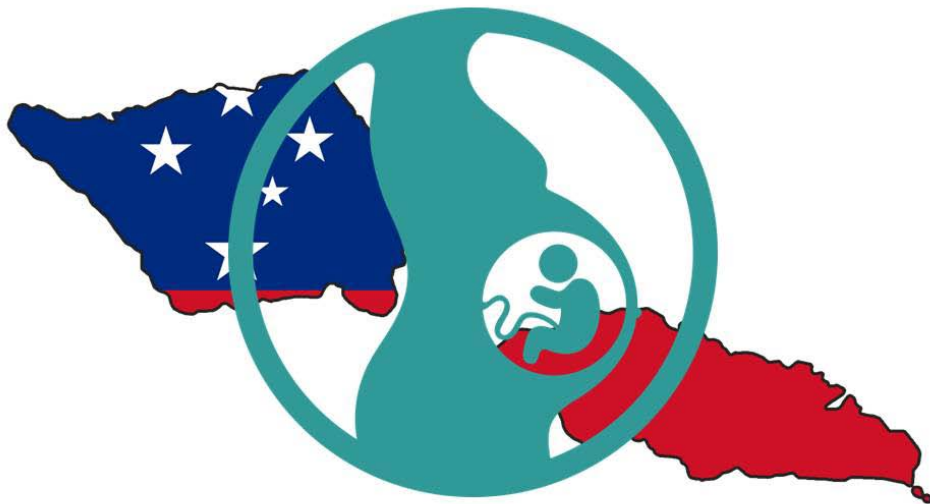# Soifua Maloloina O Fanau Fananau Mai Study 2016:

Apia Birth Health Study

Initial Results of 2014-2015 Birth Data from TTM Hospital, Apia, Samoa

Ministry of Health, Samoa

Soifua Maloloina O Fanau Fananau Mai Study 2016:

Apia Birth Health Study

Initial Results of 2014-2015 Birth Data from TTM Hospital, Apia, Samoa

Contents

Key Findings

Age	Marital Status	Parity and Gravidity
• Young women ages 20-29 made up the largest age group of the sample (54.5%). • Approximately 1 out of every 10 births at TTM were to adolescent mothers	The majority of women in the sample were married or in a stable union at the time of the birth (67.2%).	25.1% of the women in the sample had their first pregnancy (primapara). The majority of cases were having their first (25.1% with Parity=0) or second child (21.6% with Parity=1).
Village of Residence	**Antenatal Care Visits**	**Delivery Type & Gestation**
• Birth cases that reported to TTM between 2014-2015 were mostly from Upolu (specifically the Apia Urban Area and North West Upolu regions • There are a significant amount of patients coming from rural areas on Upolu and Savaii to justify measures aimed at increasing access for these patients and providing service outreach to reduce the burden and risk of travel on pregnant women.	• For ANC visits, 71.2% (4,280) had at least 1 recorded antenatal care visit at a healthcare facility. However, only 47.1% (2,829) had the minimum recommended number of ANC visits (4). • Married women are more likely to have less than 4 recommended antenatal visits for reasons not captured in the study data.	• The primary type of delivery for births was vaginal (87.3% of all births), 99.5% of which were unassisted. There was a low rate of caesarean sections (only 11.8% of all births), 65.7% of those births were emergency caesarean sections. • Both 2014 and 2015's c-section rates were low (12.6% and 10.1% respectively). • 30.5% of c-sections reported foetal distress and 20.6% had infants with malpresentation. • Low preterm birth rate of 1.6% prevalence
Hours in Labour	**Episiotomy**	**Birth Weight of Infants**
12.4% of women with their first pregnancy experience prolonged labour, compared to 7.5% mothers with at least 1 previous pregnancy.	1.5% of all births in 2014 received episiotomies and 1.8% of all births in 2015. Episiotomies are mostly performed on mothers who were young and have had 1 or fewer previous pregnancies (therefore narrow birth canals).	The macrosomial rates at TTM for 2014 and 2015 are significantly high (14% and 14.4% respectively). This increases risk for NCD's later in life for infants.
Previous Birth Complications of Women	**Birth Complication of Women's Current Birth**	**Perinatal Mortality**
• Women that reported for care at TTM 2014-2015 who had previous complications reported having a c-section (45%) or having a pregnancy that resulted in the death of the child (26.2%) which included IUD, ENND, miscarriages, abortions, and stillbirths. • For their current birth in 2014, 24.2% of women had at least one recorded complication and in 2015, 22.9% of women had at least one recorded complication.	• 23.9% of women had at least 1 recorded birth complication. • The most common types of complications were 1) arriving in the 2nd stage of labour (17%), 2) being transferred from another health centre during labour (11.9%), 3) malpresentation of the foetus (11.2%), and 4) foetal distress (11.1%). • Partnered and single women may have different risks for different birth complications.	• Most foetal or infant deaths are intrauterine deaths (62.4%). • In 2014, TTM's perinatal mortality rate (14.2 per 1,000) was similar to other small pacific island nations, but increased by almost 3% in 2015 (17.1 per 1,000). The cause of this increase cannot be determined from this dataset.

Acknowledgements

Background

Improving the health of mothers, infants as well as birth outcomes has long been a priority area for the health sector of Samoa. As of 2015, there were an estimated 77,393 women of reproductive age of 15-44 years (Census 2011). The same year, there were an estimated 9,616 pregnant women, and an estimated 6,114 that gave birth that year (DHS 2014). 2,822 women reported for antenatal care (STI), 94% of which were screened for sexually transmitted infections (STI's) in 2015 (MoH STI Surveillance).

Maternal and child health as a health sector priority for the Ministry of Health (MoH) and the National Health Service (NHS) is monitored by several indicators in the Health Sector Plan and The Health Sector Monitoring and Evaluation Framework which are linked to the Sustainable Development Goals for the region (Health Sector Plan Annual Review 2014-2015). Performance of the health sector is measured by infant mortality rates, maternal mortality rates, coverage of antenatal care, under 5 mortality rate, percent of infants exclusively breastfed for 6 months after birth, cervical cancer prevalence, the proportion of 1 year old children immunized against measles, and percent of fully immunized children (MoH M&E Manual).

These indicators indirectly measure the effects of birth outcomes and birth health. However, outside of this monitoring data collected by the health sector, there few data available to explore the specific challenges and complications patients face in giving birth. The Ministry of Health together with its development partners have identified maternal and child health and antenatal care coverage as key priority areas for the next 5 years. The purpose of this study was to provide a broad assessment of birth health to identify specific areas of clinical and public health intervention.

Tupua Tamasese Meaole (TTM) Hospital is the largest healthcare facility in Samoa, located in the Apia Urban Area (which has the highest population density in the country). To assess birth outcomes as indicators of maternal and reproductive health in Samoa, TTM was chosen as a research site to obtain a sample of births that would represent most of the population. TTM also is the most developed healthcare facility in Samoa, which supports collection of more complete data. As medical records in Samoa are still largely paper-based, the aim of this study was also to create a database that would improve the supply of reportable data for clinicians. For this reason (and ensuring adequate sample size), data of all births from 2014 and 2015 were collected for this study. An electronic database of these births (The TTM Fananau 2014-2015 Database) was created for the study analysis and shared with the Labour and Delivery Unit at TTM for their purposes. This report contains the initial findings of that database and descriptive statistical analysis.

Study Methods

This cross-sectional study was designed to provide a broad health assessment of births that occurred at Tupua Tamasese Meaole (TTM) Hospital from years 2014 and 2015. The analysis of this report uses data from the TTM Fananau 2014-2015 Database, which was created from the data collected by the study. The most recent two complete years of births (2014 and 2015) were collected in order yield a desirable sample size, and to assess any initial trends. The total sample size of all births recorded in the Labour and Delivery logbook at TTM Hospital for these years was n=6,008.

The data collection process commenced in March 2016 and completed April 2016. This involved transcribing the labour and delivery logbook of TTM Hospital in Apia, Samoa into an Excel spreadsheet for data cleaning and analysis. The logbook summarizes birth demographics, biometrics and complications of deliveries. This transcribed and recoded data became the TTM Fananau 2014-2015 Database.

Hospital ID numbers were not included in the TTM Fananau 2014-2015 database as patients reporting to hospitals in Samoa do not consistently have an ID number registered with the National Health Service. Village of residence and first name were sufficient identifiers that were used for quality assurance of cases.

Microsoft Excel 2007 was used for the initial analysis of the 6,008 cases within the database. Basic frequencies, percents, and rates were calculated using the "pivot table" function in Excel. All tests for correlations were done on continuous variables using a Pearson coefficient.

Sample

The original sample of 6,008 cases had to be disaggregated by year of admission in order to assess adequate sample sizes when calculating annual rates.

Table 1. Cases by Year of admission

Births by Year	
2014	4078
2015	1930
Total	6008

To determine the statistical significance of the sample to the estimated total population, results from the Demographic Health Survey (DHS) 2014 were used to estimate the population of women that gave birth in Samoa within a year period (see Table 2). The DHS 2014's crude birth rate was used to estimate how many women gave birth in Samoa in 2014 and 2015 adjusted to the current population estimates for 2014 and 2015 of the 2010 Census. The DHS crude birth rate was reported to be 31.6 per 1,000 births. According to the Census 2010, Samoa's population was estimated to be 192,067 in 2014 and 193,483 in 2015. Sample size was determined to be adequate for analysis by each year.

Table 2. Sample Size estimates for CI 95%, Margin of Error 5%

Year	Obtained Sample Size	Needed Sample Size	Estimated Population (Based on DHS 2014 and Census 2010)
2014	4078	599	6069.3

Year	Obtained Sample Size	Needed Sample Size	Estimated Population (Based on DHS 2014 and Census 2010)
2015	1930	599	6114.1

Sample size calculations were also performed assuming the population of births in Samoa was unknown, which would produce the largest suggested sample size. This means the number of births in a year was estimated to be 20,000 (as sample size estimates don't vary much for populations above 20,000). Table 3 below shows the different needed sample size for each level of significance for confidence intervals and margins of error. The significance of 2014's sample size became insignificant when the confidence level was set at 99% with a 2% margin of error.

Table 3. Sample Size Significance

Sample size significance	Needed Sample for 2014	Needed Sample for 2015	Obtained Sample 2014	Obtained Sample 2015
95% CI, 5% Margin of Error, 50% Distribution	362	362	1930	4078
95% CI, 2% Margin of Error, 50% distribution	1721	1725	1930	4078
95% CI, 1% Margin of Error, 50% Distribution	3720	3736	1930	4078
99% CI, 5% Margin of Error, 50% Distribution	599	599	1930	4078
99% CI, 3% Margin of Error, 50% Distribution	1414	1417	1930	4078
99% CI, 2% Margin of Error, 50% Distribution	2464	2472	1930	4078

Limitations

Missing data was considered a limitation for each variable if the percentage of missing data exceeded 10%. Missing data above that threshold is likely not random and could bias the results. The following variables had high amounts of missing data;

- Marital Status 22.6%
- Antenatal Care Visits 27.6%
- Hours in labour 21.3%

The Unknown Marital status group showed significant differences compared to partnered and single women. A second data collection stage for this study is recommended to obtain the marital status for missing cases from the individual patient records.

Since groups in the sample differed largely on antenatal care, the missing data poses challenges to results based on this variable. Women who did not book their ANC care at TTM would not have recorded ANC at the time of their delivery unless their personal paper record was brought with them. Therefore its possible more women have ANC care than estimated.

Using the logbook of the Labour and Delivery unit at TTM had specific limitations. Though the logbook contains a large amount of birth data, there are multiple variables that are not recorded, as the logbook is meant to be a summary of births that occur in the ward. Therefore the final database does not record Apgar score of infants born, results of infant and mother's blood screenings,

complete record of pre-existing conditions of the mother, list of all medications administered, etc. That information is stored in the patient's individual record, which could not be collected with the study's resources. Additionally, due to the non-transferability of paper-based medical records between health facilities, some data is unavailable to medical staff to enter into the logbook.

It is also likely that many medical conditions like gestational diabetes and STI's were not recorded in the logbook either because the patient information was not available at the time of admission or test results were not processed within the time frame of the patients' pregnancy. Only 19 cases of gestational diabetes and only 4 cases of STI's were reported. Both conditions are of particularly high prevalence in Samoa. 45.8% of adults were found to have high blood glucose levels or have been diagnosed as diabetic (MoH, 2014). 26% of people tested positive for Chlamydia in 2015 (MoH STI Surveillance). The likely reason why they are underreported in the birth register is due to specimen processing time, or medical staff recording this information in separate charts as a practice.

Although statistically the sample size was adequate to describe the national population of births, an analysis of the village of residence for each birth case revealed that residents of urban and North-western Upolu were overrepresented in the sample. Though TTM serves as a national reference hospital that handles the largest caseload of patients from all areas of the country, the sample of these patients largely represent the Apia Urban Area and North West Upolu census regions (see Section "Mapping Village of Residence of Birth Cases from 2014-2015").

For quality assurance of entered data, hospital numbers and to some extent patient names could not be reliably used. Very few patients have a Hospital ID Number registered with the National Health Service. Medical records are also paper based throughout the country, meaning even with an ID Number patients records are non-transferrable between healthcare facilities. In addition, Samoan names are different for a person depending on which village they are staying currently. One person will have different names at each village they reside in (as families are often spread throughout different villages). A patient may gain additional names or titles if they achieve a higher status in the community as well. To ensure accuracy between the logbook record and the database, cases were reviewed on all demographic variables to confirm accurate entry.

Results

Sample Characteristics

Age

Young women ages 20-29 made up the largest age group of the sample (54.5%). There were 7 total pregnancies that occurred in mothers under the age of 15. Out of those cases, 2 were age 13 and 5 were age 14. Conversely there were also 2 pregnancies to mothers over the age of 50 which constituted the smallest age group in terms of number of cases (0.03%).

Table 4. Age Group of Mothers 2014-2015

Age Group	Number	Percent
<15	7	0.1%
15-19	585	9.7%
20-24	1782	29.7%

Age Group	Number	Percent
25-29	1495	24.9%
30-34	1065	17.7%
35-39	575	9.6%
40-44	250	4.2%
45-49	13	0.2%
50+	2	0.03%
Unknown	234	3.9%
Total	6008	

The TTM pregnancy rates were high for both 2014 and 2015, with nearly 1 out of 10 deliveries occurring in females under the age of 20. Approximately 592 females were under age 20.

Table 5. Age 10-19 Births

	2014	2015	Total
Number of births under age 20	409	183	592
Under 20 birth rate per 1,000 births that occurred at TTM	100.3	94.8	98.5

Marital Status

The majority of women in the sample were married or in a stable union at the time of the birth (65.9%). However, there is a significant amount of missing data for marital status (22.6%) which may bias results based on this variable.

Table 6. Marital Status

Marital Status	Number	Percent
Married	2856	47.5
Stable Union	1281	21.3
Single	511	8.5
Unknown	1360	22.6
Total	6008	100%

Parity and Gravidity

Parity refers to the number of pregnancies a woman has had that were brought to a viable gestational age (more than 20 weeks). Twins are counted at one for this measure. Gravidity is the count of all pregnancies a woman has had regardless of what gestational age the foetus reached including the current pregnancy. Twins are counted as one for this measure as well.

25.1% of the women in the sample had their first pregnancy (primapara). The majority of cases were having their first (25.1% with Parity=0) or second child (21.6% with Parity=1). In terms of all

previous pregnancies (gravidity), 63.1% of all cases had between 1 and 3 pregnancies (including miscarriages) at the time they reported for care at TTM between 2014-2015.

Table 7. Parity and Gravidity

Parity	Number of cases	Percent	Gravidity	Number of cases	Percent
0	1506	25.1%	0	-	-
1	1299	21.6%	1	1478	24.6%
2	1037	17.3%	2	1287	21.4%
3	744	12.4%	3	1026	17.1%
4	583	9.7%	4	765	12.7%
5	370	6.2%	5	582	9.7%
6	216	3.6%	6	368	6.1%
7	101	1.7%	7	228	3.8%
8	46	0.8%	8	109	1.8%
9	26	0.4%	9	53	0.9%
10+	32	0.5%	10+	62	1.0%
Unknown	48	0.8%	Unknown	50	0.8%
Total	6008	100%	Total	6008	100%

Mapping Village of Residence of Birth Cases from 2014-2015

This map is available online at the following URL: http://arcg.is/2cKTHeB

Village of residence was recorded for each birth entered into the logbook. Only 130 out of 6,008 cases (2.2%) were missing this information. The cases for which a village of residence was recorded were plotted on a map using ArcGIS software and then analyzed for geographic distribution and density. This was done to determine 1) what areas of Samoa does the study sample represent and 2) what is the geographic range of where patients giving birth at TTM hospital in Apia?

Figure 1. Census Regions from the 2012 Report

Figure 4: Map of the four regions: AUA, NWU, ROU and Savaii
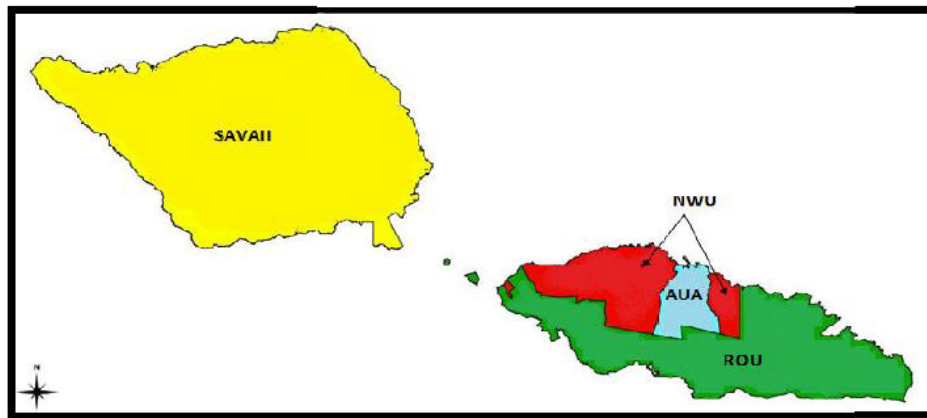
The 6,008 births between 2014 and 2015 that were recorded at TTM Hospital in Apia were largely representative of Upolu. Table 7 below compares the distribution of the sample to the estimated population distribution of the 2012 Census. Even though the urban area including and surrounding Apia (AUA) and the north west coastal region of Upolu (NWU) have the highest percentages of the population, the birth cases in the study sample had a higher proportion of cases from (93.5% in the study compared to 52% total population estimated by the Census 2012) as opposed to cases residing in Savaii (6.5% in the study compared to 24% total population estimated by the Census 2012).

Table 8. Geographic Distribution of Sample

Location	SMFR Sample Distribution		Census 2012 Population Distribution		
	Upolu	*Savaii*	*Apia Urban Area and North West Upolu*	*All areas in Upolu, Apolima, and Manono*	*Savaii*
Percent	93.5	6.5	52	76	24
Number	5619	389	97,666.4	142,743.2	45,076.8

When the birth cases were plotted on a map as points then analyzed by ArcGIS for density, there was a distinct geographic pattern in grouping of cases. Most of the cases were clustered in villages along the North West coast of Upolu in the Census regions of AUA and NWU (see Figure X.) The darker shaded areas indicate that there were greater than 5 cases within an area of 1 sq. kilometre.

Figure 2. Density of Births Upolu
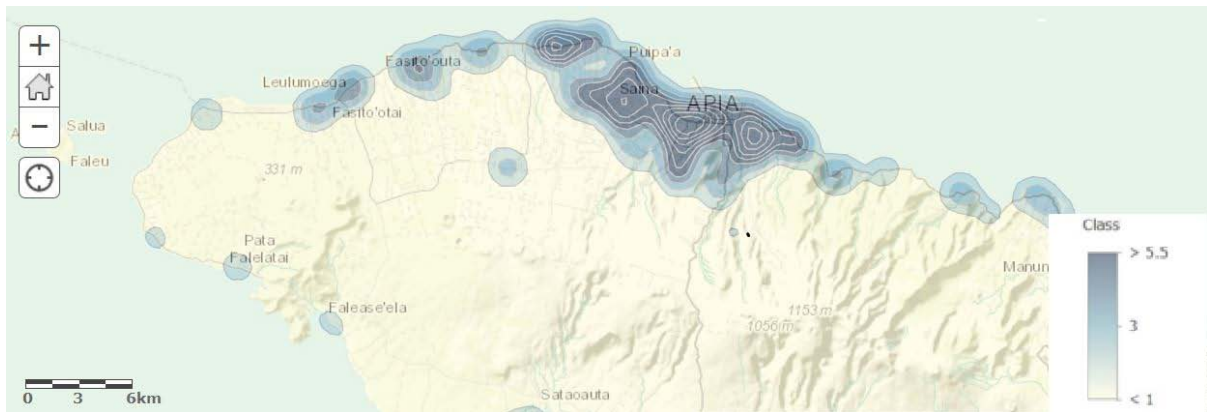
The sample cases were also analyzed to determine "hot spots" or statistically significant areas of high case concentration. In context of the study, a hot spot means an area with many births that reported to TTM Hospital for care and are from villages that are close proximity to each other. Conversely a "cold spot" means areas with low number of reported births where cases are further away from each other. These hot and cold spots can be observed in Figure 3 for Upolu.

Figure 3. Hot Spot Analysis for Upolu
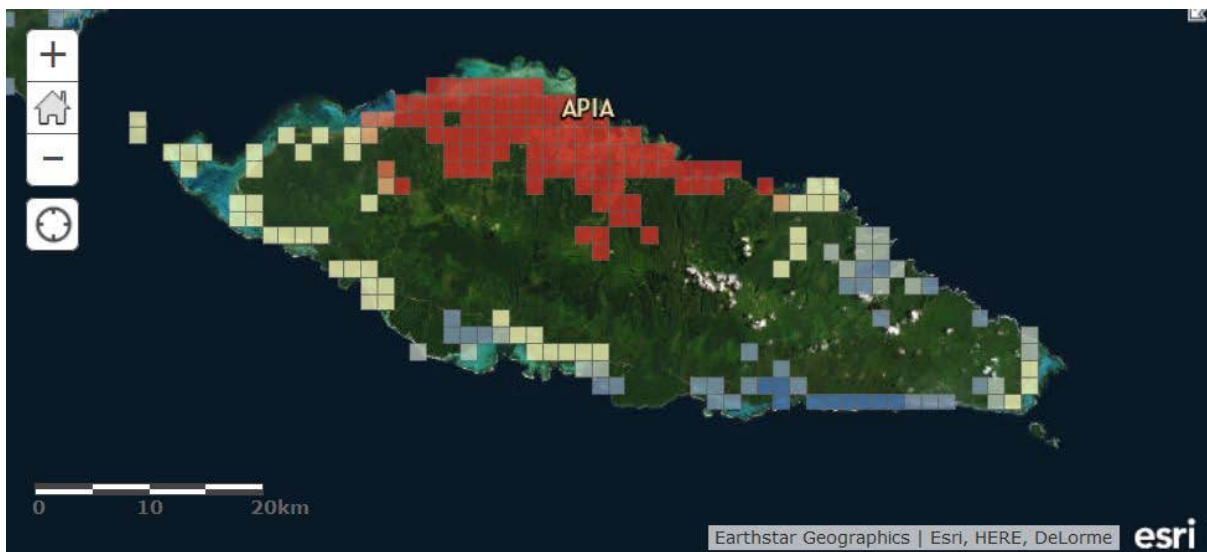
Figure 3 demonstrates that high values of spatial clustering occur in the AUA and NWU regions. This means that these regions have more births per square kilometre that report for care at

TTM hospital in Apia. Conversely, southern and south eastern Upolu has more communities where less women per square kilometre report for care at TTM Hospital. So while TTM Hospital in Apia covers more deliveries in Upolu, most of these births are from residents in the northwest coastal region of the island.

The mapped birth cases in Savaii shows that the cases that reported for care at TTM in Apia were fewer and more geographically dispersed, being classified by the ArcGIS algorithm as "cold spots" (See Figure 4). This suggests that even though Savaii has a smaller population spread across a larger area, significantly fewer women are reporting for care at TTM Hospital in Apia.

Figure 4. Hot spot analysis for Savaii
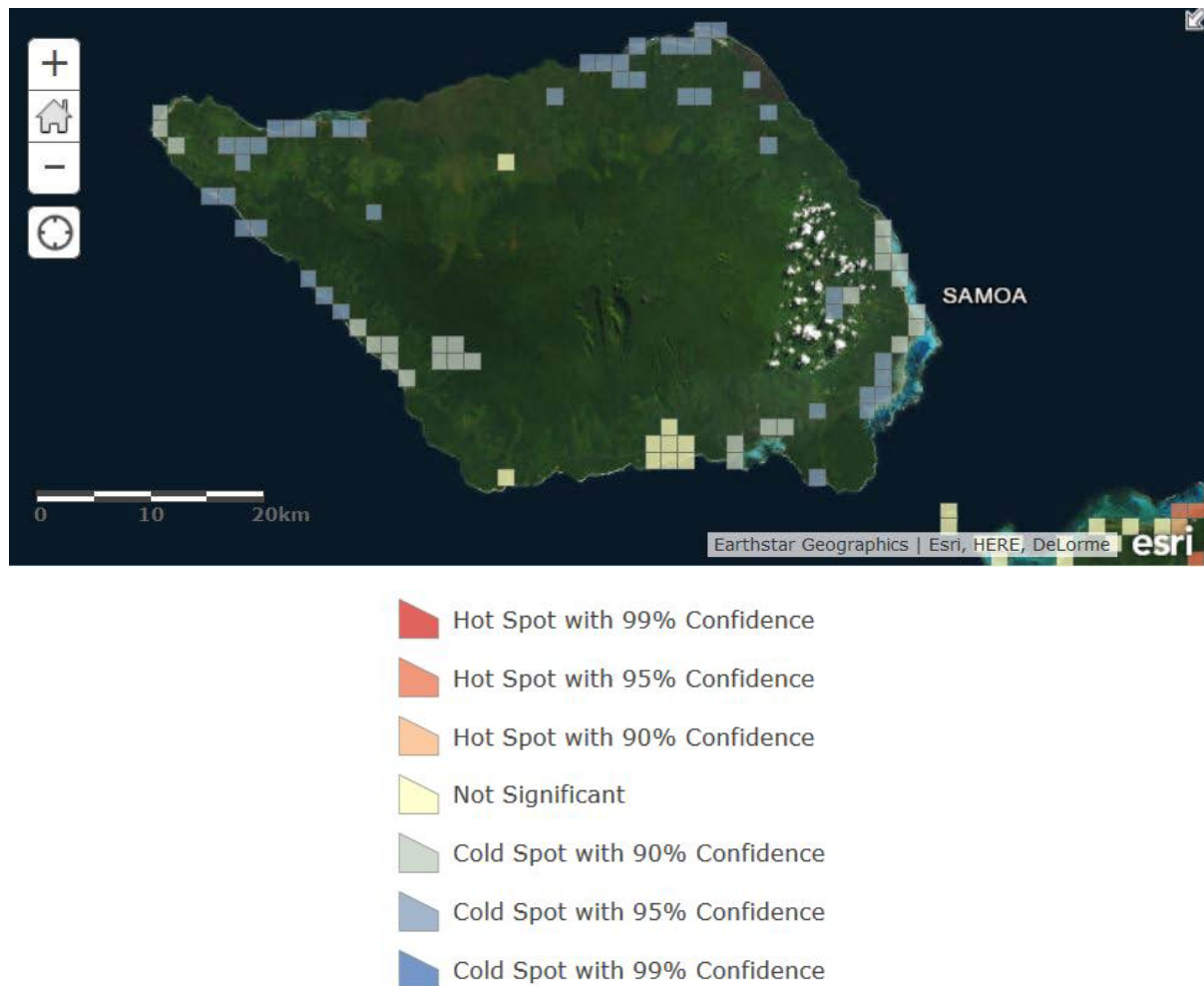
Given these results, we can answer the 2 aims of the mapping analysis;

1) What areas of Samoa does the SMF study sample represent?

Because the birth cases that reported to TTM Apia are mostly from Upolu, the results of this report are representative of the island, therefore making the results more generalizable to Upolu's entire population. However, there are some regions on Upolu that are underrepresented in this study's sample (particularly the Apia Urban Area and North West Upolu regions). As expected, much less births at TTM Apia were from Savaii due to the geographic distance and travel time. Therefore the results in this report overall are more geographically biased towards Upolu and less generalizable on the national level.

2) What is the geographic range of where patients giving birth at TTM hospital in Apia?

Though the majority of cases come from the Apia Urban Area, that TTM is meant to serve, the mapping analysis clearly indicates that patients come from rural communities on Upolu outside of the hospital's district of residence, and the outer islands of Savaii, Manono and Apolima. 6.5% of the deliveries between 2014 and 2015 came from Savaii (the furthest of the outer islands from Apia). From a clinical service standpoint, this means there are a significant amount of patients coming from rural areas to justify measures aimed at increasing access for these patients and providing service outreach to reduce the burden and risk of travel on pregnant women.

ANC Visits

The main limitation of the number of antenatal visits for all of the birth cases at TTM between 2014-2015 is that 27.7% (or 1,662) of these cases did not have a recorded number of visits (see Table 9). This is mostly due to the fact that medical records are on paper and are not transferrable between facilities. So if a woman had ANC at one facility before giving birth at TTM, these visits would not be verifiable. Therefore the results of this section may not be biased by the missing data.

Among the cases for which ANC visit data was available, 71.2% (4,280) had at least 1 recorded antenatal acre visit at a healthcare facility (see Table 9). Because all pregnant women receive a mandatory blood screening for STI's on their first ANC visit, this same group of women are presumed to have been screened. However, only 47.1% (2,829) had the minimum recommended number of ANC visits (4).

Table 9. Antenatal Care Visits

ANC Visits	Frequency	Percent
At least 1	4280	71.2
4 or more	2829	47.1
0	66	1.1
1	274	4.5
2	554	9.2
3	623	10.4
4	853	14.2
5	622	10.4
6	475	7.9
7	318	5.3
8	234	3.9
9	119	2
10+	208	3.5
Not Recorded	1662	27.7
Total	6008	

To assess factors that might contribute to the low rate of adequate ANC attendance, birth cases were grouped by marital status to compare differences in ANC attendance (see Table X). The result showed that 46.3% of married women had less than 4 ANC visits. This was more than single women and women in a stable union combined (see Table 10). Single women only made up 9.8% of the women who had inadequate ANC care.

Table 10. ANC Visits by Marital Status

Marital Status	Less than 4 ANC visits	Percent	Percent of all births
Married	702	46.3	11.7
Stable Union	371	24.5	6.2
Single	149	9.8	2.5
Unknown	295	19.4	4.9
Total	1517	100.0	25.2

This finding is unusual as being married often indicates a higher social status and therefore greater access wealth and healthcare. It was thought that reason for this is because married women are more likely to have had more previous pregnancies and single mother more likely to have fewer pregnancies. Women with more previous pregnancies would be less likely to attend ANC care visits as they know what to expect from birth and can better monitor their health from experience. Mothers with more previous children may also be busy caring for those children and not have time for ANC. Birth cases were then grouped by Parity (number of pregnancies carried to viable gestational age) to see if women with more children were less likely to have more ANC visits (see Table 11). Out of all women who had less than 4 ANC visits, the number of women with 0 or 1 previous pregnancy and the number of women with 2 more previous pregnancies was almost equal.

Table 11. ANC Visits by Parity

Parity	Less than 4 ANC visits	Percent	Percent of all births
0	331	21.8	5.5
1	331	21.8	5.5
2 or more	849	56	14.1
Unknown	6	0.4	0.09
Total	1517	100	25.2

Furthermore, a Pearson correlation test revealed that there was an insignificant negative correlation between Parity and ANC visits (-0.09). This means that Parity does not determine the amount of ANC visits a woman is likely to have. This also means that married women are less likely to attend at least 4 ANC visits for a reason not accounted for in the current data.

Age was also explored as a possible contributing factor to this finding. Married women are also older on average than single and stable union women (28.9 years for married and 27 years for all women). Table 12 disaggregates the age of married women by selected age group. Older women would be less likely to report for ANC care. However, a Pearson correlation between Age and ANC visits yielded an insignificant coefficient of 0.003. Therefore age is likely not a factor in why married women are less likely to have adequate ANC care.

Table 12. Age of Married Women Compared to Sample

	Married Women by Age Group	Percent	All Women by Age Group	Percent
<15	1	0.03	7	0.12

	Married Women by Age Group	Percent	All Women by Age Group	Percent
15-19	96	3.4	585	9.7
20-24	652	22.8	1782	29.7
25-29	822	28.8	1495	24.9
30-34	663	23.2	1065	17.7
35-39	354	12.4	575	9.6
40-44	158	5.5	250	4.2
45-49	9	0.3	13	0.2
50+	2	0.07	2	0.03
Unknown	99	3.5	234	3.9
Total	2856		6008	

To conclude, married women are more likely to have less than 4 recommended antenatal visits for reasons not captured in the study data. Future studies and interventions should examine why married women in particular don't access enough antenatal care.

Type of Delivery and Gestation

A low percentage of deliveries occurred before 37 weeks of gestation or preterm; 1.5% in 2014 and 1.7% in 2015.

Table 13. Preterm Birth Prevalence

Year of Admission	Number of births before 37 weeks of pregnancy	All births	Preterm Birth Prevalence
2014-2015	94	6008	1.6
2014	62	4078	1.5
2015	32	1930	1.7

The primary type of delivery for births in 2014-2015 at TTM was vaginal delivery (87.3% of all births), 99.5% of which were unassisted (see Table 13). There was a low rate of caesarean section deliveries (only 11.8% of all births), 65.7% of those births were emergency caesarean sections given in cases where there was foetal distress or failure to progress in labour. This means that caesarean sections are rare and only performed when there is significant risk to the foetus. Clinically speaking this is a positive finding, as caesarean section poses addition risks and healing takes longer for the mother.

Table 14. Type of Delivery (missing data for 56 cases)

	Vaginal (87.3% of All Births)			Caesarean (11.8% of All Births)			
	Normal Vaginal Delivery	Ventouse Assisted Delivery	Total	Emergency	Elective	Unspecified	Total
Number	5217	26	5243	466	61	182	709
Percent	99.5%	0.5%	100%	65.7%	8.6%	25.7%	100%

Looking at the rate of caesarean sections by year (see Table 15), the c-section rate as a percent of all births was 12.6% in 2014 and 10.1% in 2015. Both years are within

UNFPA/UNICEF/WHO's recommended range of 5-15%. In 2015 the c-section rate decreased. Data from previous years is needed to evaluate if this is part of a trend.

Table 15. Caesarean section by year

Caesarean section by Year	2014 Rate	2015 Rate
Rate	12.6	10.1
Numerator	514 c/sections	195 c/sections
Denominator	4078 births	1930 births

Out of the 709 total C-section births, 525 of those births had a recorded birth complication (74%). C-sections are commonly performed to avoid a previously detected birth complication or one that arose during labour. Looking at only the c-section cases with a recorded birth complication, 30.5% of c-section reported foetal distress and 20.6% had infants with malpresentation. This suggests that c-sections are only performed when the fetus is in a dangerous position for delivery or when the health of the fetus is comprised during birth.

Table 16. Caesarean Section by Birth Complication

Complication of Birth	C-section (unspecified)	Emergency C-section	Elective C-section	Total	Percent
Foetal Distress (includes non-reassurance)	22	136	2	160	30.5
Malpresentation	28	66	14	108	20.6
Labour Obstruction (includes obstruction noted due to large infant size and noted CPD)	6	32	1	39	7.4
Meconium (any type)	7	28	0	35	6.7
Failed IOL	3	28	1	32	6.1
Placental Complication (Placenta Praevia, Placental Abruption, or Retained Placenta)	8	17	2	27	5.1
Pre-eclampsia	2	23	0	25	4.8
Tubaligation	9	11	3	23	4.4
Haemorrhaging (ante partum or post partum)	4	10	0	14	2.7
Polyhydramnios	3	4	5	12	2.3
Pre-existing condition (unrelated to birth) *	6	5	1	12	2.3
GDM	2	4	4	10	1.9
Transferred during hospital admission for pregnancy	2	7	0	9	1.7
Other Birth Related Complication**	0	6	2	8	1.5
Arrived in 2nd stage of labour	0	2	1	3	0.6
Rupture of membranes***	1	2	0	3	0.6

Complication of Birth	C-section (unspecified)	Emergency C-section	Elective C-section	Total	Percent
Failure to Progress or Poor Progress of Labour (Vaginal Deliveries Only)	0	2	0	2	0.4
IOL	1	0	0	1	0.2
Socially Stigmatic Pregnancy****	0	1	0	1	0.2
Grandmultipara	0	0	1	1	0.2
Any complication	104	384	37	525	100

*includes chikungunya, anaemia, RHD, cardiac health issues, pyelonephritis, obesity, maternal or infant deformity, IUGR, asthma, smoker, STI, short umbilical cord, mental illness, ovarian laparotomy etc.

** (includes blood loss, transfers to neonatal ICU, chorioamnionitis, shoulder dystocia, post-term delivery, premature birth, hypovolemic shock, bradycardia, tachycardia, hyrdrocephalus, Spontaneous delivery, low blood pressure, VBAC, cervical or vaginal tear, oligohydramnios, lw hemoglobin, high risk pregnancy, maternal trauma and infant deaths).

***premature or artificial rupture

****this term refers to all teenage pregnancies, noted family conflicts regarding the woman's pregnancy, immediate adoption of the baby upon delivery, or other notes by nursing staff that indicated social complications surrounding the birth.

Hours in Labour

Prolonged labour is defined as labour lasting more than 20 hours for the first pregnancy, and labour lasting more than 14 hours for all subsequent pregnancies. 187 out 1506 primapara (first pregnancy) cases went above 20 hours (12.42% prolonged labour).

Table 17. Prolonged labour by Parity

Parity	>20 Hours	Denominator	Percent Prolonged	Unknown Hours in Labour	Percent Unknown
0	187	1506	12.42%	328	21.78%
Parity	**>14 hours**	**Denominator**	**Percent Prolonged**	**Unknown Hours in Labour**	**Percent Unknown**
1	114	1299	8.8%	260	20.0%
2	67	1037	6.5%	210	20.3%
3	56	744	7.5%	151	20.3%
4	46	583	7.9%	120	20.6%
5	19	370	5.1%	94	25.4%
6	15	216	6.9%	40	18.5%
7	9	101	8.9%	25	24.8%
8	4	46	8.7%	10	21.7%
9	3	26	11.5%	4	15.4%
10	2	20	10.0%	6	30.0%
11	0	8	0	1	12.5%
12	0	2	0	0	0
13	0	2	0	0	0
Unknown Parity	3	48		35	72.9%

Episiotomy

Episiotomies are performed to assist in deliveries where there are complications with labour progress. An episiotomy assists in delivering the baby, but can cause blood loss or perianal tears to mothers which are difficult to heal. 1.5% of all births in 2014 received episiotomies and 1.8% of all births in 2015. In total there were 90 cases with a recorded episiotomy. Analysis of the mother's demographics revealed that episiotomies are mostly performed on mothers who were young and have had 1 or fewer previous pregnancies (see Tables 18 and 19). Birth canals are usually narrower in these women.

Table 18. Episiotomies by Parity

Parity (Number of Previous Pregnancies)	Deliveries with Episiotomies	Percent
0	54	60%
1	17	18.9%
2	10	11.1%
3	5	5.6%
4	2	2.2%
5	2	2.2%
6	0	-
7	0	-
8	0	-
9	0	-
10+	0	-
Unknown	0	-
Total	90	-

Table 19. Episiotomy by age group

Age Group	Episiotomy	Percent
<15	0	0
15-19	24	26.7%
20-24	32	35.6%
25-30	18	20.0%
>30	14	15.6%
Unknown	2	2.2%
Total	90	-

Married and non-married women were roughly equally represented in the sample of births with episiotomies (see Table 20).

Table 20. Episiotomy by marital status

Marital Status	Delivery with Episiotomy	Percent of Episiotomy Cases
Married	38	42.2%
Single	18	20.0%
Stable Union (Unmarried but Partnered)	20	22.2%

Marital Status	Delivery with Episiotomy	Percent of Episiotomy Cases
Unknown	14	15.6%
Total	90	100%

Previous Abnormalities of Pregnancy or Pre-existing conditions

Table 21 shows the detailed number of cases and percentages for the types of previous abnormalities of pregnancy or pre-existing conditions that women had recorded at the time of their birth. Out of 6008 women, 319 (5.3%) had a previously recorded abnormality at the time of their current pregnancy. These 319 had 374 total previous abnormalities. The most common abnormalities were having a previous c-section (45%) and having a pregnancy that resulted in the death of the child (26.2%) which included IUD, ENND, miscarriages, abortions, and stillbirths.

Table 21. Previous Abnormalities of Pregnancy or Pre-existing conditions

Category	Numerator	Denominator	Percent
Women with Previous Abnormalities	319	5689 no abnormality	5.3%
Total Recorded Previous Abnormalities	374	n/a	n/a
Previous Caesarean	168	374 (women with abnormalities)	45%
Previous Multiple Caesarean	29	168 (women with c-section)	17.3%
Previous Death of Child	98	374 (women with abnormalities)	26.2%
▪ **IUD (intrauterine death)**	26	98 Child deaths	26.5%
▪ **ENND (early neonatal death)**	9	98 Child deaths	9.2%
▪ **Stillbirth**	5	98 Child deaths	5.1%
▪ **Miscarriage**	50	98 Child deaths	51%
▪ **Abortion**	8	98 Child deaths	8.2%
Haemorrhage (ante or post partum)	9	374 (women with abnormalities)	2.4%
Previous twin birth	11	374 (women with abnormalities)	2.9%
Previous home deliveries or births before arrival	3	374 (women with abnormalities)	0.8%
Other (Hepatitis, Molar Pregnancy, RHD, Previous laparotomy, high blood sugar, bicoronated uterus, ectopic pregnancy, omphalocele, CPD, pre-eclampsia, placenta praevia, teenage pregnancy, tubaligation, polyhydramnios, transferred patient, anaemia, grand and elderly multipara.)	56	374 (women with abnormalities)	15%

Complications of Current Birth

Out of the total sample of 6,008 women between 2014 and 2015, 1439 (23.9%) of those women had a birth complication recorded. There was a total 1619 recorded complications (excluding Caesarean section as a birth complication), as some women had multiple complications during birth. In 2014, 24.3% of women had at least 1 birth complication and in 2015 23.2% had at least 1 complication.

Deaths of the foetus or infant were not consistently recorded as patient birth complications in the logbook. Instead they were consistently recorded as part of the infant's status after birth. Therefore this section does not use the indication/indication or complication variable to track infant or foetal death, which is analyzed in the "Perinatal Death" section. This section will discuss only reported birth complications for women before the infant health status was recorded. Birth complications that were highly infrequent were categorized as "Other Birth Related Complications" for sake of analysis.

The most common types of these complications were 1) arriving in the 2nd stage of labour (17%), 2) being transferred from another health centre during labour (11.9), 3) malpresentation of the foetus (11.2%), and 4) foetal distress (11.1%). All of these types of complications are preventable. Arriving in late stages of labour is likely related to access barriers to healthcare services. This may be due to the distance TTM Hospital is from rural areas or women not being properly informed of when they should report to a hospital for delivery. Malpresentation can be prevented through screening, timely diagnosis and external cephalic version (repositioning the foetus before birth) at 36 weeks. Foetal distress is partially caused by malpresentation, and can be addressed through external cephalic version and delivery techniques of nurses and midwives.

Table 22. Birth Complications

Complication Type	Total Complications	Percent
Arrived in 2nd stage of labour	275	17.0
Transferred during hospital admission for pregnancy	193	11.9
Malpresentation	181	11.2
Foetal Distress (includes non-reassurance)	180	11.1
IOL	98	6.1
Birth before Arrival	73	4.5
Pre-eclampsia	61	3.8
Labour Obstruction (includes obstruction noted due to large infant size and noted CPD)	58	3.6
Meconium (any type)	57	3.5
Pre-existing condition (unrelated to birth) *	44	2.7
Haemorrhaging (ante partum or post partum)	42	2.6
Placental Complication (Placenta Praevia, Placental Abruption, or Retained Placenta)	42	2.6
Other Birth Related Complication **	89	5.5
Failed IOL	34	2.1
Precipitated labour	28	1.7
Failure to Progress or Poor Progress of Labour (Vaginal Deliveries Only)	29	1.8
Tubaligation	27	1.7
Home delivery	23	1.4
GDM	19	1.2
Socially Stigmatic Pregnancy***	19	1.2

Complication Type	Total Complications	Percent
Grandmultipara	17	1.1
Polyhydramnios	17	1.1
Rupture of membranes (premature or artificial)	13	0.8
Total	1619	100

* includes chikungunya, anaemia, RHD, cardiac health issues, pyelonephritis, obesity, maternal or infant deformity, IUGR, asthma, smoker, STI, short umbilical cord, mental illness, ovarian laparotomy etc.

**(includes blood loss, transfers to neonatal ICU, chorioamnionitis, shoulder dystocia, post-term delivery, premature birth, hypovolemic shock, bradycardia, tachycardia, hyrdrocephalus, Spontaneous delivery, low blood pressure, VBAC, cervical or vaginal tear, oligohydramnios, lw hemoglobin, high risk pregnancy, maternal trauma and infant deaths).

***this term refers to all teenage pregnancies, noted family conflicts regarding the woman's pregnancy, immediate adoption of the baby upon delivery, or other notes by nursing staff that indicated social complications surrounding the birth.

The cases of women with birth complications were disaggregated by marital status to see if there were differences in the frequency and type of birth complication. Out of the 24% of women in the study sample, married women were the largest group of women with at least 1 recorded complication (11.5% of 6,008). Single women were the smallest group of women with a record birth complication (2.1% out of 6,008).

Table 23. Denominators for Birth Complication and Marital Status

	Number of Complications in Married Women	Number of Complications in Stable Union Women	Number of Complications in Single Women	Unknown Marital Status	Total Complications
Complications	*772*	*316*	*140*	*391*	*1619*

	Number of Married Women with Birth Complication	Number of Women in Stable Union with Birth Complication	Number of Single Women with Birth Complication	Number of Women with Unrecorded Marital Status with Birth Complication	Total Women
Women	*690*	*279*	*131*	*339*	*1439*

	Married	**Stable Union**	**Single**	**Unknown**	**All Women**
Percent of all women with at least 1 birth complication recorded	*11.5%*	*4.6%*	*2.1%*	*5.6%*	*24%*

Since women in marriages or stable unions are overrepresented in the sample (see Table 6), the cases of women with birth complications were used to calculate prevalence for each group separately. All groups were roughly equal when it came to rates of birth complications within their marital status group. Women in relationships (married or stable union) accounted for 67.2% of women with at least 1 birth complication while single women represented only 8.6% and unknown women represented 24.2%. This almost the same proportion of marital status group representation in the sample.

Table 24. Rates of Birth Complications by Marital Status

Marital Status	Women with Complication	All Women	Percent
Married	**772**	2856	27.0
Stable Union	**316**	1281	24.7
In Relationship	*1088*	*4137*	*26.3*
Single	**140**	511	27.4
Unknown	**391**	1360	28.8
Total	**1619**	6008	100

However, looking at the type of birth complications by marital status, it can be seen that certain groups of women represent more cases for different birth complications than their respective proportion in the caseload of women with birth complications. For this analysis, partnered (married or stable union) women were compared to single women and women of unknown marital status. Each group made up a certain percentage of birth complication cases. 67.2% of women were partnered (either married or in a stable union) and 8.2% were single at the time of their birth. This percentage was used as a threshold value. If the percentage was above this threshold value for any type of complication, that complication was considered a high rate in relation to proportion of the marital group to cases with birth complications. High values are highlighted in Table 25.

Partnered women represented proportionately more birth cases that arrived in late stages of labour, had foetal malpresentation, had an induced labour, had various placental complications, had tubaligations as part of their delivery services, had Gestational Diabetes, more cases had high numbers of previous pregnancies, experienced premature rupture of membranes or needed artificial rupturing of membranes to induce labour compared to single women.

Single women represented proportionately more birth cases that were transferred during their hospital admission to TTM, reported foetal distress during delivery, gave birth before arrival at the hospital, have an obstructed labour, have a meconium present during the birth, have a home delivery, or have a socially stigmatic pregnancy compared to partnered women.

This analysis also found that women with unknown marital status at the time of their birth also had high values for specific complications. A follow-up analysis should look obtaining this missing data to see if these cases are influencing the results in the study sample.

Table 25. Birth Complications of Current Pregnancy by Marital Status and Complication Type

Complication Type	In Partnered Women	Percent	In Single Women	Percent	In Unknown Marital Status	Percent	Total Complications	Percent
Arrived in 2nd stage of labour	211	76.7	18	6.5	46	16.7	275	17.0
Transferred during hospital admission for pregnancy	129	66.8	22	11.4	42	21.8	193	11.9
Malpresentation	124	68.5	10	5.5	47	26.0	181	11.2
Foetal Distress (includes non-reassurance)	98	54.4	19	10.6	63	35.0	180	11.1
IOL	76	77.6	8	8.2	14	14.3	98	6.1
Birth before Arrival	48	65.8	7	9.6	18	24.7	73	4.5
Pre-eclampsia	39	63.9	5	8.2	17	27.9	61	3.8
Labour Obstruction (includes obstruction noted due to large infant size and noted CPD)	35	60.3	6	10.3	17	29.3	58	3.6
Meconium (any type)	31	54.4	6	10.5	20	35.1	57	3.5
Pre-existing condition (unrelated to birth) **	33	75.0	5	11.4	6	13.6	44	2.7
Haemorrhaging (ante partum or post partum)	29	69.0	3	7.1	10	23.8	42	2.6
Placental Complication (Placenta Praevia, Placental Abruption, or Retained Placenta)	31	73.8	0	0.0	11	26.2	42	2.6
Other Birth Related Complication***	54	60.7	8	9.0	27	30.3	89	5.5
Failed IOL	18	52.9	0	0.0	16	47.1	34	2.1
Precipitated labour	20	71.4	7	25.0	1	3.6	28	1.7
Failure to Progress or Poor Progress of Labour (Vaginal Deliveries Only)	22	75.9	4	13.8	3	10.3	29	1.8
Tubaligation	19	70.4	0	0.0	8	29.6	27	1.7

Complication Type	In Partnered Women	Percent	In Single Women	Percent	In Unknown Marital Status	Percent	Total Complications	Percent
Home delivery	11	47.8	3	13.0	9	39.1	23	1.4
GDM	15	78.9	0	0.0	4	21.1	19	1.2
Socially Stigmatic Pregnancy****	8	42.1	7	36.8	4	21.1	19	1.2
Grandmultipara	14	82.4	0	0.0	3	17.6	17	1.1
Polyhydramnios	13	76.5	2	11.8	2	11.8	17	1.1
Rupture of membranes (premature or artificial)	10	76.9	0	0.0	3	23.1	13	0.8
Number of Complications	1088	67.2	140	8.6	391	24.2	1619	100

* ☐ *indicates that percentage is above either 67.2% for partnered women or 8.6% for single women, which means proportionately more women for a specific condition than are represented in the sample by marital status*

***includes chikungunya, anaemia, RHD, cardiac health issues, pyelonephritis, obesity, maternal or infant deformity, IUGR, asthma, smoker, STI, short umbilical cord, mental illness, ovarian laparotomy etc.*

****(includes blood loss, transfers to neonatal ICU, chorioamnionitis, shoulder dystocia, post-term delivery, premature birth, hypovolemic shock, bradycardia, tachycardia, hyrdrocephalus, Spontaneous delivery, low blood pressure, VBAC, cervical or vaginal tear, oligohydramnios, lw hemoglobin, high risk pregnancy, maternal trauma and infant deaths).*

*****this term refers to all teenage pregnancies, noted family conflicts regarding the woman's pregnancy, immediate adoption of the baby upon delivery, or other notes by nursing staff that indicated social complications surrounding the birth.*

Birth weight

Birth weight was analyzed by infant to include twin births in the calculation. There were 6,008 births in the sample that produce 6,086 infants, totalling 78 twin births with a recorded birth weight. This count includes all infants living and dead. Very low birth weight was defined as less than 1500 grams, low birth weight was defined as weight between 1500 and 2500 grams, normal was defined as between 2500 grams and 4,000 grams, and all weight above 4,000 grams was considered macrosomial or high birth weight.

Only 4.5% of infants born in the sample were born with very low to low birth weight with 79.6% of infants falling into the normal range for birth weight. Conversely, almost 14% of infants were born macrosomial or with high birth weight.

Table 26. Birth weight

Birth Weight Category	Number	Percent
very low	62	1.02
low	212	3.48
normal	4842	79.56
macrosomial	850	13.97
missing	120	1.97
Grand Total	6086	-

Table 27. Macrosomial Rates by Year

	2014	2015	NZ 2014 (Webb 2014)	NZ Pacific Islander Rate 2014 (Webb 2014)
Macrosomial Birth Rates	14.0	14.4	2.5	4.7

The macrosomial rates at TTM for 2014 and 2015 are significantly high (14% and 14.4% respectively), especially compared to other pacific populations (see Table 27). The rates also increased within the two year period. It has been documented that macrosomia has been linked to obesity later in life for the infant as well as immediate complications of the infant's birth such as should dystocia, foetal distress, and difficulties in delivery. The mother's weight, blood sugar, and obesity are documented in increasing the risk for macrosomial birth. This highlights the interconnectedness of antenatal nutrition and the inheritance of NCD risk.

Perinatal Mortality

Perinatal mortality rates per 1,000 were calculated to assess preventable child death in the context of pregnancy. Perinatal death is defined in this analysis as the death of the foetus or child between 20 weeks of gestation and the first 7 days after birth. This excludes miscarriage cases. Infants were the unit of analysis totalling 6,068. Table 28 shows the calculation for the perinatal mortality rates for TTM Hospital for 2014 and 2015.

Table 28. Perinatal mortality

Perinatal Death Rate Calculation	2014	2015
Numerator	58 deaths	33 deaths
Denominator	4078 births	1930 births
Perinatal Death Rate	14.2 per 1,000	17.1 per 1,000

These rates were compared to other Pacific nations and by year (see Table 28). In 2014, TTM's perinatal mortality rate was similar to other small pacific island nations, but increased by almost 3% in 2015. The cause of this increase cannot be determined from this dataset. It is recommended that clinical interventions address the underlying causes of this increase.

Table 29. Perinatal mortality

TTM 2014	TTM 2015	Papua New Guinea 2014 (STCF 2014)	Solomon Islands 2014 (STCF 2014)	Fiji 2012 (Bythell 2016)	New Zealand 2013
14.2 per 1,000	17.1 per 1,000	24.3 per 1,000	13.8 per 1,000	14.6 per 1,000	10 per 1,000

Table 30 shows the disaggregation of perinatal death by type (intrauterine death, miscarriage, early neonatal death, and stillbirth). Most foetal or infant deaths are intrauterine deaths (62.4%).

Table 30. Deaths of Current Birth

Infant Deaths of Current Birth	Number	Percent	Notes
(All Infants including twins = 6068)			
IUD	58	62.4%	Out of Deaths
IUD macerated	18	19.4%	Out of Deaths
ENND	6	6.5%	Out of Deaths
Stillbirth	9	9.7%	Out of Deaths
Miscarriage	2	2.2%	Out of Deaths
Deaths (including miscarriages)	93	1.5%	of all infants
Alive	5975	98.5%	of all infants
Missing Result	31	0.5%	of all births

Recommendations:

1. Increasing antenatal care coverage should target married women to assess why they are less likely to receive adequate numbers of ANC visits to a healthcare provider and eliminate barriers this group encounters in accessing care.

2. Efforts to reduce NCD's should consider reducing the rates of macrosomial births. Macrosomia increases the risk of the infant developing obesity later in life. TTM Hospital's rates were higher when compared to Samoan populations in New Zealand.

3. The 2015 significant increase in the perinatal mortality rate needs to be reviewed by management at NHS and MoH to determine what strategies and prevention programs should be put in place to improve these rates.

4. C-section rates were low, as the procedures were only used in emergencies when there was a threat to the health of the fetus. Practices should encourage vaginal birth if there are no threats to mother or infants' health.

5. Of the birth complications that were reported, the majority were related to issues of access. Women reporting to hospitals in later stages of labour, or being transferred from other health centres due to complications. TTM should partner with rural health centres to improve the transfer process and conduct community awareness about when to go a hospital or health centre when labour starts.

6. In addition to improving ANC attendance to ensure malpositioning of the foetus is prevented and treated, TTM should conduct targeted outreach screenings with pregnant women at 36 weeks. Medical outreach visits to screen for malpositioning and to deliver external cephalic version can reduce complications when cases arrive at the hospital for labour.

7. The differences in types of birth complications amongst partnered and single women should also be formally assessed in qualitative studies to gain insight on improving services and preventing complications for these groups.

Bibliography

1. Bythell M, Nand D, Tikoduadua L, Vereti I, Kado J, Fong J, Jenkins K, Mataitoga K. "Stillbirths, Neonatal and Infant Mortality in Fiji 2012: Preliminary findings of a review of medical cause of death certificates". May 5, 2016. Fiji Journal of Public Health. Retrieved from: http://www.health.gov.fj/eJournal/index.php/2016/05/05/stillbirths-neonatal-and-infant-mortality-in-fiji-2012-preliminary-findings-of-a-review-of-medical-cause-of-death-certificates/

2. Ministry of Health STI Surveillance Data

3. Ministry of Health, "Health Sector Plan 2008-2018 Annual Review Report July 2014-June 2015"

4. Ministry of Health, "Monitoring and Evaluation Operational Manual 2011"

5. Ministry of Health, "NCD Risk Factors STEPS Report 2014"

6. Samoa Bureau of Statistics, "Population and Housing Census 2011 Analytical Report"

7. Samoa Bureau of Statistics, "Demographic Health Survey 2014"

8. Save the Children Fund (STCF). "Ending Newborn Deaths: Ensuring Every Baby Survives" 2014. London UK. Page Bros. Ltd.

9. Webb Rachel, "The Health Economics of Macrosomia" 2014. Christchurch, New Zealand: University of Canterbury.

Appendix A. Disaggregation of All Birth Complications (Number of Cases)

Any Birth Complication	1604
Anemia	4
APH	17
AROM	2
Arrive 2nd Stage	274
Asthma	1
BBA	74
Big Baby	21
Blood loss	6
Bradycardia	2
Breech (unspecified)	74
Breech (Footling)	34
Breech (Buttock)	16
Oblique Lie	3
Cardiac	6
Chikungunya	2
Chorioamnionitis	4
Cord Prolapse	16
CPD	2
Edema	1
Failed IOL	34
Failure to progress (Vaginal Deliveries only)	2
Fetal Distress	173
Fetal Tachycardia	1
GDM	19
Grandmultipara	17
Home delivery	23
Hydrocephalus	2
Infant deformity	1
IOL	98
IUD	31
IUD (Macerated)	19
IUGR	10
low haemoglobin	3
Maternal deformity	1
Maternal Trauma	2
Meconium	57
Infant sent to NNU	6
Non-reassurance	6
Nuchal Cord	11
Obese mother	5
Obstructed labour	35
Placenta praevia	25
Placental Abruption	10

Polyhydramnios	17
Pre-eclampsia	61
Poor Progress (vaginal delivery only)	23
PPH	25
Precipitated Labour	28
PROM	9
Pyelonephritis	4
Retained Placenta	7
RHD or Rh. Fever	8
Shoulder Dystocia	9
Nurse Noted Stigmatic Pregnancy	19
Transfer	193
Transverse lie	18
Tubaligation	24
Unstable lie	9

Appendix B. List of Variables Available in TTM Fananau Database 2014-2015

1. Marital Status
2. Name
3. P (Parity)
4. G (Gravidity)
5. Age
6. Address (Village Name)
7. Prev. Abnormalities
8. Admission Date
9. Admission Year
10. Weeks of Pregnancy
11. Delivery Type
12. Induction/ Indication
13. Current Birth Complication
14. Antenatal Visits
15. Hours in Labour
16. Result Mother
17. Result Infant
18. Infant Weight
19. Weight Category
20. Episiotomy
21. Clinician comments (any other info)