
- The study reveals that the SIOB is not a full proof device, as it can be tempered with. The evidence generated may not stand in court of law.

- The SIOB devise is seen as a deterrent by the district administration but no action has been taken by the districts based on the evidence generated by it since the inception of the project. While many stakeholders also perceive that the initiative has been able to create a fear because of the of monitoring of F forms and correlating them with images, it does not address the issue of sex selection as clients seeking sex determination services go to neighboring districts for the same.
- The Radiologists feel strongly that SIOB is not a requirement under the law and there are issues regarding breach in confidentiality.
- Though the direct cost of the SIOB devise is about Rs. 28,500/- per piece, there are indirect costs involved (which could be huge) in its implementation.

The decision regarding replication of the ICT led initiative may be taken keeping the study findings as well as the direct and indirect cost in view.

Chapter 5

Post Script Report

The evaluation of Silent Observer was initiated by State Health Systems Resource Centre (SHSRC), Pune in December 2010. The field work and data collection was accomplished by January 2011. The findings based on the draft report were presented to Additional Chief Secretary, Public Health, Mantralaya, Mumbai on 17/3/2011. Later on 7/10/2011 at International Institute of Population Science, Mumbai the draft report of the study was shared with the Collector, Kolhapur. After giving feed back (Annexure) to the findings of the draft report, the Collector, Kolhapur requested the study team to visit Kolhapur to examine the revised version of the device - "Active Tracker".

As per the decision of the above meeting all the consultants and team members of the study team were communicated to inform their convenient dates of the visit to Kolhapur in November third week. Dr. F. Ram, Dr. B. S. Garg and Prof. R. K. Mutatkar communicated their inconvenience because of their other prior engagements. Representatives from UNFPA, Thane office were also requested to join for the visit to Kolhapur. The representative from UNFPA communicated her inconvenience because of administrative issues.

On 19/11/2011 Dr. P. P. Doke, Dr. S. D. Agashe and SHSRC representative Dr. N. D. Deshmukh, Deputy Executive Director, Assistant Director, State Family Welfare Bureau, Pune and Dr. Varsha Dhurde, Program Officer visited Kolhapur and had meeting with Collector, Kolhapur. Shri. Girish Lad, Proprietor, Magnum Opus was also present for the meeting along with his team. District collector also had invited civil surgeon, medical officer of health, district health officer and Principal, HFWTC, Kolhapur for the meeting.

During the meeting the Collector, Kolhapur elaborately explained answers to the queries which were raised in draft report by the experts. In discussion Appropriate Authority mentioned that revised version of Silent Observer called Active Tracker has been developed. Further the benefits of new version were explained.

Increased Reporting of the F form in terms of numbers

The draft report of the study has already reported the above finding. Collector, Kolhapur, reported that the rise in reporting of F form is significant and is sustained. Further issues related to F form reporting were demonstrated through power point presentation and explained by the proprietor, Magnum Opus.

- With the help of Active Tracker it is possible to generate the analytical reports of various aspects mentioned in F form.
- With the help of device it is possible to detect underreporting of F forms.
- With the help of Active Tracker the linking of radiographic images and on line data of F form is possible. This would enable to assess the quality of F forms.

Use of electronic data as legal evidence in court

The honourable High court, Mumbai delivered judgement positively in favour of collector and held it as legal and useful.

Use of device in effective enforcement of PCPNDT Act

It is possible to cross verify the medical reason for which MTP is done with radiographic images.

Impact of initiative in reversing the trends in sex ratio at birth

Child Sex Ratio in non corporation area: Looking at the trend of 0-6 years child sex ratio (Data Annexed) there seems to be no difference in non corporation area of Kolhapur.

Sex ratio at Birth in corporation area: In the year 2010 sex ratio at birth (data annexed) in the range of 794-996. The sex ratio at birth for the year 2011 varies in the range of 751-955.

Sex ratio at Birth in non-corporation area: The sex ratio at birth in the year 2011 for non corporation area varies between 783-924. The data on sex ratio at birth from non corporation region indicates marginal increasing trend.

Reforms in the earlier version of the device

The study team visited a radiological and imaging centre- "Vyankatesh Clinic" in Rajarampuri, Kolhapur. The clinic is owned by Dr. Sunil Kuber, Dr. Rajendra Mehta, Dr. C. P. Mehta, and Dr. Anil Pandit. The technical expert assessed the device "Active Tracker". The summary of the findings by Prof. Agashe regarding Technical issues raised in the previous report are as follows:

1. The owner and developer agreed and accepted the shortcomings in the previous model. The earlier report categorically mentioned the issues related to data security, connection and sealing issues, data handling at the time of overflow, status of machine etc. The demonstration of the newly developed product addressed following issues.

SN	Feature	Old Version	New Version	Remarks
1	Operating system	Linux full version	Linux Ubuntu, with modification and working on linux OS to suit the high quality recording and applications	Enhanced the performance in New Version as compared to Silent Observer
2	Software tools	PHP, MY SQL	Windows programming	PHP and MY SQL gets corrupt immediately and hence did not used in New Version and windows programming is used
3	Encryption	Medium standard	High standards	Improved logic for encryption
4	Dom/Dongle	Used for software and OS storage	Removed the dom and entire application is now in HDD	Dom was not recommended and has lots of operational and manual problems which was successfully removed in New Version It has also helped saving cost
5	Video quality	Low quality due to incorrect compression	High quality with improved compression and encryption-decryption methods and codes	There is substantial quality improvement in video of New Version
6	Data capture/copy mechanism	Only through the external software application	Two way connectivity and ftp mechanism gives higher speed	Silent observer was taking too much time to copy the data, and it was affecting the USG center and

SN	Feature	Old Version	New Version	Remarks
				waiting patients, also the link used to get disconnected, and same process needs to start again. In New Version, ftp access is used which is very quick and saves 90% time as compared to silent observer
7	Data recording on cursor movement	Records only when there is movement on the screen, does not record contentious videos	Contentious video recording, even if the screen is on idle position	Risk of application error in silent observer and hence completely removed that feature and also as per legal terms, New Version records everything contentiously
8	On and off button	yes	No	New Version does not have on and off button and directly switch on and off with power supply
9	Corruption of operating system	Yes, because of on and off button	No as the new process is tested for more than 6 months	The New Version has been tested live for more than six months and not a single machines has got this type of problem
10	Corruption of application tools	Yes, php and my sql	No such applications were used	So no issue of any third party application affecting the contentious recording in New Version
11	Reasons for corruptions	Direct on and off, application tool, dom etc.	No reason and no corruption of any tool	Tested successfully
12	Hard disk capacity	Cannot scale hard disk, the application is linked with the size of hdd	Nothing to do with the size of the hdd, can be scaled to any size	Huge advantage of New Version as storage capacity changes from center to center
13	Storing of data	Difficult in data management with hdd	Easily structure and manage data storage	Flexible usage of HDD (Hard Disk Drive) and data storage as per requirements
14	Physical model of silent observer	Tampering is feasible	Minimum tampering	As the wiring methods and connection methods have changed the points which can be tampered have reduced.

SN	Feature	Old Version	New Version	Remarks
15	Sealing procedure	All points need to be sealed	Only one point to be sealed, also use of blue gun has solved the issue of mishandling of the cables	New Version has less chances of tampering.
16	GPRS use	Not used and not applicable	Extensively used	GPRS is being used to control the entire New Version management, it has saved huge amount of time and implementation cost
17	Hard disk capacity	Fixed with the application version, 320 and 500 GB	1TB, and can be scaled down and scaled up	Flexibility depending upon the work load on USG machines.
18	On and off online log	Not available	Directly integrated with STBG portal	Can monitor directly from online machine
19	SMS alert	Not available	SMS alerts can be set as per the requirement for tampering and managing the machines performance	GPRS SMS alerts can be used as and when required and as per specific requirement related to on and off, and also technical errors in the New Version, helping minimum data loss
20	Data loss	Huge chances, since can not check for the functioning of the machine,	Minimum 24 hours data loss, as control units alerts authorities	Within 24 hours damaged machine can be replaced and minimum data loss in New Version
21	Software error	Can not detect remotely	Can detect remotely	Huge advantage for control and loss of data
22	Hardware error	Can not detect remotely	Can detect remotely	Huge advantage for control for loss of data
23	Data backup alerts	Not available, if the hdd is full, it overwrites the first video	Alerts AA when the hdd is full on set size	Very much important as it can directly affect the legal data, New Version has all important measures to avoid this data loss and alerting to AA
24	Interlinking with portal	Not available	Every machine in interlinked with online portal	Helps in controlling and managing huge number of machines with minimum resources & saving costs

2. The demonstration of web site and reports clearly indicates the enhanced functionality. The GUI has been improved and data related to each class of user can be easily seen.
3. The cost of the machine as reported by the vendor is Rs. 19,500/- (Rs. Nineteen Thousand Five Hundred Only).
4. It was also mentioned by the vendor that a proposal is sent to GoM to offer the entire software free of cost.
5. From the reports it is easy to find the space available on the Hard Disk of the machine, status of the machine, and number of video images stored on the HDD. This helps in identifying the faults in the machine if any, time to change the HDD etc.

Challenges in the implementation

Additional man power consisting of radiologist and expert from information technology would be required to give suggestions based on data retrieval and analysis.

There is certain improvement in the process but on the result side still statistics is not conclusive.