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Postpartum Family Planning in Sierra Leone

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Table of content

1. Introduction

Sierra Leone is a small country in West Africa. The population was estimated to be 8 605 718 in 2022 (The World Bank, 2022). Most of the population is engaged in subsistence agriculture, but Sierra Leone is also a mining centre. Its land yields rutile, bauxite, diamonds, and gold. Internal conflict crippled the country from the late 1980s onward, culminating in a brutal civil war that took place from 1991 to 2002 (Davidson , Shekou, & Fyfe, 2023) . The country is still recovering from the civil war and has become one of the world's poorest countries.

1.1. Background of the study

Maternal mortality is unacceptably high globally. There is a great disparity between low- and high-income countries, with low and lower-middle-income countries (LMICs) counting for 95% of all maternal deaths in 2020 (WHO, 2023). With 717 maternal deaths per 100 000 live births in 2019 (Statisitics Sierra Leone and ICF, 2019), Sierra Leone has one of the highest maternal mortality ratios in the world (FN-sambandet, 2023). Poor healthcare practices and sub-standard and ill-equipped healthcare facilities are some of the causes (Qiao, 2023). Fortunately, there have been major efforts to reduce maternal mortality in recent years, such as the *Maternal health literacy as an effort to reduce maternal mortality* in Nepal (Nursanti, Tayo, & Nurhasanah, 2021), and the *Addressing maternal health services perception and experience* in Nigeria (Wuraola Ope, 2020). A big effort in Sierra Leone was the *Sierra Leone National Reproductive, Maternal, Neonatal, Child and Adolescent Health strategy* in 2017-2021 (Unicef, 2023).

Unsafe abortion is a major cause of maternal deaths worldwide, alongside other pregnancy and labour-related complications like severe bleeding, infections, high blood pressure during pregnancy and delivery complications. Preventing unintended pregnancies is crucial to avoid maternal deaths. To do so, access to contraception and safe abortion services is essential (WHO, 2023). To date, abortion in Sierra Leone is only legal if it is necessary to save a woman's life (WHO, 2022).

Postpartum family planning is defined as the prevention of unintended or closely spaced pregnancies during the first 12 months post-partum. It is considered an important intervention to increase women ́s control of the number and spacing of children. Not to mention, postpartum

family planning is important in decreasing the current lack of contraception in low- and middle-income countries. Multiple opportunities to ensure that the women ́s contraceptive needs are met are given postpartum, as women are in frequent contact with the healthcare system during this time. Waiting a recommended minimum of 24 months after a livebirth before falling pregnant again is considered beneficial to reduce the risk of adverse maternal, perinatal, and infant outcomes. After a caesarean section, the risk of complications is even higher. Although over 90.0% of women in low- and middle-income countries want to avoid pregnancy in the 12-24 months after giving birth, less than one-third use contraception (Morroni & Glasier, 2020).

Data was collected for the study "Maternal and perinatal outcomes after Caesarean Section[1] in Sierra Leone" (ISRCTN registry, 2017) from 2016 to 2022. In 2020, part of the material was analysed in an observational study published as an article; "Caesarean section performed by medical doctors and associate clinicians in Sierra Leone" (van Duinen, et al., 2019). This article discusses maternal and perinatal morbidity and mortality after caesarean section performed by medical doctors to ones performed by non-physician clinicians, using data collected 30 days after the caesarean section. Data material was also collected at follow-ups one and five years later. This data has yet to be analysed. Questionaries used to collect data from the follow-ups included questions about contraceptives, see *Appendixes 2 and 3*. Considering that only 21% of married women (15-49 years old) in Sierra Leone used a contraceptive method in 2019, it is of great interest to explore what contraceptive guidance is given to women post-partum, how many women are using contraceptives a year after delivery, what kind of contraception they use and which factors that influence the use of contraception (The World Bank, 2023). This data material from Sierra Leone provides a unique opportunity to do this with a cohort of women that was followed for up to five years after delivery.

1.2. Aim of the Study

The aim of the study is to explore factors influencing the uptake and continuation of contraceptive use among women after caesarean sections in Sierra Leone. The following questions will be explored: what proportion of women use contraceptives one and five years after caesarean section, what types of contraception are used, and what factors are associated with women using contraceptives after five years?

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[1] Surgical procedure in which one or more incisions are made through a woman's abdomen and uterus to deliver one or more babies

2. Method

This study is based on data from the study: "Maternal and perinatal outcomes after Caesarean Section in Sierra Leone" with data collection performed between 2016-2022. This was a prospective observational study that quantified maternal and perinatal morbidity and mortality after caesarean section and compared these for medical doctors and non-physician clinicians. Nine hospitals from all over Sierra Leone were included. All women who had a caesarean section, either performed by a medical doctor or a non-physician clinician, were asked to participate in the study. Patients were excluded if the foetus weighed less than 500 grams or if essential data was missing (*see Appendix 1*). Inclusion criteria for participating hospitals were all hospitals in Sierra Leone where both a medical doctor and non-physician clinician performed caesarean sections, and permission from the hospital was achieved.

The data was collected using questionnaires the women were asked to answer. In the participating hospitals, the data collectors regularly visited the different hospitals to collect and review the data. The same data collectors visited the patients after 30 days, one year and five years. At the follow-ups after one and five years, the questionnaires included questions on contraceptive use (*see Appendixes 2 and 3*).

2.1. Research questions

This study uses data collected in the "Maternal and perinatal outcomes after Caesarean Section in Sierra Leone" to investigate the uptake of postpartum family planning among women after caesarean section in Sierra Leone, and the use of contraception one and five years after a caesarean section. See *appendix 2 and 3*. Furthermore, factors influencing contraceptive use five years after caesarean section is investigated. With Sierra Leone being one of the poorest countries in the world, cost of contraception is an important factor in making contraception accessible to the population (D'Souza,, V. Bailey, Oliver, & Stephenson, 2022). Hence, whether there is a difference in contraceptive costs between the different hospitals will also be explored, and if so whether this affects the number of women using contraceptives after one year.

2.2. Statistical analysis

All analyses were performed with SPSS V.24. Descriptive statistics using proportions with confidence intervals and mean with standard deviation are used to describe the characteristics of the study population, including age and parity distribution. It is also used to report the

proportion of women using contraceptives one and five years after a caesarean section and what proportion of women used each contraceptive method.

Moreover, binary logistic regression was used to assess factors influencing the use of contraceptives after five years. Contraceptive use after five years was used as the dependent variable, and the different contraceptive methods after one year (implant, Mirena, condoms, and pills), age and parity as explanatory variables. Contraceptive use and contraceptive methods were ordinal variables, while age and parity were continuous variables. The explanatory variables Age and Parity are collected at the continuous (metric) measurement level.

An ANOVA analysis was used to investigate differences in costs of contraception between different hospitals. Costs is a continuous variable (measured in the local currency, Le), and Hospital a categorical variable. A Chi-Square test was used to investigate possible differences in contraceptive use at different hospitals, with contraceptive use after one year as an ordinal variable. Lastly, the correlation between costs of contraception at different hospitals and contraceptive use was explored by a correlation analysis. Contraceptive use one year after the caesarean section was chosen for this analysis, because the data material only included information about contraceptive costs within the first year.

For all analyses, p-values < 0.05 were considered significant.

2.3. Ethical Considerations

Doing research in low-income setting rises specific ethical dilemmas such as resource prioritization, quality of research and power imbalances (Steinert, Nyarige, Jacobi, Kuhnt , & Kaplan, 2121). The study protocol was approved by the Sierra Leone Ethics and Scientific Review Committee and the Regional Committees for Medical and Health Research Ethics in Central Norway (ethical clearance number 2016/1163) and registered at the International Clinical Trial Registry (ISRCTN16157971).

3. Results

3.1. Study population

In the study "Maternal and perinatal outcomes after Caesarean Section in Sierra Leone" 1279 women post caesarean section were included. Among these, 238 women were excluded from

this study because they did not respond to the main research question, whether they were on contraceptives after one and/or five years. This left a total study sample of 1041 women. A flow chart of this selection is displayed in *Figure 3*.

Figure 1: Flow-chart showing the inclusion of women in the study
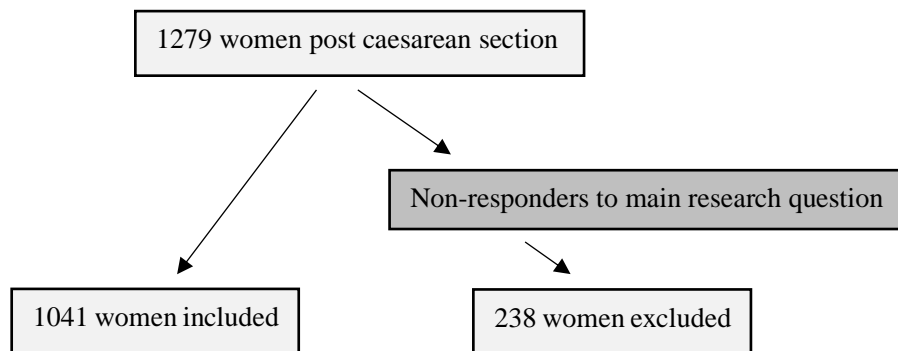
At the time of inclusion in the study, the mean age of the participants was 26.11 years old, and the median age 25.73, with the youngest participant being 13 years old and the oldest 50 years old. The age distribution of the participants is shown more detailed in *Table 1*, with the largest age group being 25-30. The mean para[2] was 1.89, while the median was 1.00. Meanwhile, 11.8 % of the population were grand multipara with para $\geq$ 5.

Table 1: Distribution of age and para in the study population.

Variable	Proportion n[3] (%)
Age	
< 20	190 (18.3)
20-25	248 (23.8)
25-30	288 (27.7)
30-35	185 (17.8)
35+	130 (12.5)
Para	
Nullipara	345 (33.4)
Multipara (1-4)	573 (55.0)

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[2] The number of times a woman has given birth to a viable child.

[3] Number

Grand multipara (5 or more)	123 (11.8)

Table 1 presents an overview of the distribution of age and para in the sample, by groups.

3.2. Contraceptive use by study participants

In total, 35.4% of the women answered that they were using a contraceptive method one year after the caesarean section. As seen in *Table 2,* different contraceptive methods have varying levels of use. The largest share of women using contraceptives were using Mirena (15.5%). Other common contraceptive methods were implants (9.9%) and pills (9%), while condoms only were used by a small proportion of the sample (1.3%).

Table 2: The frequency of women using different contraceptives one year after cesarean section

Contraceptive	Proportion (n)	Proportion (in %)	95% Confidence intervals
Pills	94	9.0	7.3– 10.8
Implant	103	9.9	8.1-11.7
Mirena	161	15.5	13.2-17.8
Condoms	14	1.3	0.6-2.1

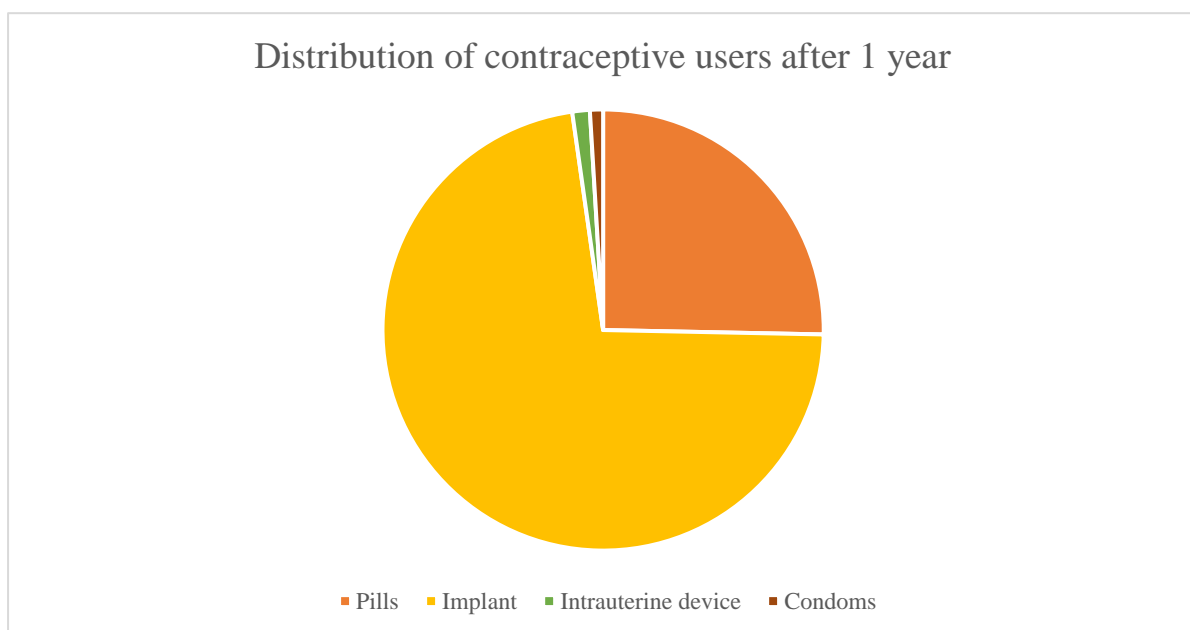*Figure 2: Distribution of contraceptive users after one year*

Figure 2 shows the proportions of women using the different contraceptive methods, within the 35.4% that used a contraceptive method. Dark orange represents the number of women using pills, yellow represent implants, green represent Mirena (IUD) and dark red represent condoms.

To understand changes in the contraceptive behavior and needs within this population, the women were asked if they also used contraception five years after the caesarean section. Almost half the study population (46.8%) were using a contraceptive method at the five-year mark post caesarean section. The women were also asked what types of contraception they were using.

From 1041 responders, implants were by far the most common contraceptive method used by the women (21.7%) (Table 3). Pills were the second most used contraceptive method (7.6%). Both intrauterine devices and condoms had a low adoption level (respectively 0.4% and 0.3%). Furthermore, 175 women (16.8%) reported using other forms of contraception. They were also asked to specify what type of "other" contraception they used. Methods mentioned were contraceptive injections (14%), tubal ligation[4] (2.5%), hysterectomy[5] (0.3%) and traditional methods[6] (0.1%).

Table 3: Proportion of women using different contraceptives five years after cesarean section

Contraceptive	Proportions n	Proportion percentage	95 % Confidence intervals
Pills	79	7.6	6.0-9.2
Implant	226	21.7	19.1-24.3
Intrauterine device	4	0.4	0.0-0.8
Condoms	3	0.3	0.0-0.6
Other	175	16.8	14.5-19.1

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[4] A surgical procedure for female sterilization which involves severing and tying the fallopian tubes

[5] A surgical procedure that removes the uterus. After the surgery you cannot become pregnant and no longer menstruate

[6] Some examples could be periodic abstinence, rhythm/calendar method, withdrawal and lactational amenorrhea.

Figure 3: Distribution of contraceptive users after five years

Distrubution of contraceptive users after 5 years

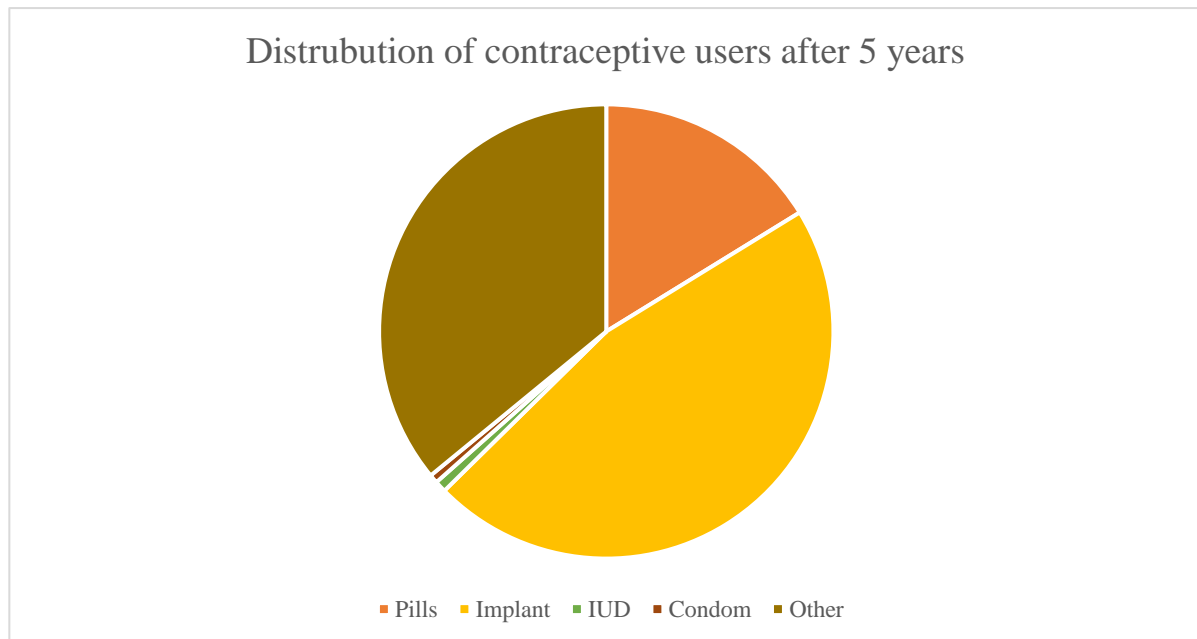■ Pills ■ Implant ■ IUD ■ Condom ■ Other

Figure 3 represents the proportion of women using the different contraceptive methods within the 46.8% that used a contraceptive method. Dark orange represents the usage of pills, yellow stands for implants, green stands for IUD, dark brown/red illustrates the number of women using condoms and the brown piece is the "other" category.

Figure 4: Distribution within the group using "other" contraceptives

Distribution of contraceptive users within users of "other" contraceptives

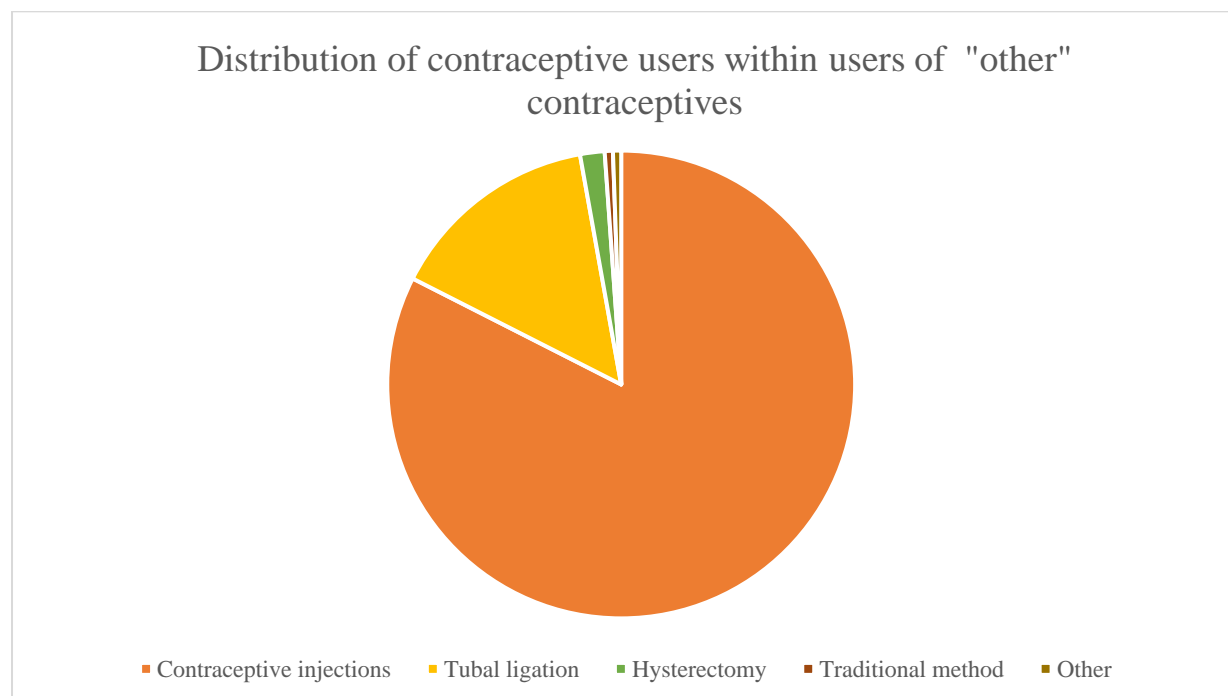■ Contraceptive injections ■ Tubal ligation ■ Hysterectomy ■ Traditional method ■ Other

Figure 4 presents the proportion of women using the different contraceptive methods within the 16.8% using "other" contraceptive methods.

3.3. Factors influencing the use of contraceptives

While use of an implant one year after the caesarean section, age and para are statistically significant predictors of contraceptive use after five years, the usage of condoms, Mirena and contraceptive pills at the one-year mark are not statistically significant predictors.

As seen in *Table 4*, the positive coefficient shows that women using contraceptive implants one year after caesarean section have 1.61 (1.04-2.48) times higher odds of using contraceptives after five years compared to those not using contraceptive implants. The odds ratio for age is 0.95 (0.92-0.97), which shows that increasing age is associated with lower use of contraceptives, indicating a higher contraceptive use among younger women. Greater parity was also associated with higher contraceptive use after 5 years, as seen in Table 4. Additionally, while condom use did not achieve significance at the 0.05 significance level ($p = 0.086$), it is borderline significant and therefore still a noteworthy variable with 2.83 times more likeliness of contraceptive use after five years for women who used condoms one year after the caesarean section.

Table 4: Factors influencing contraceptive use after five years

	Odds ratio	95% Confidence Intervals	P-value
Pills	1.13	0.81-1.58	0.571
Implant	1.61	1.04-2.48	0.029
Mirena	0.94	0.68-1.29	0.716
Condoms	2.83	0.96-8.28	0.086
Age	0.95	0.92-0.97	< 0.001
Parity	1.10	1.02-1.18	0.016

3.4. Costs of contraception in different Sierra Leone hospitals

Costs of contraception were measured in the local currency, Le. Although there are funders offering free contraception to women in Sierra Leone, like The United Nations Population Fund (Bah, 2018), 27.3 % of the women spent money on contraception in the first year after the caesarean section. The average cost of contraception was 11 537.10 Le, which is equivalent to

approximately 0.59 USD. However, costs varied significantly, ranging from 1000 Le to 50 000 Le.

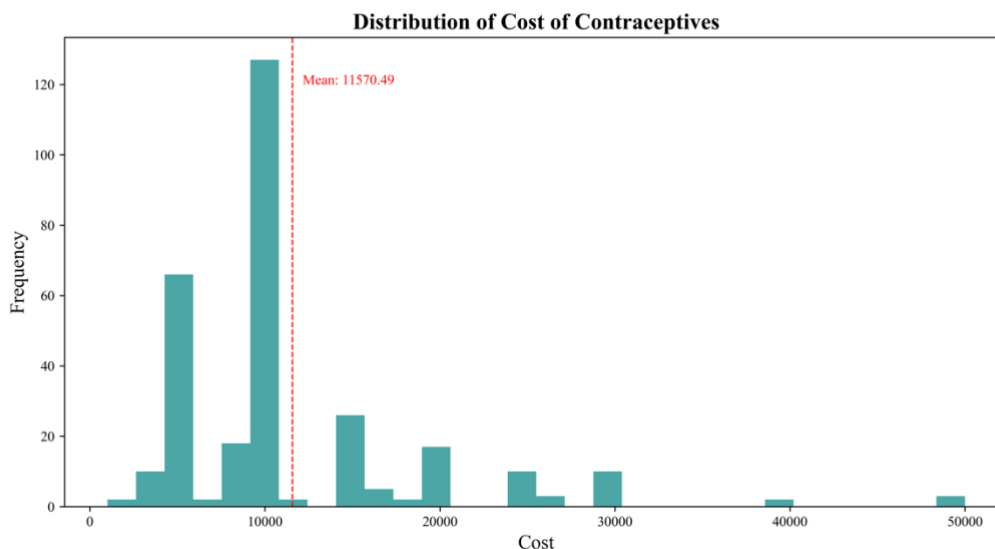*Figure 5: Distribution of the cost of contraception in Sierra Leone*

Figure 5 illustrates the responses provided by women in this study regarding the cost of contraceptives. The costs are measured in the local currency, Le

An ANOVA analysis was used to investigate possible differences in costs of contraception between different hospitals. A one-way ANOVA analysis demonstrated that there was a significant difference in contraceptive costs between different hospitals. The F-test gave a near-zero p-value ($p < 0.001$).

Disparities in contraceptive prices at different hospitals raises the question on how this impacts contraception use. Since contraceptive use after one year and hospitals are respectively ordinal and categorical variables, a Chi-square test was used to see if there is a difference in contraceptive use between different hospitals. The test indicates a significant association between hospital and contraceptive use ($p = 0.005$). This suggests that contraceptive use varies by the hospital where the woman had her cesarean section.

To further investigate whether fewer patients use contraceptives at hospitals associated with higher costs, a comparative analysis was conducted. The average cost for each hospital, and the proportion of contraceptive users at each hospital after one year, was calculated. Subsequently, the Pearson correlation coefficient between the average cost and the average contraceptive use

for each hospital was found to be - 0.369. The negative correlation coefficient indicates that hospitals with higher costs of contraception tend to have lower contraceptive use (and vice versa).

4. Discussion

4.1. Result comments

In this study, there was an overall moderate use of contraceptives among women one and five years after caesarian section. The majority of women did not use contraceptives. There was an increase in women using contraceptives from one to five years, and women using an implant after one year were more likely to use contraceptives after five years. Other factors associated with use of contraceptives were age and parity. The most common contraceptive used after one year was Mirena, a type of intrauterine device, while implants were most used after five years.

4.1.1. Comments about contraceptive use by study participants

As seen in *3.2. Contraceptive use by study participants,* 35.4% of the women included in this study used contraceptives one year after surgery, and 46.8% reported using contraceptives after five years. This is an increase of 11.7%. Several factors may have contributed to this. Education on family planning, including information about the benefits and various methods of contraception, is an important factor alongside contraception being available (Palmer, Kamara, & Lewis, 2023). During the last few years there has been increased attention and resources devoted to ensuring good health care services in developing countries. The United Nations Sustainable Development Goal nr. 3 is to "Ensure healthy lives and promote well-being for all at all ages" (The United Nations, 2023). A subgoal to reach this in Sierra Leone is to "By 2030, ensure universal access to sexual and reproductive health-care services, including for contraceptive use, information and education, and the integration of reproductive health into national strategies and programmes" (The United Nations, 2023). Both government efforts and initiatives led by non-governmental organizations (NGOs) promoting family planning have likely been committed to achieve this goal.

Out of the 35.4 % who used contraceptives after one year, Mirena stands out as most common method (used by 15.5 % of women). Long-acting reversible contraception (LARC) methods are gaining more popularity because they provide long-term protection without requiring users

to remember daily or monthly actions. On the other side, while cost-effective over time due to their long-term effectiveness, they can be expensive to insert initially (Afolabi Bolarinwa, et al., 2022). This could be a big problem in low-income countries.

According to the numbers from this data material, only 0.4 % used an intrauterine device after five years. After insertion, Mirena is an effective contraceptive for eight years (Felleskatalogen, 2023). Therefore, the substantial decrease from year one is surprising. A possible explanation for this change may be that the women were older and no longer in childbearing age. However, the median age of the participants at the time of inclusion in the study was only 25.73 years. Taking this information about the study population into consideration, age is not a highly significant factor. Another possible explanation is that they no longer wanted to use temporary contraceptives and opted for permanent contraception methods, like tubal ligation. It is still likely that there is some question bias due to differences in the formulation of the questions in the one and five year questionnaires. This is discussed further in *4.3 Formulation of questions*.

Some women included in this study probably also desired more children, and therefore did not want to use contraception, even if they had the chance to. The exact reason why most of the women in this study did not use contraceptives is difficult to answer, but family size preferences, lack on information, availability, economy, and cultural and social norms are some possible explanations.

4.1.2. Comments about influencing factors

As seen in *3.3. Factors influencing the use of contraception,* use of an implant one year after caesarean section is correlated with an increased chance of still using contraception after five years. Many factors may be contributing to this. An important aspect is the efficacity of contraceptive implants in preventing pregnancies, the reduced maintenance compared to other contraceptives and accessibility to contraception. It is possible that knowledge about contraception, economy and accessibility to contraception is different in this group compared to other groups. Unfortunately, the data material did not include demographic information on the women's education level, economy, or information about their settlement (urban or rural area).

The results of the logistic regression on factors influencing contraceptive use also showed that the frequency of contraception use decreased with increasing age. A reason for this may be older women feeling their risk of unintended pregnancy being low, as fertility naturally decreases. It is also possible that younger women have more knowledge about contraception, as there has been efforts to strengthen the national programs for family planning in recent years (United Nations Population Fund, u.d.). Women with a higher parity group used prevention more often than women with a lower parity group. A possible explanation to this is that women with fewer children more frequently have a desire to fall pregnant again, compared to those with more children.

4.1.3. Comments about costs of contraception in different Sierra Leone hospitals

The ANOVA analysis conducted on contraceptive costs in different hospitals revealed a statistically significant difference in costs. Notice that there may be other factors that contribute to the overall variation in contraceptive costs, like for example differences in the types of contraceptives that were offered.

Disparities in contraceptive prices at different hospitals raised the question on how this impacted contraception use. A Chi-Square analysis suggested that there were differences in contraceptive use between different hospitals. However, there may be other variables affecting contraceptive usage, such as the availability of healthcare providers, education, or cultural factors. A correlation analysis provided some evidence to suggest that hospitals associated with higher costs might generally have lower contraceptive use. However, the relationship is weak to moderate, indicating that cost is not the sole factor influencing contraceptive use, and further investigation into other influencing factors would be beneficial. The data material from this study did not give information on what the size of hospitals with the different hospitals were. Comparing differences in contraceptive costs between district, regional and local hospitals would be an interesting topic for a future study.

4.2. Existing studies

There has been a large increase in the use of long-acting reversible contraceptives in Sierra Leone in recent years. Within existing data, there is a large disparity in the findings on contraceptive use. For example, the total use of modern contraception in Sierra Leone was 24.3% in 2019 according to the Sierra Leone Demographic and Health Survey 2019 (Statisitics

Sierra Leone and ICF, 2019), while the United Nations Population Fund stated it was 16% in 2017 (United Nation Population Fund, 2017). As presented in *3. Results,* the data material analyzed showed 35% of women were using contraception in 2017-2018, and 46.8% in 2021-2022.

Use of implants have increased drastically in recent years. The numbers from this data material from 2017-2018 and 2021-2022, show an increase from respectively 9.9% to 21.7%. According to the United Nations Population Fund, the usage of implants has increased from being used by 18% of women in 2013 to 34 percent in 2019 (United Nations Population Fund, u.d.). Meanwhile, the Sierra Leone Demographic and Health Survey 2019 stated that only 8.4% of all women use implants, and 19.9% of sexually active unmarried women (Statisitics Sierra Leone and ICF, 2019).

Injectable contraceptives are the most common family planning method in Sierra Leone according to "The Sierra Leone Demographic and Health Survey", that found that 10.1% of fertile women (15-49 years old) used injectables in 2019 (Statisitics Sierra Leone and ICF, 2019). In this study, the women could not indicate that they were using injectables in the one year follow up, and therefore there is no data on this. Meanwhile, they were able to answer that they used an "other" contraceptive in the five-year follow-up and further specify that they used injectables. As seen in *3.2. Contraceptive use in the sample:* 14% answered that they were using injections in 2021-2022.

According to United Nations' Contraceptive Use by Method, only 0.3% of women in Sierra Leone used an IUD in 2017 (United Nations, Department of Economic and Social Affairs, 2019). This number was similarly at 0.4% in 2019, according to "The Sierra Leone Demographic and Health Survey" (Statisitics Sierra Leone and ICF, 2019). These numbers correlate well with findings in this study after five years (0.4%) but are of great disparity to the findings from det one year follow-up (15.5%).

4.3. Formulation of questions

The data material in this study was collected from the questionnaires H2M and H3M, *Appendix 2* and *3*. For more information about the data collection, see *1.1 Background of the study.* The forms included questions about contraceptives, complications, pregnancies, and financial costs,

both one and five years after the caesarean section. It is noteworthy that the questions were not identically formulated in the H2M (one year) and H3M (five year) forms. The use of different terminology introduces a potential source of bias and confusion in the data.

In H2M, the women were asked if they used Mirena, while they were asked if they used an IUD (f.ex. Mirena) in H3M. This may have led to misclassification- or non-responsive bias. Misclassification bias occurs when a study participant is categorised into an incorrect category altering the observed association or research outcome of interest (Catalogue of Bias Collaboration, 2018). Non-responsive bias is a bias that occurs due to systematic differences between responses and non-responders (Catalogue of Bias Collaboration, 2019). There is a possibility that the women did not understand the terms "Mirena" or "IUD", and that they therefore either provided incorrect answers or chose not to respond to the question. The results and outcome in this thesis must be interpreted with this in mind. Another difference between the questionnaires is that there is a new variable in the five-year interview called "other" contraceptives.

4.4. Missing data

Missing data is a common issue in clinical research, and can occur due to non-response by participants, incomplete data entry, equipment malfunction and more. Different methods can be used to handle missing data. Imputation is a method where missing values are replaced by estimated. Sensitivity analyses or excluding cases with missing data are other ways to handle missing values (Austin, White, & Lee, 2021). For the main research question on contraceptive use after one and five years, there were 238 out of 1279 missing answers. This is equivalent to 18.6 %. As stated in *3.1. Study population* these women were excluded from the entirety of this data analysis, reducing the sample from 1279 to 1041 participants.

4.5. Conclusion

This thesis has revealed insight into contraceptive use in Sierra Leone. Over a six-year period, it shows an increase in contraception adaption, with more women using contraceptives five year after a caesarean section compared to after one year. This data shows that Mirena (an IUD) was most used one year after the caesarean section, while implants were most used after five years. Women who used implants early on tended to be more likely to keep using contraceptives over time. Demographics also played a role. Older women were less likely to use contraceptives and

women with larger families were more likely to use contraceptives. Analysis of the data also revealed differences in costs of contraception between different hospitals. Notably, varying costs of contraceptives across hospitals impact the number of women using contraception one year after caesarean section.

Despite the results in this thesis, there is still much to explore in understanding contraceptive use among women in low-income countries. Further research in this area is crucial to improve women's health and family planning strategies in similar challenging settings.

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6. Appendixes

7.1. *Appendix 1:* Baseline

Outcome after CS in SL	**Demography (2/4)** Version July 2016	▣ NTNU

Centre Number	Patient Number	Case Report Form
☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐	P | O | D

5. Names

First Name ☐☐☐☐☐☐☐☐☐☐☐

Middle Name ☐☐☐☐☐☐☐☐☐☐☐

Last Name ☐☐☐☐☐☐☐☐☐☐☐

6. Date of Birth / Age

Is <u>date of birth</u> known?　Yes ☐　No ☐

If yes: write <u>date of birth</u> (DD.MM.YYYY) ☐☐☐☐☐☐☐☐

If not: write <u>age</u> (in years) ☐☐ Years

7. <u>Permanent</u> living address and tribe:

District (list) ☐☐☐☐☐☐☐☐☐☐☐☐

Chiefdom (list) ☐☐☐☐☐☐☐☐☐☐☐☐

Village ☐☐☐☐☐☐☐☐☐☐☐☐

Tribe (list) ☐☐☐☐☐☐☐☐☐☐☐☐

Centre Number	Patient Number	Case Report Form
☐☐☐☐☐	☐☐☐☐	P O D

---

8. Place of stay before delivery:

Is the place of stay before the start of the delivery the same as the permanent address?

Yes ☐   Go to next question

No ☐   Fill out the following fields

District (list)   ☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Chiefdom (list)   ☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Village   ☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Estimated time from place of stay before delivery and study facility (HH:MM)   ☐☐ : ☐☐

---

9. Place of stay after delivery:

Is the place where you are going to stay after the delivery the same as the same as the permanent address?

Yes ☐   Go to next question

No ☐   Fill out the following fields

District (list)   ☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Chiefdom (list)   ☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Village   ☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Screening (4/4)
Version July 2016

Centre Number	Patient Number	Case Report Form
▢▢▢▢▢	▢▢▢▢	P O D

10. Phone numbers:

Mobile 1	+	2 3 2	▢▢▢▢▢▢▢▢▢
Mobile 2	+	2 3 2	▢▢▢▢▢▢▢▢▢
Mobile relative	+	2 3 2	▢▢▢▢▢▢▢▢▢

11. Additional contact information:

Use the space below to provide any additional information on how reach the participant or relatives (street / house number; description of the place of stay; additional phone numbers or email address etc.).

Signature ATM:

Signature Reviewer:

Centre Number	Patient Number	Case Report Form
☐☐☐☐☐	☐☐☐☐	P O M

1. Obstetric history

Gravida: ☐☐

Para: ☐☐   Twins: ☐☐

                  Triplets: ☐☐

Children alive: ☐☐

2. Previous CS:

Previous CS?   Yes ☐   Fill out the fields below   number ☐

                      No ☐   Go to next question

Incision: Phanenstihl ☐   Midline ☐

3. Previous VVF operation:

Did the participant had a previous VVF?   Yes ☐   If yes: When (year)? ☐☐☐☐

                                                 No ☐

Centre Number

Patient Number

Case Report Form

| P | O | M |

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4. Current pregnancy:

Is it a single/twin/triplet pregnancy?

single ☐

twin ☐

triplet ☐

Is the <u>term date</u> known?

Yes ☐   No ☐

If yes: write <u>term date</u> (DD.MM.YYYY) ☐☐☐☐☐☐☐☐

If not: write <u>age</u> (in years) ☐☐ Years

Number of antenatal visits:

one ☐

two ☐

three or more ☐

---

5. Onset of labour

Date of onset of labour (DD.MM.YYYY) ☐☐☐☐☐☐☐☐

Time of onset of labour (HH:MM) ☐☐ : ☐☐

Mode of onset (one answer):

spontaneous rupture of membranes ☐   artificial rupture of membranes ☐

contractions ☐   Foley catheter ☐

bleeding ☐   medicaments ☐

Centre Number

Patient Number

Case Report Form

| P | O | M |

---

6. Traveling time and other facilities

Traveling time from place of stay before start of labour to the study facility (HH:MM)

[   ] [   ] : [   ] [   ]

Did the participant visited any other facilities before reaching the study centre? Use the text blocks below to write the name and type (health post, PHU, hospital etc.) in chronologic order (1,2 and 3).

1.
2.
3

---

7. Involved Healthcare workers pre hospital

Were any of the following health care workers involved in managing the delivery (more answers possible):

Traditional birth attendants [   ]   midwifes [   ]

MCHaides [   ]   Community Health Officers/Assistants [   ]

nurses (SRN/SECHN) [   ]   doctors [   ]

Centre Number ☐☐☐☐☐

Patient Number ☐☐☐☐

Case Report Form
| P | O | M |

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8. Admission and decision date and time

Date of admission (DD.MM.YYYY) ☐☐☐☐☐☐☐☐

Time of admission (HH:MM) ☐☐ : ☐☐

Date of decision to do CS(DD.MM.YYYY) ☐☐☐☐☐☐☐☐

Time of decision to do CS (HH:MM) ☐☐ : ☐☐

---

9. Indication

Was the CS planned or emergency?

Planed ☐   Emergency ☐

Indication (chose the one most important option):

Transverse presentation ☐   Previous CS ☐

Breech presentation ☐   VVF operation ☐

Twin pregnancy, first one not cephalic ☐   HIV positive mother ☐

Placenta previa ☐   Placenta previa ☐

Abruptio placentae ☐   Fetal distress ☐

Cephalic Pelvic Disproportion ☐   Failure of induction ☐

Failure to progress (fill out question 3) ☐   Other, specify below ☐

Other specify:

Centre Number	Patient Number	Case Report Form
☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐	P O M

---

10. Anesthesia

Type of anaesthesia (more answers possible):

Local ☐   Ketamine ☐

Spinal ☐   Intubation ☐

Prophylactic antibiotics

No ☐   Yes, Describe: [   ]

---

11. Save Surgery and Surgical APGAR score

Has the WHO safe surgery checklist been applied?

Yes ☐   No ☐

Estimated blood loss (choose one option)

More than 1000ml ☐   Between 101 and 600 ml ☐

Between 601 and 1000ml ☐   100 ml or less ☐

Lowest mean arterial pressure (choose one option)

Under 40 mmHg ☐   Between 40 and 54 mmHg ☐

Between 40 and 54 mmHg ☐   70 mmHg or more ☐

Lowest hearth rate (choose one option)

More than 85 bpm ☐   Between 56 and 65 bpm ☐

Between 76 and 85 bpm ☐   55 bpm or more ☐

Between 66 and 75 bpm ☐

27

Centre Number

Patient Number

Case Report Form

| P | O | M |

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12. Operation technique

Which type of skin incision has been used?

Midline ☐   Pfannenstiel ☐

Which type of uterus incision has been used?

Lower segment transverse ☐   Corporal incision ☐

Other ☐   Explain: [   ]

Uterus closure:

1 layer ☐   3 layers ☐

2 layers ☐

Has acute hysterectomy been performed?

Yes ☐   No ☐

Has tubal ligation been performed?

Blood bank ☐   Relative ☐

---

13. Blood transfusion

Has blood been given to the patient?

No (go to the next question) ☐   Yes ☐

How many units have been given?

Number of units: [   ]

Where does the blood come from (more options possible):

Blood bank ☐   Relative ☐

Outcome after CS in SL

Peri-op indicators (7/7)
Version: July 2016

NTNU

Centre Number

Patient Number

Case Report Form

| P | O | M |

---

1. End of operation and outcome

Date of end CS (DD.MM.YYYY)

Time of end CS (HH:MM)

Did the mother survive the operation? In case of maternal death inform the primary investigator to obtain verbal autopsy.

Yes (go to the next question)

No: (fill out date and time)

Date of maternal death (DD.MM.YYYY)

Time of maternal death (HH:MM)

Signature ATM:

Signature Reviewer:

29

Outcome after CS in SL

Dir. outcome baby (1/2)
Version: July 2016

Centre Number	Patient Number	Case Report Form
☐☐☐☐☐	☐☐☐☐	P | O | X

---

1. Date and time of birth

Date of birth (DD.MM.YYYY) ☐☐☐☐☐☐☐☐

Time of birth (HH:MM) ☐☐ : ☐☐

---

2. Primary outcome

Direct outcome:

Alive ☐   Death fresh ☐   Death macerated ☐

Resuscitation:

None ☐   Stimulation ☐   Mask bag ☐

APGAR Score:

After 1 minute: ☐   After 5 minutes: ☐

Visible congenital abnormalities?

No ☐   Yes ☐

If yes, Describe: _____

Centre Number   Patient Number   Case Report Form

P	O	X

---

3. Birth weight

Birth weight (gram)

Gender

Male ☐   Female ☐

Signature ATM:

Signature Reviewer:

---

1. Discharge and outcome mother

Date of discharge mother (DD.MM.YYYY)

Time of discharge mother (HH:MM) ☐☐ : ☐☐

Discharge at own request?

No ☐   Yes ☐

Referral to another hospital?

No ☐   Yes (specify) ☐

Specify referral:

Was the mother alive at discharge? In case of maternal death inform the primary investigator to obtain verbal autopsy.

Yes (go to the next question) ☐   No: (fill out date and time) ☐

Date of maternal death (DD.MM.YYYY)

Time of maternal death (HH:MM) ☐☐ : ☐☐

Centre Number | Patient Number | Case Report Form

| A | D | M |

2. Reoperation and antibiotics

Did the mother had a postoperative infection that was treated with antibiotics

No ☐   Yes (specify) ☐

Type & dose

Was the patient re-operated before discharge?

No (go to the next question) ☐   Yes ☐

Date of maternal death (DD.MM.YYYY)

Time of maternal death (HH:MM)

Type of operation:

Wound revision ☐   Laparotomy ☐   Other (specify) ☐

Specify operation:

Signature ATM:

Signature Reviewer:

Outcome after CS in SL

Discharge baby (1/1)
Version: July 2016

NTNU

Centre Number	Patient Number	Case Report Form
☐☐☐☐☐	☐☐☐☐	A D X

1. Discharge and outcome baby

Date of discharge baby (DD.MM.YYYY) ☐☐☐☐☐☐☐☐

Time of discharge baby (HH:MM) ☐☐ : ☐☐

Discharge at own request?

No ☐   Yes ☐

Referral to another hospital?

No ☐   Yes (specify) ☐

Specify referral: ☐

Was the baby alive at discharge?

Yes (go to the next question) ☐   No: (fill out date and time) ☐

Date of neonatal death (DD.MM.YYYY) ☐☐☐☐☐☐☐☐

Time of neonatal death (HH:MM) ☐☐ : ☐☐

2. Weight, feeding and care

Last weight before discharge (gram) ☐☐☐☐

Did the baby receive breastfeeding?

Exclusive breastfeeding ☐   Substitutive ☐   None ☐

Did the baby receive kangaroo care?

No ☐   Yes ☐

Outcome after CS in SL

◻ NTNU

Centre Number	Patient Number	Case Report Form
☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐	P O D

---

1. CS Date

Date of CS (DD.MM.YYYY) ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Time of CS (HH:MM) ☐ ☐ : ☐ ☐

Surgeon code ☐ ☐ ☐ ☐ ☐ ☐

---

2. Informed Consent

The patient has been informed in accordance with the Declaration of Helsinki and local laws and gave his/her written informed consent on:

Date of patient signature (DD.MM.YYYY) ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Date of investigator signature (DD.MM.YYYY) ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

---

3. Inclusion Criteria

		Yes	No
I1	Pregnant women that undergoes a CS including laparotomy for uterus rupture	☐	☐
I2	Foetus over 500 gram	☐	☐
I3	Procedure is performed by either a MD or a SACHO	☐	☐

Any answer in the shades area EXCLUDES the subject from the study

---

4. Exclusion Criteria

		Yes	No
E1	The foetus been delivered before the procedure	☐	☐
E2	The procedure is performed by a student (for example medical student or STP student).	☐	☐

Any answer in the shades area EXCLUDES the subject from the study

---

Signature ATM:

Signature Reviewer:

35

Outcome after CS in SL

⊙NTNU

Centre Number	Patient Number	Case Report Form
☐☐☐☐	☐☐☐☐	P O D

1. CS Date

Date of CS (DD.MM.YYYY)	☐☐.☐☐.☐☐☐☐
Time of CS (HH:MM)	☐☐ : ☐☐
Surgeon code	☐☐☐☐☐☐

2. Informed Consent

The patient has been informed in accordance with the Declaration of Helsinki and local laws and gave his/her written informed consent on:

Date of patient signature (DD.MM.YYYY)	☐☐☐☐☐☐☐☐
Date of investigator signature (DD.MM.YYYY)	☐☐☐☐☐☐☐☐

3. Inclusion Criteria

		Yes	No
I1	Pregnant women that undergoes a CS including laparotomy for uterus rupture	☐	☐
I2	Foetus over 500 gram	☐	☐
I3	Procedure is performed by either a MD or a SACHO	☐	☐

Any answer in the shades area EXCLUDES the subject from the study

4. Exclusion Criteria

		Yes	No
E1	The foetus been delivered before the procedure	☐	☐
E2	The procedure is performed by a student (for example medical student or STP student).	☐	☐

Any answer in the shades area EXCLUDES the subject from the study

Signature ATM:

Signature Reviewer:

Outcome after CS in SL — Outcome mother (1/4)

Version September 2017

Utrecht University

Data collector	Patient Number	Case Report Form
☐☐☐	☐☐☐☐	H 2 M

1. Outcome mother between discharge and HV2

Did the mother die between hv1 and hv2? In case of maternal death inform the primary investigator to obtain verbal autopsy.

Yes (fill out date and time) ☐   No: (go to the next question) ☐

Date of maternal death (DD.MM.YYYY)   ☐☐☐☐☐☐☐☐

Time of maternal death (HH:MM)   ☐☐ : ☐☐

2. VVF related symptoms and treatment?

a. Complaints that have started after the operation?

Incontinence for urine ☐   Chronic abdominal pain ☐

Incontinence for faeces ☐

b. Has the mother been diagnosed with VVF?

Yes ☐   No ☐

c. Has the mother been treated with VVF surgery?

Yes ☐   No ☐

If treated with VVF surgery specify where and when: _____

3. Other complaints after CS

Other complaints that have started after the operation? (check box if yes)

Irregular menstrual cycle ☐   ☐

Abdominal pain ☐   Abdominal pain score (VAS 0-10) ☐

Dysmenorrhoea ☐   Dysmenorrhoea (VAS 0-10) ☐

Outcome after CS in SL

Outcome mother (2/4)
Version September 2017

Utrecht University

Data collector

Patient Number

Case Report Form

| H | 2 | M |

4. Tubal ligation

a. Has tubal ligation been offered as a form of family planning before start of operation?

Yes ☐ Go to 4e   No ☐ Go to 4b

b. Would you have preferred that tubal ligation was offered?

Yes ☐ Go to 4c   No ☐ Go to 4c

c. Have any alternative methods of family planning been offered before discharge?

Yes ☐ Go to 4d   No ☐ Go to 5

d. Which methods have been offered?

☐ Go to 4e

e. Has any alternative methods of family planning been offered before operation?

Yes ☐ Go to 4f   No ☐ Go to 4f

f. Did you accept the offer and received tubal ligation?

Yes ☐ Go to 4g   No ☐ Go to 5

g. Are you still satisfied with your decision to receive tubal ligation?

Yes ☐ Go to 4h   No ☐ Go to 4h

h. Did you have any complications after tubal ligation?

Yes — Explain: ☐   No ☐

Data collector ☐☐☐ Patient Number ☐☐☐☐ Case Report Form | H | 2 | M |

---

5. Use of contraceptives

a. Do you use any of the following forms of family planning?

Pills	Yes	☐	No	☐
Implant	Yes	☐	No	☐
Mirena	Yes	☐	No	☐
Condom	Yes	☐	No	☐

b. Did you spend any money on family planning last month? If yes, how much?

Yes ☐   No ☐

Le ☐☐☐ , ☐☐☐ , ☐☐☐

---

6 Next pregnancy

a. Have you been pregnant again after the CS?

Yes (go to b) ☐   No (next q) ☐

b. Outcome of the first pregnancy after CS

Abortion (next q)	Yes	☐	No	☐
Still pregnant (go to c)	Yes	☐	No	☐
Delivered (go to c)	Yes	☐	No	☐

c. Explain:

Write expected date of delivery (if still pregnant)
or date of delivery, mode, outcome (sex, life/stillbirth)

Outcome after CS in SL

Outcome mother (4/4)
Version September 2017

Utrecht University

Data collector	Patient Number	Case Report Form
☐ ☐ ☐	☐ ☐ ☐ ☐	H 2 M

---

7. Information about risks and information

a. Do you want to be pregnant in the future?

Yes ☐   No ☐   Don't know ☐

b. What do you think is the risk for a next pregnancy?

[   ]

c. Do you remember why you had the CS?

[   ]

Signature research nurse:

[   ]

Signature Reviewer:

[   ]

7.3. Appendix 3: H3M

Outcome after CS in SL	**Outcome mother (1/4)** Version December 2021	◨ NTNU

Data collector code:	Patient Number	Case Report Form
[ ] [ ] [ ]	F 0 4 7	H 3 M

---

1. Outcome mother between discharge and HV3

Did the mother die between discharge and the home visit?

Yes (fill out date and time; verbal autopsy) [ ]   No: (go to the next question) [ ]

Date of maternal death (DD.MM.YYYY)   [ ][ ][ ][ ][ ][ ][ ][ ]

---

2. Chronic diseases

Does the mother have any of the following chronic diseases?

Hypertension	Yes [ ]	No [ ]
Heart disease	Yes [ ]	No [ ]
Diabetes	Yes [ ]	No [ ]
Kidney disease	Yes [ ]	No [ ]
Pulmonary disease	Yes [ ]	No [ ]
HIV	Yes [ ]	No [ ]
Tuberculosis	Yes [ ]	No [ ]
Hepatitis	Yes [ ]	No [ ]
Neurologic disease incl. CVA	Yes [ ]	No [ ]
Other	Yes [ ]	No [ ]

If yes, other:

[   ]

Data collector code:

Patient Number

| F | 0 | 4 | 7 |

Case Report Form

| H | 3 | M |

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3. Use of chronic medication

Does the patient regularly use medication?

Indication	Name medication	Dosage (if possible)
1.		
2.		
3.		
4.		
5.		
6.		

---

4. Use of contraceptives

a. Do you use any of the following forms of family planning?

	Yes	No
Pills	☐	☐
Implant	☐	☐
IUD (f. ex Mirena)	☐	☐
Condom	☐	☐
Other	☐	☐

If other:

Data collector code:

Patient Number
| F | 0 | 4 | 7 |

Case Report Form
| H | 3 | M |

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5. Long term complications

a. Long-term (>6 weeks) complications that started after the index caesarean section?

Irregular menstrual cycle ☐   Dysmenorrhoea ☐

Chronic abdominal pain ☐   Unwanted infertility ☐

---

6. Updated obstetric history:

a. Gravida:

b. Miscarriages (spontaneous abortions)   Induced abortions

c. Extra uterine gravidity

d. Para: (from 24 weeks)   Previous Twins (sets):

          Previous triplets (sets):

e. Children alive:

43

Data collector code: ☐☐☐   Patient Number | F | 0 | 4 | 7 | Case Report Form | H | 3 | M |

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7. Current pregnancy:

a. Currently pregnant?   Yes ☐   No, go to 8. ☐

b. Date of expected birth (DD.MM.YYYY) ☐☐☐☐☐☐☐☐

c. Planned place of delivery
- Home ☐
- PHU ☐
- Hospital ☐
- Other ☐

d. Please explain motivation Planned place of delivery [   ]

e. Name and location of PHU or hospital: [   ]

---

8. Pregnancy after index CS

a. Have you been pregnant after the index CS?

Yes ☐   No, go to H3X ☐

How many? Including current pregnancy ☐   Fill out **H3P** for every pregnancy *

b. Do you consider to become pregnant again, now or in the future?

Yes ☐   No ☐

*if > 4 pregnancies, add additional infant CRFs

44