Tigray Region Bureau

Mums for Mums

Mekelle University

VSO Ethiopia

The Report on the Prevalence of Pelvic Organ Prolapse, Obstetric Fistula, and Associated Factors in Tigray Region, Northern Ethiopia

Tigray Region Bureau of Health, Mums for Mums, Mekelle University College of Health Sciences, and VSO Ethiopia

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PREFACE

POP is an increasingly common gynecological problem resulting from loss of the support of pelvic organs in the women pelvic area. Although Pelvic Organ Prolapse (POP) rarely results in death, it had a huge impact on the daily activities of the women who are afflicted by this condition, disrupting and decreasing their quality of life. It can severely limit a woman's physical, social, psychological and sexual function. Severe prolapse may contribute to disrupted marital relationships and divorce. POP and its complications impose a considerable economic burden on the affected person and it had been estimated that about 11% of American women undergo surgery for POP or incontinence before the age of 79, with 29.2% requiring additional surgery.

The prevalence and trend data for POP in Tigray was not easily available. Many factors contribute to the etiology of POP: intrinsic factors (genetics, age, postmenopausal status, and ethnicity) and extrinsic factors (parity, history of previous hysterectomy, co-morbidities, occupation) components. High parity was the single most important risk factor for POP among women in rich as well as in poor countries. However, the relationship between these risk factors and the stages and component prolapsing organs was incompletely understood Tigray region, Nothern Ethiopia.

Permission to undertake the study was also granted by the heads of each district of Tigray and Tigray Health Bureau, Ethiopia. This study was granted an ethical approval from the Tigray Health Bureau and the Makelle University College of Health Sciences- Research and Community Services Committee.

On behalf of Mums for Mums, I would like to take this opportunity to pass my sincere gratitude to all stake holders who contributed academically, financially and physically in the design, data collection and report generation of this important findings.
Sincerely,

Mr Ashenafi Asmelash

EXECUTIVE DIRECTOR,
MUMS FOR MUMS

ACKNOWLEDGEMENT

We are very grateful to Mekelle University College of Health Sciences and World Wide Fistula Fund for providing funding for this project and Mums for Mums and Regional Health Bureau for supporting the use of valuable resources. VSO and Mums for Mums will remain proud for offering committed operational support supporting during data collection team, data validation and report generation through a team work approach.

Many people in Tigray offered a heartfelt support and contributed to the data collection for this important research, including health extension workers who collected data; health center staff who assisted for physical examination of women. Dr Malaku Abraha, Dr Yibra Berhe are highly appreciated for training data collectors. Last but not least, we are grateful to the women who kindly allowed us into their homes and their generosity in giving us the time to ask personal questions.

With a great honor we would like to appreciate the contribution of Dr Bernard Mbwele in analyzing the data using the STATA v13 in a standard format results and then presenting the results to the Tigray Health Bureau during a special workshop for result dissemination. With respect the team of investigators would like to offer a special acknowledgement to Alem Kahsal Samhal, Abel, Yarid and Minya Hadush for data verification using STATA commands;

We understand the importance of academic and technical contribution given by Makelle University, College of Health Sciences with additional funding from external funding from Mekelle University on top of that given by World Wide Fistula Fund. We, understand that without Makelle University - College of Health Sciences, the study design, data collection and analysis could be quite difficult. We hope that the publication f the finding from this research will be of sound and will change many other communities of Africa.

As we declared and we have not found any conflict of interest the finding of this study will be distributed country wide for the benefit of all mothers of Ethiopia.

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EXECUTIVE SUMMARY

Introduction: Pelvic organ prolapse (POP) and obstetric fistula can severely affect a women's quality of life by limiting physical, social, psychological, and sexual function.

Objectives: The objective of this study was to determine the prevalence of POP, Obstetric fistula, and their associated risk factors among women in Tigray Region, Northern Ethiopia.

Methods: A Community-based cross-sectional study were employed from May 2014 to August 2014.Socio-demographic and risk factors associated with POP and obstetric fistula were collected by a standardized questionnaire. Data obtained were cleaned and entered into a computer and statistical analysis were performed using STATA v13 software. A p-value <0.05 were considered statistically significant.

Results:
Prevalence of Pelvic organ Prolapse in Tigray by 2015 was 12 women out of 1000 women and the Prevalence of Obstetric Fistula in Tigray by 2015 was 3 out of 1000 women. Parity, Occupation, Age, Age at Marriage, Marital status and home delivery and they are significantly associated with stillbirth and 12 common distress symptoms related to Pelvic Vaginal, Colo-Anal and Urinary distress symptoms. Visible protrusion is significantly associated with Age (Age by 10 years difference; df (5), χ^2 = 15.8267, p value = 0.007), (Age by reproductive age categories; df (1), χ^2 = 5.3638 p value = 0.021) and Parity (df (2), χ^2 = 26.5118, p value< 0.001). Parity is further associated with Loss urine while straining (df (2), χ^2 = 17.5112 P value< 0.001) and Loss of stool on in a careful pelvic examination (df (2), χ^2 = 7.9696 P value = 0.01). Majority of women were some-what bothered by the distress symptoms with exception of bulge on vaginal area which presented the majority to be quite a bit bothered 53(37.86%).

Conclusion
The prevalence of Pelvic Organ Protrusion is slightly higher than other rural Ethiopian areas. This prevalence is however low compared to the previous years. It is possible to eliminate Obstetric fistula and reduce POP and in Tigray by focusing on risk factors of Parity, Occupation, Age, and Age at Marriage, Marital status and home delivery.

Recommendation:
A special campaign with a well guided strategy on treatment and evidence based community prevention measures on women rights in choice of life style is needed. Strategy shall include choice of women for light duty works after parity of 3, gynecological medical checkup with increasing age, community intervention on prevention of early age at marriage, marital status counseling and home delivery prevention.

LIST OF ACRONYMS

BMI:	Body Mass Index
CSA:	Central Statistical Agency
NHANES:	National Health and Nutrition Examination Survey
OF	Obstetric Fistula
POP:	Pelvic organ prolapse
POP-Q:	Pelvic Organ Prolapse Quantitation
UVP:	Utero vaginal prolapse
US:	United States (US)

CHAPTER 1: INTRODUCTION

Pelvic Organ Prolapse (POP) refers to the downward descent of the pelvic organs towards and down through the vaginal opening (1-4). The prolapsing organs typically include one or more of the following: the urinary bladder, urethra, rectum, small intestines, vagina, or uterus. It was an important public health problem affecting the quality of life more than 30 million women globally (1, 4-14). The prevalence of POP varies widely across studies, depending on the population studied and entry criteria (2). It appears to be quite common among women in sub-Saharan Africa (8, 15, 55).Women may be affected at any age (2, 16), although prolapse an incontinence are more common in older women (2, 5, 6, 8, 17). POP and its complications impose a considerable economic burden (16, 18, 19).

Obstetric fistula (OF) is a seriously debilitating condition, occurring indirectly or directly from prolonged and obstructed labor (7, 8). The vast majority of women with fistula have had a traumatic labor, often lasting for several days, during which time pressure from the fetal head on bony pelvic structures will irrevocably damage underlying pelvic tissues and nerves (9, 10).

POP was an increasingly common gynecological problem resulting from loss of the support which normally was maintained by a complex interaction among the levatorani, the vagina, and the connective tissue; neurologic injury from stretching of the pudendal nerves may occur during childbirth and contribute to the development of POP (4, 5, 9, 10, 11, 16, 22-28). In a healthy woman in whom the levatorani had normal tone and the vagina had adequate depth, the upper vagina is almost horizontal when she is upright. When the upper vagina is pressed against the levator plate during an increase in intra-abdominal pressure, the levatorani loses tone, it starts to sag, moving a horizontal to a semi-vertical position (10,11). This creates a widened genital hiatus that forces the pelvic structures subjected to constant stress, then stretched. Then connective tissue support fails, as a result of possible collagen decrease and tearing, and a prolapse occurs (2).

Numerous factors which are commonly found throughout Ethiopia influence prolapse, incontinence and obstetric fistula formation, including early marriage (8, 37), grand-multiparty, obstructed labour, and lack of a fully developed maternal healthcare infrastructure (8, 38, 39). To date there have been no community-based studies to determine the prevalence of POP and its associated risk factors. This situation warrants an accurate epidemiological approach among local populations. Hence, the aim of this study was to assess the prevalence of POP, pelvic floor symptoms, and obstetric fistula in Tigray region, Northern Ethiopia. This will serve as a baseline against which the development of healthcare services and public health policy can be developed.

CHAPTER 2: LITERATURE REVIEW

Pelvic organ prolapse (POP) (also called urogenital prolapse) has an increasing gynecological problem worldwide, which affects the quality of life of millions of women by their limiting physical, social, psychological and sexual function. It had an estimated lifetime prevalence of 30.0% to 50.0% in parous women (4, 10, 11, 13, 14, and 40). The prevalence of POP varies widely across studies, depending on the population studied and entry criteria (2). It is one of the most common indications for gynecologic surgery (1).POP rarely results in severe morbidity or mortality; rather, it causes symptoms of the lower genital, urinary, and gastrointestinal tracts that can affect a woman's daily activities and quality of life (3). It may be associated with urinary incontinence as well as defecatory dysfunction (2, 41). It was a common condition among older women and the prevalence had been reported to be as high as 39.8% in some studies (16, 41). In addition, POP and its complications impose a considerable economic burden. It had been estimated that about 11% of American women undergo surgery for POP before the age of 79, with 29.2% requiring additional or repeat surgery (16, 19, 35). A European study showed that the number (rate) of admissions for POP surgery was 36,854 (0.87 per 1,000 women) in Germany, 36,679 (1.14 per 1,000 women) in France, and 28,959 (1.13 per 1,000 women) in England during the year 2005 (36). It had been estimated that the cost of surgery for POP in 2005 was 144,236,557 euro, 83,067,825 euro, and 81,030,907 euro in Germany, France, and England, respectively (36).

In a multicenter study of 1006 women age 18-83 years presenting for routine gynecological care, 24% had normal support and 38.0% had stage I, 35.0% stage II, and 2.0% stage III POP (29).Many women with POP do not seek medical advice (8, 33, 42, 43). This makes it difficult to determine the incidence and prevalence of this condition (8, 44, 45). Such gynecological conditions can impact women's sexual (44, 45) and lead to psychological problems (8, 45). In areas where access to health care was limited, women usually have to live with the consequences of fistula or prolapse for the rest of their lives (8, 17, 56, 64) which can be a challenge, both physically and emotionally, as the symptoms can disrupt the woman's day-to-day life (8, 33, 64). Prevalence of depression was 3-5 times higher among women with advanced stages of POP than it was among normal controls (8, 46, 47). Severe forms of prolapse can contribute to disrupted marital relationships and divorce (33, 34).

The etiology of POP was complex and multi-factorial (1-3, 11, 14, 21, 22). Risk factors vary from patient to patient (3, 23). The risk factors may be grouped into several categories, including intrinsic (genetics, age, postmenopausal status, ethnicity) and extrinsic factors (parity, history of previous hysterectomy, co-morbidities, occupation) components (14). Vaginal childbirth, advancing age, and increasing body-mass index (BMI) are the risk factors found most consistently, with vaginal childbirth

being the most frequently associated with prolapse (21, 26). Usually a combination of these etiologic factors results in POP. These risk factors vary from patient to patient and can be influenced by race (13). However, the relationship between these risk factors and the stage or component of POP had not been clearly defined (23). A clear understanding of predisposing factors was important in the evaluation of patients (14).

Identification of POP can be difficult because women are often embarrassed by it (8, 45). Many patients with a degree of POP are often asymptomatic (3, 23); but often they have a variety of pelvic floor symptoms which may or may not be directly related to the prolapse (11).Since asymptomatic prolapse does not require treatment, the clinical focus should be on symptomatic patients(3, 23). Using surgical procedures as a surrogate measure for the prevalence of prolapse will not detect the number of women with symptomatic prolapse who have not had surgical treatment (48).

The prevalence of symptomatic POP was reported to be 5-10% (49). However, population-based cohort studies have reported a significant difference in the prevalence of symptomatic prolapse in different ethnic groups, with white and Latina women having the highest prevalence, followed by Asian women, and then by African-American women. After adjustment for multiple risk factors, Latina and white women had four to five times the risk of symptomatic prolapse, and white women had a 40% higher risk of objective prolapse demonstrated with the leading edge of prolapse at or beyond the hymen, compared with African-American women (13). Most studies on prolapse report on symptomatic women living in more developed countries who are actively seeking help and these patients are usually reported as case series from hospitals and similar healthcare institutions. But a few studies from less developed countries suggest that POP in African women may occur at younger age (1, 22, 55). When prolapse was symptomatic, options include expectant observation, use of a pessary, and surgery. Surgical strategies for prolapse can be categorized broadly by reconstructive and obliterative techniques (3).The incidence of surgery for prolapse was between 1.5 and 4.9 cases per 1000 women-years (50, 51). The need for POP surgery increases with age and it had been conservatively estimated that the surgical workload related to POP will increase by 46.0% over the next four decades as the population ages (32). A woman's lifetime risk of surgery for POP by age 80 years was about 7% in the United States.

The peak incidence of such surgery was in individuals age 60–69 years (42·1 per 10 000 women). However, almost 58% of procedures are undertaken in people younger than 60 years. An estimated 13% of patients who have surgery will need a repeat operation within 5 years. The worldwide

prevalence of genital prolapse was estimated to be 2–20% in women under the age of 45 years (5). However, prolapse was common among elderly and multiparous women, and the prevalence has been reported as high as 39.8% in some populations (5, 6, 8, 17).

POP is common among women of developing countries (8, 15, 55). Symptoms of POP include pelvic heaviness; a bulge, lump or a protrusion of tissue from vaginal outlet, a dragging sensation in the vagina or backache, dyspareunia, urinary incontinence, and incomplete emptying after voiding (11, 15). Symptoms of bladder, bowel or sexual dysfunction are frequently present as well. These symptoms may be directly related to the prolapsed organ; for example a poor urinary stream may be associated with outlet obstruction by a cystocele and obstructed defecation may be found in association with a rectocele. Prolapse may involve any part of the vagina: upper vaginal prolapse i.e. uterus, vaginal vault (after hysterectomy when the top of the vagina descends); anterior vaginal wall prolapse i.e. cystocele (bladder descends), urethrocele (urethra descends), paravaginal defect (pelvic fascia defect); posterior vaginal wall prolapse i.e. enterocele (small bowel descends), rectocele (rectum prolapses into the vagina), or perineal deficiency. A woman can present with prolapse of any of these sites (11). Some symptoms may be associated with prolapse but also may occur independently of any protrusion, for example symptoms of overactive bladder in association with a cystocele (1, 11).

One cross-sectional study of the Women's Health Initiative found the following prevalence of prolapse in USA: 14.2% reported uterine prolapse, 34.3% had cystocele, and 18.6% had rectocele (53). The completely prolapsed uterus can undergo ulceration and become infected. Patients may complain of frequency of micturition, stress incontinence, difficulty of passing urine, low back pain, a feeling of something down and chronic discharge (1, 22).

Characteristics of women living in the resource-poor countries of sub-Saharan Africa differ from those of women in the more developed world (55). In countries such as the Ethiopia, high fertility rates and higher rates of obstetric and gynecologic disease have been reported. Life expectancy tends to be shorter; women marry at an earlier age and a considerable proportion of them into polygamous unions. Particularly in rural women, problems such as substance abuse, obesity and constipation are rare compared with more developed countries. These fundamental differences warrant an accurate epidemiological approach based on local populations when investigating prolapse.

Obstetric fistula had been eliminated from high income countries and virtually eliminated among middle-income countries, but it remains a problem for women in low-income countries such as Ethiopia, where most births occur at home, where access to emergency obstetric services was often

difficult, and where obstructed labor continues to be a major public health problem (57 – 61). Childbirth-associated injuries occur along a spectrum with mild degrees of minimally-symptomatic prolapse at one end, worsening degrees of prolapse in the middle, and catastrophic injuries such as obstetric fistula and the variety of presentations associated with the "obstructed labor injury complex" on the far end (65,66).

CHAPTER 3: THE PROBLEM STATEMENT

Although POP rarely results in death, (16, 31), it had a huge impact on the daily activities of the women who are afflicted by this condition, disrupting and decreasing their quality of life (9, 14, 16, 32). It can severely limit a woman's physical, social, psychological and sexual function (1). Severe prolapse may contribute to disrupted marital relationships and divorce (33, 34). POP and its complications impose a considerable economic burden on the affected person and it had been estimated that about 11% of American women undergo surgery for POP or incontinence before the age of 79, with 29.2% requiring additional surgery (16, 19, 35). Many factors contribute to the etiology of POP: intrinsic factors (genetics, age, postmenopausal status, and ethnicity) and extrinsic factors (parity, history of previous hysterectomy, co-morbidities, occupation) components (14). High parity was the single most important risk factor for POP among women in rich as well as in poor countries (1, 3, 22). However, the relationship between these risk factors and the stages and component prolapsing organs was incompletely understood (23).

Obstetric fistula was a catastrophic complication of prolonged obstructed labor (56). Obstructed labor was common in Ethiopia, as are the most extreme complications of this condition: uterine rupture and obstetric fistula (57 - 62). Because uterine rupture and obstetric fistula are serious complications of obstructed labor, and because high parity was one of the risk factors most strongly related to the development of pelvic organ prolapse and non-fistula-related urinary and fecal incontinence, it makes good sense to combine a survey of the prevalence of obstetric fistula to surveys about pelvic organ prolapse. The prevalence of obstetric fistula in Tigray had been estimated to be 1.6% based on data from the 2005 Ethiopian Demographic and Health Survey (63). To observers actively working in the field of fistula repair and prevention, the current estimate seems high. Accurate data are needed to plan and provide services to these women.

CHAPTER 4: SIGNIFICANCE OF THE RESEARCH PROJECT

Pelvic organ prolapse can severely affect a woman's quality of life by limiting physical, social, psychological and sexual function. POP and its complications also impose a considerable economic burden to both the individual woman with this condition and to the country at large.

Ethiopia had numerous maternal health-related problems including POP and obstetric fistula. In Ethiopia no community-based studies have yet been conducted to determine the prevalence of POP and its associated risk factors. As noted previously, the prevalence of obstetric fistula had been determined to be 1.6% in Tigray, but this statistic had been determined indirectly, not by direct community survey (63). These fundamental issues warrant and more detailed epidemiological approach to local populations in Tigray when investigating POP and obstetric fistula. Hence, the aim of this study was to assess the magnitude of the prevalence of POP and obstetric fistula in the Tigray region of northern Ethiopia. This will serve as a baseline data for the management the cases in the region and then support an agenda to eliminate obstetric fistula and decrease POP in Ethiopia.

CHAPTER 5: OBJECTIVES

5.1. General Objectives

The main objective of the study was to determine the prevalence of Pelvic organ prolapse (POP) obstetric fistula and their associated risk factors among women in Tigray Region

5.2. Specific Objectives

The specific objectives were:

- To determine the prevalence of POP in the Tigray Region
- To determine the prevalence of risk factors for POP in the Tigray Region
- To determine the prevalence of obstetric fistula in the Tigray Region
- To determine the prevalence of risk factors for obstetric fistula in the Tigray Region
- To assess the degree of bother and associated factors associated with POP and obstetric fistula

CHAPTER 6: METHODS AND MATERIALS

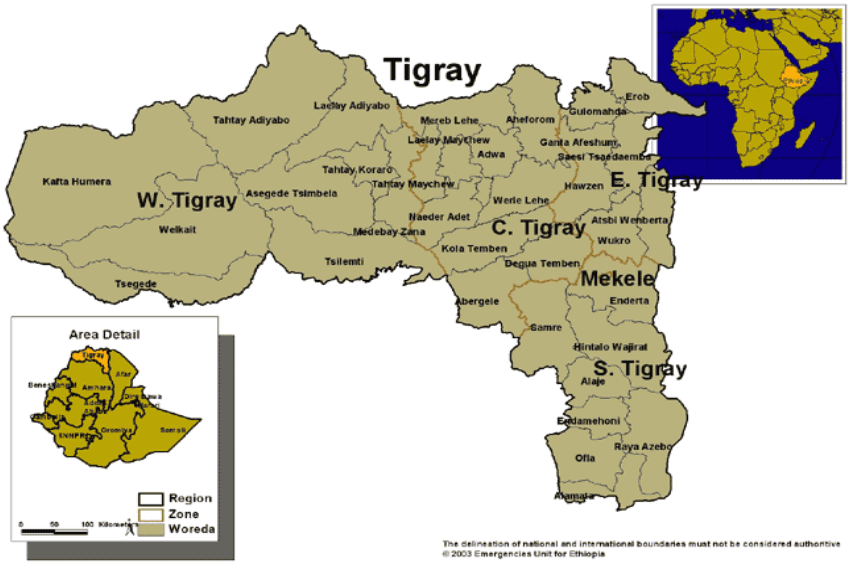
6.1. Study Area

The study we conducted in Tigray region. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), the Tigray Region had an estimated total population of 4,314,456, of whom 2,124,853 are men and 2,189,603 women; urban inhabitants number 842,723 or 19.53% of the population. With an estimated area of 50,078.64 square kilometers, this region had an estimated density of 86.15 people per square kilometer. For the entire region 985,654 households were counted, with an average of 4.4 persons per household, with urban households having on average 3.4 and rural households 4.6 people. The region was predominantly inhabited by people from the Semitic-speaking Tigray ethnic group (96.55%). The other residents hail from other Afro-Asiatic communities, including the Amhara (1.63%), Saho (0.71%), Afar (0.29%), Agaw (0.19%) and Oromo (0.17%). There are also a minority of Nilo-Saharan-speaking Kunama Nilotes (0.07%). 95.6% of the Tigray region's population was Orthodox Christians, 4.0% Muslim, 0.4% Catholics and 0.1% Protestant.

According to CSA (2008), in Ethiopia "urban areas" refer to all capitals of regions, zones and woredas, and it also includes localities with urban kebeles whose inhabitants are primarily engaged in non-agricultural activities." All the other areas are considered rural. Based on the definition, the rural areas comprise 84 percent of the total population of Tigray.

Access to health services was very limited in Ethiopia. Only 51 percent of the population had access to health services.

Figure 1: Map of Study Area, Tigray Region



6.2. Study Design

A community based cross sectional study design, using quantitative methods was employed. The quantitative methods were used to assess the prevalence and factors associated with outcome variables.

6.3. Source of population

The study population was made of all women of the age group greater than or equal to 15 years living in the Tigray region. The reason for this was age determination was that both POP and Obstetric Fistula are reproductive health problems which begin at the time of menarche and potential fertility.

6.4. Study Unit

All women in the age group of greater than or equal to 15 years were eligible to be interviewed by random selection from the household.

6.5. Inclusion and Exclusion Criteria

6.5.1. Inclusion Criteria

All women of age groups greater than or equal to 15 years were included in the study.

6.5.2. Exclusion Criteria

Those women who have not lived for at least six months in the area and those who decline to participate were excluded from the study.

6.6. Sample Size Determination

6.6.1. Sample Size

Kreft (1996) suggests a rule of thumb which she calls the '30/30' rule, which means a sample of at least 30 groups (in our case woredas) with at least 30 individuals per group was necessary; these sample size will help us also to make inter-woreda comparisons (54). Based on these facts, and in order to obtain a robust estimate, we will take 50 individuals from each woreda of the region. In the region there are 46 different woredas / districts, and we will take three kebeles (two from rural and one from urban) from each woreda randomly. At the second stage, 50 women (40 from rural and 10 from urban) women were recruited from each randomly selected kebele.

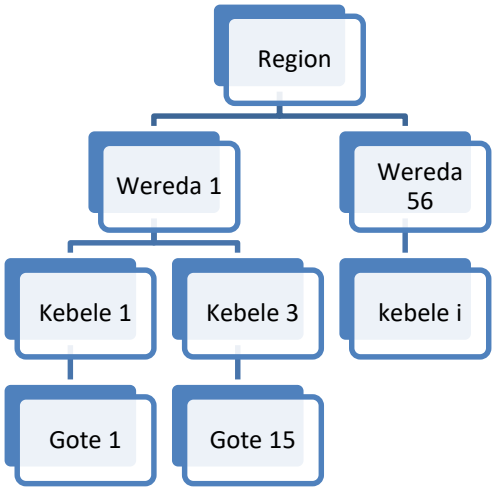
The sample size were determined by taking 50 individuals from each woreda or district; 40 individuals from rural areas and 10 individuals from urban areas. Because Tigray region had 52 woredas the total sample size were52*50=2600 households

6.6.2. Sampling procedure

Multistage sampling techniques were used to select the study population. Since there are 52 woredas, 144 "kebeles (92 rural and 52 urban, and 50 households in the district; 3 kebeles were selected by simple random sample from each woreda. There are 15 'Gotes' in the selected 3 kebeles, out of this 5 of the "gotes" were selected by simple random sampling and the total sample shared a "gote" based on the available number of household of the all women in age groups greater than or equal to 15 years in each "gote" by applying population proportion to size allocation. On the selected 3 'Kebeles' house-to-house visits were carried out to identify households women eligible to participate.

By using systematic sampling techniques the houses were selected, if the houses are closed or the women are not present at the time of data collection, two trials were made. If it was not possible to get in after two attempts, the household were listed as "absent." The next house were considered in place of the absent house which could not be accessed. If there was more than one woman within the same household, she were included in the sample and interviewed and examined separately.

Figure 2. Schematic representation of sampling procedure



6.7. Data Collection

6.7.1. Data Collection Instrument

The data were collected using structured interviewer administered questionnaires, including condition-specific questionnaires for pelvic floor disorders (67). Women suspected of having symptomatic prolapse or a fistula undergone a standardized gynecologic examination (68). Additional questions pertaining to obstetric fistula were asked (69). The interviewer-administrated questionnaires that captures socio-economic, demographic factors and knowledge, attitude, intention and behavior towards UVP.

6.7.2. Data Collection Procedure

The principle investigators trained the data collectors and supervisors for three consecutive days on instruction to include the use of study guides, role-playing (demonstration), informed consent, how to approach participants, ethical procedures and general information in UVP and fistula, as well as the objective of the study. 92 HEW data collectors were used to collect the data and 92 Supervisors (mid wife nurses). Midwives nurses were assigned to check for the daily activity, consistency, and completeness of the questionnaires, to give appropriate support during the data collection process and to perform the standard POP-Q gynecological examination in the nearest health facility. The data collectors and the supervisors were assigned to different sites of the "gotes" in the kebeles. The data collectors visited the sampled households to get the required information. The principal investigators checked on average about 10% of the supervisors' work each day. Incomplete or unsatisfactory questionnaires were given back to the interviewer and get completed.

6.8. Data Quality Control

To assure the quality of the data, data collectors and supervisors were trained and there were both regular supervision and follow-up by the supervisors and the principal investigators. In addition, daily checks quality control to insure the completeness and consistency of the data were made. The questionnaires were translated to Tigrigna and then translated back into English by translators who are blinded to the original questionnaire. The questionnaire were pre-tested in 5% of the nearby gates which have similar characteristics five days before the actual data collection begins to ensure clarity, appropriate language and wording, logical sequences and to assess any skip patterns of the questions. The pre-test sample were not included in the study data and modification were made as necessary before finalizing the final data collection instrument.

6.9. Data Analysis

The collected data were entered in to SPSS Version 12. After the data had been cleaned, checked for missing, outlier and invalid values, then descriptive data analysis by TEXAS STATA Version 13. Study variables were conducted using frequencies and percentage for the categorical data; mean and standard deviation and median and inter-quartile range for normally and not-normally-distributed quantitative variables respectively. The quantitative variables normality of the distribution were checked using box plot graphs. The presence of association between categorical variables were tested using cross tabulation with chi-square test at significance level of P-value <0.05. If the variables are quantitative independent sample t-test were used. To identify factors associated with the UVP, we applied Pearson's Chi squire analysis.

CHAPTER 7. ETHICAL CONSIDERATION

The study was approved Mekelle University and ethical clearance will also be obtained from College of Health Sciences Research and Community Service Ethical review board and the Tigray Regional Health Bureau. At the district level, permission to conduct the study were obtained from the district Health Office in advance of conducting the study. The free and informed consent of each individual participant were obtained prior to their interview and examination.

The research team was required to respect the culture of the respondents during the data collection process. Confidentiality were maintained by the use of code numbers on the questionnaire rather than names. Information obtained will only be used for the purposes of the study. The data collected was only accessible to study personnel and the principal investigator will store the questionnaires and other study materials in a secured placed.

All study participants signed a consent form and those who were supposed to undergo physical examination were asked to undergo another consent for gynecological pelvic examination with high level of confidentiality of the findings.

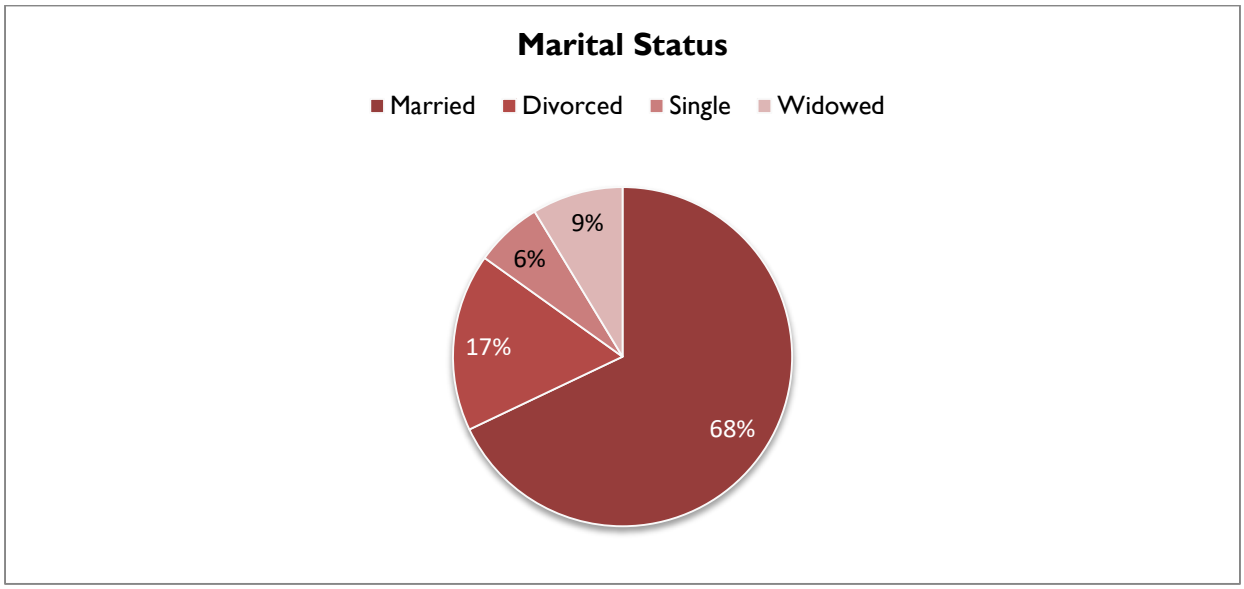
All women found with gynecological morbidities and diseases or syndromes were referred to Mekelle University College of health science for further medical intervention and treatment.

CHAPTER 8: RESULTS

8.1 Demographic Patterns

There were 2,607 women from Tigray region who were selected and interviewed for Pelvic Organs Protrusion (POP) and Urinary Fistula. The average age of women interviewed was 34.8 ± 12.5 years of age, ranging from the minimum of 15 years of age to a maximum of 85 years. Among these 2,607 women, 1,771 women (67.9%) were married, 442 women (16.95%) were divorced, 168 women (6.44%) were single and 226 women (8.67%) were widowed as shown in figure 3.

Figure. 3 the distribution of marital status response from women of Tigray region



The response to time of marriage was that a total of 2,434 women could recall the age at marriage where at average they were married at the age of 16.99 years ± 3.59 ranging from 6 years to 40 years. The age groups distribution is shown in Table 1.

Table 1. Description of Age at time of interview and time of Marriage

	Age Groups at the time interview	Proportion of Age Groups at the time interview (%)	Age Groups at the time of marriage	Proportion of Age Groups at the time of marriage (%)
01 to 10 years	0	0	95	3.9
11 to 20 years	214	8.2	2,097	86.2
21 to 30 years	1,033	39.6	236	9.7
31 to 40 years	745	28.6	6	0.2
41 to 50 years	344	13.2		
51 to 60 years	171	6.6		
61 to 100 years	100	3.8		
Total	**2607**	**100**	**2434[a]**	**100**

[a]*There were 168 women who were single and 5 women could not recall the time of birth*

Majority of women at time of interview were at the age of 21 to 30 years, followed by age group of 31 to 40 years while majority of women who were ever married, were married at the age group of 11 to 20 years, followed by marriage at 21 to 30 years. Strikingly there were 95 women married at the age

of less than 10 years. The demographic distribution among women by religion and occupation is shown in Table 2.

Table 2. Demographic description by religion and occupation

Religion and Occupation Distribution		
Religion	**Frequency**	**Proportion (%)**
Christian	2,427	93.10
Muslim	165	6.33
Other Religion	15	0.58
Total	2607	100
Occupation		
Light Workload	2,056	78.86
Heavy Workload	551	21.14
Total	2607	100

The Christian religion included the Orthodox, Catholics and Protestants while other religions included Bahai, Bahula and Seventh Day Adventists and Budha. All of occupations and household chores were categorized into two main occupational risks for POP, i.e. the heavy workload and light workload. The heavy workload included all tasks involving a lifting heavy object that strains the pelvic organs while light workload includes all tasks that do not involve a lifting heavy object to strain the pelvic organs.

8.2 Pregnancy and facility delivery

Among 2,607 women interviewed, there were 2,321 women (89.0%) who were ever been pregnant with different number of live births as shown in Table 3. Parity was ranging from 1 to 14 with the average of 3.7 ± 2.2 children per woman. The general parity category was presented as 401 (18.9%) being prim-gravida, 1,253 (59.4%) being multipara and 460 (21.9%) being grand multipara.

There were a total of 1,527 woman out of 2,321 delivered at the health facility (65.7%). At average 1.9 ± 1.2 per woman ranging from 1 to 8 children per woman.

The number of women who ever had caesarian section was137 representing 8.9% of all facility delivery. The average frequency of caesarian section per woman was 1.2 ± 0.8 ranging from a frequency of 1 caesarian section to 8 caesarian sections. Validated as 111 (81.0%) with 1 caesarian section, 21 (15.3%) with 2 caesarian sections, 3 (2.2 %) with 3 caesarian sections, 1 (0.7%) with 4 caesarian sections and 1 (0.7%) with 8 caesarian sections. The woman who reported 8 caesarian sections presented with information bias, in that she had 5 different episiotomies which she called caesarian sections.

Table 3. Frequency distribution of number of live-births, Facility delivery and stillbirths

Number of Live Births	Frequency	Proportion (%)	Number of Facility Deliveries	Frequency	Proportion (%)	Number of Stillbirths/ Abortion	Frequency	Proportion (%)
1	401	18.97	1	729	47.12	1	390	54.70
2	378	17.88	2	451	29.15	2	178	24.96
3	350	16.56	3	206	13.32	3	84	11.78
4	284	13.43	4	86	5.56	4	28	3.93
5	241	11.40	5	44	2.84	5	17	2.38
6	174	8.23	6	19	1.23	6	9	1.26
7	126	5.96	7	8	0.52	7	2	0.28
8	105	4.97	8	4	0.26	8	3	0.42
9	39	1.84				9	1	0.14
11	9	0.43				11	1	0.14
12	5	0.24						
13	1	0.05						
14	1	0.05						
Total	**2,114**	**100.00**	**Total**	**1,547**	**100**	**Total**	**713**	**100.00**

In view of stillbirths there were 672 women (28.9%) who had an experience of stillbirth. There were 713 reported stillbirths with different variation of number stillbirths at average of 1.8 ± 1.2 ranging from frequency of 1 to 11 as shown in Table 3.

8.3 The Response of Women with an Experience of Distress Symptoms

There were 21 different distress responses related to POP and Urinary Fistula categorized into 6 Pelvic Vaginal distresses (PV), 8 Colo-Anal distress (CA) and 7 Urinary Distress symptoms (UD) as shown in Table 4.

Heaviness on pelvic area was the leading Pelvic vaginal distress as reported by 434 women 16.7 % followed by Pressure on the lower abdomen which was reported by 302 women 11.6%.

Strain too hard for bowel movement was the leading distress symptoms among women with rectal anal distress, where by 265 women (10.2%) presented with challenges during passing stool and related bowel movements. This was followed by a challenge of pain during passing stool which was reported by 186 women (7.1%).

In a group of urinary distress symptoms, Leak urine and feces out of control was the leading complaint with 421 women presenting with the complaint (16.1%). This was followed by frequent urination presented by 375 women (14.4%) and Small urine leakage by 295 women (11.3%).

Table 4. Outcome distress responses related to POP and Urinary Fistula

	Condition Present		Condition Absent	
	Frequency	Proportion (%)	Frequency	Proportion (%)
PV-1Pressure on lower abdomen	302	11.6	2,305	88.4
PV-2 Heaviness on pelvic area	434	16.7	2,173	83.3
PV-3 Bulge vaginal area	139	5.3	2,468	94.7
PV-4 Push vagina for bowel movement	212	8.1	2,395	91.9
PV-5 Incomplete bladder emptying - strain void	245	9.4	2,362	90.6
PV-6 Push bulge vaginal area with fingers	69	2.7	2,538	97.3
CA-1 Strain too hard for bowel movement	265	10.2	2,341	89.8
CA-2Feel completely emptied bowels	154	5.9	2,453	94.1
CA-3 Lose stool beyond control well formed	54	2.7	2,553	97.9
CA-4 Lose stool beyond control loose	42	1.6	2,565	98.4
CA-5Lose gas from rectum beyond control	98	3.8	2,509	96.2
CA-6 Pain during p ass stool	186	7.1	2,421	92.9
CA-7 Strong sense urgency toilet	134	5.1	2,473	94.9
CA-8 Part bowel pass rectum and bulge	51	1.9	2,556	98.1
UD-1Frequent urination	375	14.4	2,232	85.6
UD-2 Feeling urine leakage	176	6.8	2,431	93.2
UD-3 Urine leakage related to coughing	211	8.1	2,396	91.9
UD-4 Small urine leakage	295	11.3	2,312	88.7
UD-5 Difficulty emptying bladder	192	7.4	2,414	92.6
UD-6 Pain abdominal genital region	258	9.9	2,349	90.1
UD-7 Leak urine and feces out of control	421	16.1	2,186	83.9

The patterns of detailed description of distress symptoms are further shown in Figure 2, Figure 3 and Figure 4 below.

Figure 4. Distribution of Pelvic Organ Prolapse Distress complaints among women of Tigray, Northern Ethiopia

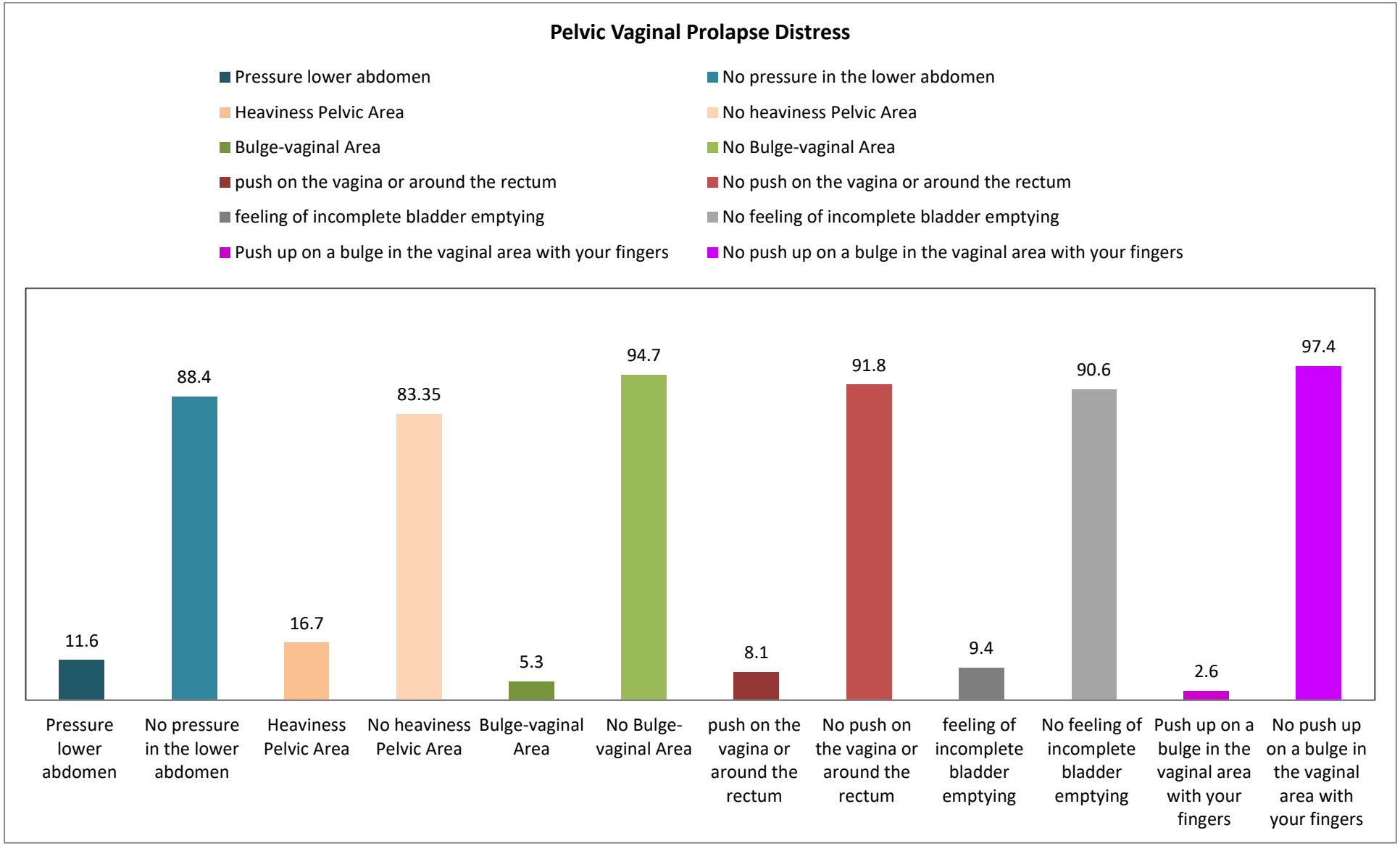


Figure 5. Distribution of Colo-Anal distress complaints among women of Tigray Northern Ethiopia.

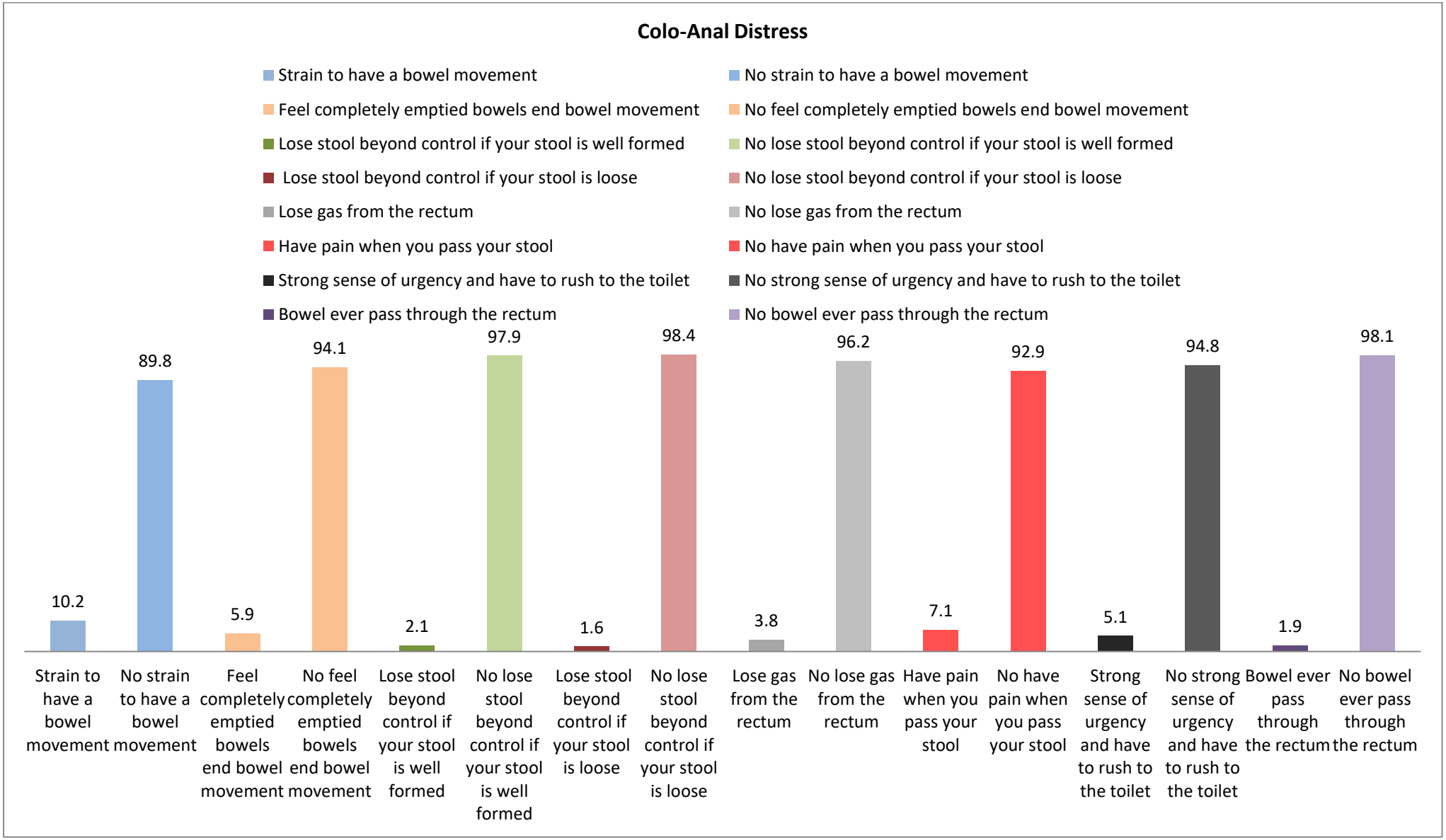
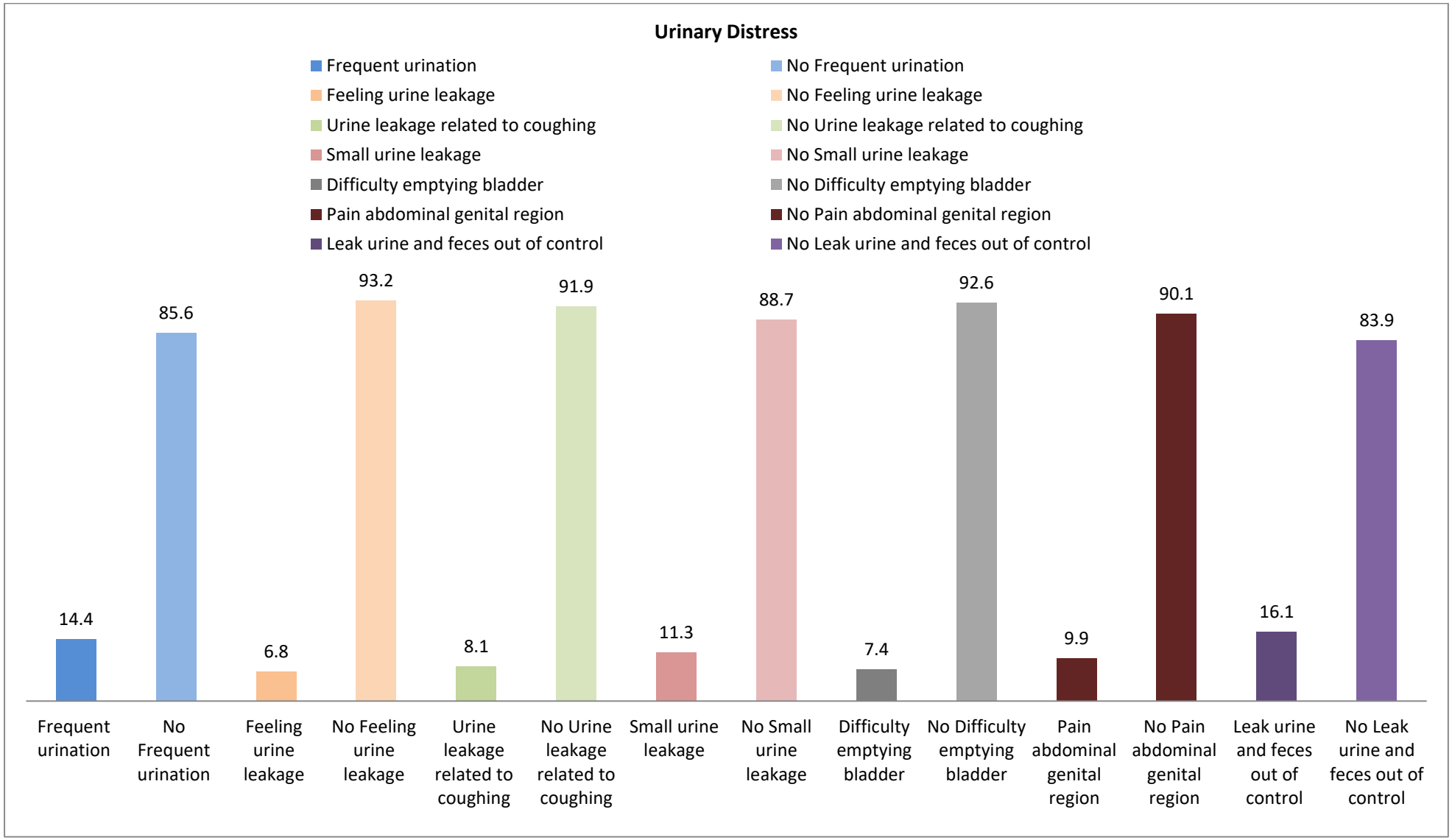


Figure 6. Distribution of Urinary distress complaints among women of Tigray Northern Ethiopia.



8.4 The degree of being bothered among women presenting with distress responses

All women who presented with distress symptoms were asked to what extent they are bothered by the experience of living with a distress. There were 4 main options categorized as "Not bothered at all", "Somewhat bothered" as first degree of being bothered, "Moderately bothered" as being bothered at second degree and "Quite a bit bothered" as the highest level of being bothered by the distress. The summary findings of the degree of being bothered is shown in table 5.

Table 5. Level of bothering among women presenting with pelvic floor distress, colo-anal distress and urinary distress

variables	Not at All Freq (%)	Somewhat Freq (%)	Moderately Freq (%)	Quite a bit Freq (%)	Total
PV-1 Pressure on lower abdomen	30 (9.93%)	156 (51.7%)	56 (18.54)	60 (19.87%)	**302**
PV-2 Heaviness or dullness on pelvic area	27 (6.24%)	234 (54.04%)	87 (20.09%)	85 (19.63%)	**433**
PV-3 Bulge on vaginal area	16 (11.43%)	37 (26.43%)	34 (24.29%)	53 (37.86%)	**140**
PV-3.5 Push on the vagina or around the rectum	18 (8.45%)	110 (51.64%)	39 (18.31%)	46 (21.60%)	**213**
PV-4 Push vagina for bowel movement	18 (8.45%)	110 (51.64%)	39 (18.31%)	46 (21.60%)	**213**
PV-5 Incomplete bladder emptying after voiding	6 (10.61%)	128 (52.24%)	50 (20.41%)	41(16.73%)	**245**
PV-6 Push up on a bulge in vagina by fingers	11 (15.94%)	23 (33.33%)	18 (26.09%)	17 (24.64%)	**69**
CA-1 Strain too hard for bowel movement	26 (9.77%)	152 (57.14%)	41(15.41%)	47 (17.67%)	**266**
CA-2 Feel completely emptied bowels	22 (14.38%)	79 (51.63%)	24 (15.69%)	28 (18.30%)	**153**
CA-3 Lose stool beyond control well formed	11 (19.64%)	30 (53.57%)	5 (8.93%)	10 (17.86%)	**56**
CA-4 Lose stool beyond control loose	9 (19.15%)	22 (46.81%)	4 (8.51%)	12 (25.53%)	**47**
CA-5 Lose gas from rectum beyond control	8 (8.08%)	54 (54.55%)	20 (20.20%)	17 (17.17%)	**99**
CA-6 Pain during p ass stool	10 (5.35%)	110 (58.82%)	31 (16.58%)	36(19.25%)	**187**
CA-7 Strong sense urgency toilet	32 (23.36%)	77 (56.20%)	16 (11.68%)	12 (8.76%)	**137**
CA-8 Part bowel pass rectum and bulge	12 (23.53%)	26 (50.98%)	3 (5.88%)	10 (19.61%)	**51**
UD-1 Frequent urination	56 (14.93%)	168 (44.68%)	93 (24.80%)	58 (15.47%)	**375**
UD-2 Feeling urine leakage	17 (9.44%)	92 (51.11%)	30 (16.67%)	41 (22.78%)	**180**
UD-3 Urine leakage related to coughing	32 (15.09%)	93 (43.87%)	40 (18.87%)	47 (22.17%)	**212**
UD-4 Small urine leakage	32 (10.85%)	157 (53.22%)	55 (18.64%)	51 (17.29%)	**295**
UD-5 Difficulty emptying bladder	17 (8.85%)	83 (43.23%)	42 (21.88%)	50 (26.04%)	**192**
UD-6 Pain abdominal genital region	30 (11.63%)	119 (46.12%)	50 (19.38%)	59 (22.87%)	**258**

Majority of women were some-what bothered by the distress symptoms with exception of bulge on vaginal area which presented the majority to be quite a bit bothered 53(37.86%).

Table 6. Level of effects for all women once they would be presenting with pelvic floor distress, colo-anal distress and urinary distress

variables	Not at All Freq (%)	Somewhat Freq (%)	Moderately Freq (%)	Quite a bit Freq (%)	Total
How bladder urinary symptoms affect household chores	2,401 (92.10%)	98 (3.76%)	48 (1.84%)	60 (2.30%)	**2,607**
How bladder urinary symptoms affect physical activities	2,392 (91.75%)	84 (3.22%)	49 (1.88%)	82 (3.15%)	**2,607**
How bladder urinary symptoms affect Religious activities	2,449 (93.94%)	58 (2.22%)	46 (1.76%)	54 (2.07%)	**2,607**
How bladder urinary symptoms affect travel	2,397 (91.94%)	91 (3.49%)	42 (1.61%)	77 (2.95%)	**2,607**
How bladder urinary symptoms affect social participation	2,440 (93.59%)	63 (2.42%)	41 (1.57%)	63 (2.42%)	**2,607**
How bladder urinary symptoms affect emotional health	2,383 (91.41%)	65 (2.49%)	46 (1.76%)	113 (4.33%)	**2,607**
How bowel rectal symptoms make frustrated	2,408 (92.37%)	38 (1.46%)	28 (1.07%)	133 (5.10%)	**2,607**
How bowel rectal symptoms affect Household chores	2,473 (94.86%)	60 (2.30%)	33 (1.27%)	41 (1.57%)	**2,607**
How bowel rectal symptoms affect physical activities	2,468 (94.67%)	57 (2.19%)	33 (1.27%)	49 (1.88%)	**2,607**
How bowel rectal symptoms affect religious attendance	2,484 (95.28%)	52 (1.99%)	35 (1.34%)	36 (1.38%)	**2,607**
Bowel rectal symptoms affect movement	2,473 (94.86%)	55 (2.11%)	37 (1.42%)	42 (1.61%)	**2,607**
How bowel rectal symptoms affect social participation	2,485 (95.32%)	49 (1.88%)	32 (1.23%)	41 (1.57%)	**2,607**
How bowel rectal symptoms affect emotional health	2,453 (94.09%)	49 (1.88%)	40 (1.53%)	65 (2.49%)	**2,607**
How bowel rectal symptoms make frustrated	2,408 (92.37%)	38 (1.46%)	28 (1.07%)	133 (5.10%)	**2,607**
Effect of pelvic vaginal symptoms on house hold chores	2,424 (92.98%)	85 (3.26%)	38 (1.46%)	60 (2.30%)	**2,607**
Effect of pelvic vaginal symptoms on physical activities	2,413 (92.56%)	86 (3.30%)	53 (2.03%)	55(2.11%)	**2,607**
Effect of vaginal pelvic symptoms religious attendance	2,452 (94.05%)	50 (1.92%)	49 (1.88%)	56 (2.15%)	**2,607**
Effect of vaginal pelvic symptoms on movement	2,421 (92.87%)	69 (2.65%)	47 (1.80%)	70 (2.69%)	**2,607**
Effect of vaginal pelvic symptoms on social activities	2,432 (93.29%)	59 (2.26%)	50 (1.92%)	66 (2.53%)	**2,607**
Vaginal or pelvic symptoms affect emotional health	2,382 (91.37%)	62 (2.38%)	46 (1.76%)	117 (4.49%)	**2,607**
How vaginal pelvic symptoms feel frustrated	2,327 (89.26%)	45 (1.73%)	47 (1.80%)	188 (7.21%)	**2,607**

When all women who were selected and interviewed regardless of presence of distress symptoms for the level of bothering, Majority of women said not at all bothered.

8.5 The Association between the 5 Risk Demographic Risks and Outcome Variables

The risk factors for women to presenting with 21 distress symptoms for POP, Urinary Fistula were studied and then two additional outcome for Stillbirth and Facility Delivery was also studies in view of risks by marital status, age, occupation, parity and home delivery. Table 7 summarizes all the findings.

Table 7. Presence of association between the 5 risk demographic values versus 23 outcome distress responses related to POP, Urinary Fistula, Stillbirth and Facility Delivery

	Marital Status	Age group at marriage	Current Age group	Age categories by Reproductive age	Religion	Occupation	Parity
Stillbirth	df (3), χ^2 = 66.396 p value < 0.001	df (3), χ^2 = 25.815 p value < 0.001	df (5), χ^2=167.467 p value < 0.001	df (2), χ2 = 57.227 p value < 0.001	df (2), χ^2 =1.4586 p value < 0.482	df (2), χ^2 =55.5691 p value < 0.001	df (2), χ^2 = 130.612 p value < 0.001
Health facility delivery	df (3), χ^2 =220.535 p value < 0.001	df (3), χ^2 = 26.123 p value < 0.001	df (5), χ^2=274.066 p value < 0.001	df (2), χ2 = 188.23 P value < 0.001	df (2), χ^2 = 4.378 p value = 0.112	df (2), χ^2 = 24.4144 p value = 0.000	df (2), χ^2 = 141.610 p value < 0.001
Pressure on lower abdomen	df (3), χ^2 = 8.767 p value = 0.033	df (3), χ^2 = 27.465 p value < 0.001	df (5), χ^2 =54.404 p value < 0.001	df (2), χ2 = 7.734 p value = 0.021	df (2), χ^2 =0.8656 p value = 0.649	df (2), χ^2 = 43.8376 p value < 0.001	df (2), χ^2 = 42.160 p value < 0.001
Heaviness on pelvic area	df (3) χ^2 = 24.2343 p value < 0.001	df (3) χ^2 = 27.674 p value < 0.001	df (5) χ^2 = 94.244 p value < 0.001	df (2), χ2 = 39.400 P value < 0.001	df (2) χ^2 = 1.5305 p value = 0.465	df (1) χ^2 = 70.6573 p value < 0.001	df (2), χ^2= 39.788 p value < 0.001
Bulge vaginal area	df(3) χ^2 = 13.147 p value = 0.004	df (3) χ^2 = 15.376 p value <0.002	df (5) χ^2 = 59.827 p value <0.001	df (2), χ2 = 22.414 P value = 0.001	df (2) χ^2 = 5.2358 p value = 0.073	df (2) χ^2 = 48.5181 p value <0.001	df (2), χ^2= 33.738 p value < 0.001
Push vagina bowel movement	df(3) χ^2 = 11.010 P value = 0.012	df (5) χ^2 = 13.636 p value = 0.003	df (5) χ^2 = 46.358 p value <0.001	df (2), χ2 = 7.405 P value = 0.025	df (2) χ^2 = 0.2210 p value = 0.895	df (2) χ^2 = 33.9390 p value <0.001	df (2), χ^2= 17.072 p value < 0.001
Incomplete bladder emptying - voiding	df(3) χ^2 = 21.799 p value <0.001	df (5) χ^2 = 10.063 p value =0.018	df (5) χ^2 = 41.562 p value <0.001	df (2), χ2 = 7.604 p value = 0.022	df (2) χ^2 = 2.1418 p value = 0.343	df (2) χ^2 = 37.4382 p value <0.001	df (2), χ^2 = 11.617 p value = 0.003
Push bulge vaginal area with fingers	df (3) χ^2 = 0.693 p value = 0.875	df (5) χ^2 = 10.027 p value = 0.018	df (5) χ^2 = 18.846 p value = 0.002	df (2), χ2 = 8.977 p value = 0.011	df (2) χ^2 = 5.2566 p value = 0.072	df (2) χ^2 = 37.2283 p value <0.001	df (2), χ^2 = 25.896 p value < 0.001
Strain too hard for bowel movement	df (3) χ^2 = 9.7186 p value = 0.021	df (5) χ^2 = 11.834 p value = 0.008	df (5) χ^2 = 47.394 p value <0.001	df (2), χ2 = 20.0612 p value < 0.001	df (5) χ^2 = 1.4454 p value = 0.485	df (5) χ^2 = 37.4382 p value <0.001	df (2), χ^2 = 20.030 p value < 0.001
Feel completely emptied bowels	df (3) χ^2 = 7.0454 p value = 0.070	df (5) χ^2 = 5.3027 p value = 0.151	df (5) χ^2 =30.1202 p value <0.001	df (2), χ2 = 8.0017 P value = 0.018	df (5) χ^2 = 0.3681 p value = 0.832	df (5) χ^2 = 14.0959 p value <0.001	df (2), χ^2 = 30.420 p value < 0.000
Lose stool beyond control well formed	df (3) χ^2 = 8.8032 p value = 0.032	df (5) χ^2 = 11.819 p value = 0.008	df (5) χ^2 =13.3989 p value = 0.020	df (2), χ2= 49.8164 P value < 0.001	df (5) χ^2 = 0.9785 p value = 0.613	df (5) χ^2 = 10.4270 p value < 0.001	df (2), χ^2 = 5.6904 p value = 0.058
Lose stool beyond control loose	df (3) χ^2 = 6.4175 p value = 0.093	df (5) χ^2 = 6.4229 p value = 0.093	df (5) χ^2 =12.4245 p value = 0.029	df (2), χ2 = 1.4577 p value = 0.482	df (5) χ^2 = 3.1660 p value = 0.205	df (5) χ^2 = 12.0837 p value < 0.001	df (2), χ^2 = 14.189 p value = 0.001
Lose gas from rectum beyond control	df (3) χ^2 = 7.5460 p value = 0.056	df (5) χ^2 = 6.984 p value = 0.072	df (5) χ^2 = 24.582 p value <0.001	df (2), χ2 = 5.9578 p value = 0.051	df (5) χ^2 = 0.5995 p value = 0.741	df (5) χ^2 = 26.1800 p value <0.001	df (2), χ^2 = 7.3635 p value = 0.025
Pain during pass stool	df (3) χ^2 = 6.2185 p value = 0.101	df (5) χ^2 = 8.7315 P value = 0.033	df (5) χ^2 = 38.608 p value <0.001	df (2), χ2 = 5.9200 p value = 0.052	df (5) χ^2 = 4.4546 p value = 0.108	df (5) χ^2 = 39.4180 p value <0.001	df (2), χ^2 = 29.476 p value < 0.001
Strong sense urgency toilet	df (3) χ^2 = 1.8220 p value = 0.610	df (5) χ^2 = 1.1695 p value = 0.760	df (5) χ^2 = 13.759 p value = 0.017	df (2), χ2 = 1.637 p value = 0.441	df (5) χ^2 = 3.4698 p value = 0.176	df (5) χ^2 = 8.8308 p value = 0.003	df (2), χ^2 = 10.803 p value = 0.005
P art bowel pass rectum and Buldge	df (3) χ^2 = 0.5602 p value = 0.905	df (5) χ^2 = 4.1946 p value = 0.241	df (5) χ^2 = 21.250 p value = 0.001	df (2), χ2 = 6.5005 p value = 0.039	df (5) χ^2 = 5.0555 p value = 0.080	df (5) χ^2 = 10.2016 p value < 0.001	df (2), χ^2 = 20.006 P value < 0.001

Frequent urination	df (5) χ^2 = 20.927 p value <0.001	df (5) χ^2 = 11.977 P value = 0.007	df (5) χ^2 = 48.029 p value <0.001	df (2), χ2 = 19.676 p value < 0.001	df (5) χ^2 = 1.8681 p value = 0.393	df (5) χ^2 = 34.1379 p value <0.001	df (2), χ^2 = 23.450 p value < 0.001
Feeling urine leakage	df (5) χ^2 = 21.880 p value <0.001	df (5) χ^2 = 17.823 p value <0.001	df (5) χ^2 = 32.799 p value <0.001	df (2), χ2 = 0.7655 P value = 0.682	df (5) χ^2 = 2.7166 p value = 0.257	df (5) χ^2 = 36.9701 p value <0.001	df (2), χ^2 = 22.817 P value < 0.001
Urine leakage related to coughing	df (5) χ^2 = 18.841 p value <0.001	df (5) χ^2 = 11.575 P value = 0.009	df (5) χ^2 = 12.521 p value = 0.028	df (2), χ2 = 11.381 p value = 0.003	df (5) χ^2 = 0.5649 p value = 0.754	df (5) χ^2 = 19.9661 p value <0.001	df (2), χ^2 = 15.977 p value < 0.001
Small urine leakage	df (5) χ^2 = 17.174 P value = 0.001	df (5) χ^2 = 7.7039 P value = 0.053	df (5) χ^2 = 29.977 p value <0.001	df (2), χ2 = 7.928 p value = 0.019	df (5) χ^2 = 0.1785 P value = 0.915	df (5) χ^2 = 24.4467 p value <0.001	df (2), χ^2 = 17.868 p value < 0.001
Difficulty emptying bladder	df (5) χ^2 = 12.742 p value = 0.005	df (5) χ^2 = 3.3231 p value = 0.344	df (5) χ^2 = 27.636 p value <0.001	df (2), χ2 = 4.072 p value = 0.130	df (5) χ^2 = 0.9599 p value = 0.619	df (5) χ^2 = 42.5031 p value <0.001	df (2), χ^2 = 16.518 p value < 0.001
Pain abdominal genital region	df (5) χ^2 = 31.137 p value <0.001	df (5) χ^2 = 8.5472 p value = 0.036	df (5) χ^2 = 39.874 p value <0.001	df (2), χ2 = 11.842 p value = 0.003	df (5) χ^2 = 3.1773 p value = 0.204	df (5) χ^2 = 44.3841 p value <0.001	df (2), χ^2 = 14.863 p value = 0.001
Leak urine feces out of control	df (5) χ^2 = 9.0515 p value = 0.029	df (5) χ^2 = 3.5447 p value = 0.315	df (5) χ^2 = 7.6317 p value = 0.178	df (2), χ2 = 8.670 p value = 0.013	df (5) χ^2 = 4.5134 p value = 0.105	df (5) χ^2 = 47.7743 p value <0.001	df (2), χ^2 = 4.6145 p value = 0.100

On due measure of association between the risk factors of current age at the time of interview, we found that Religion did not had any association with any of the outcome variables of distress symptoms. Occupation presented association at 95% confidence ($p<0.05$) with 23 outcome variables 22 of them were at 99% Confidence interval for $p<0.01$. Parity presented association at 95% confidence ($p<0.05$) with 21 outcome variables 19 of them were at 99% Confidence interval for $p<0.01$.

Current age spaced at 10 years intervals showed associations at 95% confidence ($p<0.05$) with 20 outcome variables 16 of them were at 99% Confidence interval for $p<0.01$. Age categories by reproductive age groped as <15, 15 to 49 and >50 years showed associations at 95% confidence ($p<0.05$) with 16 outcome variables 8 of them were at 99% Confidence interval for $p<0.01$. There were 5 patterns with 99% significance level at a current age spaced at 10 years intervals but reflected as 95% significance level at Reproductive age categories. Again 2 patterns were at 99% significance level at reproductive age categories and displayed to 95% significance level at current age categories spaced by 10 years intervals. Age group at marriage showed association at 95% confidence ($p<0.05$) with 16 outcome variables in which 5 of them were at 99% Confidence interval for $p<0.01$.

Marital status presented association at 95% confidence ($p<0.05$) with 16 outcome variables 9 of them were at 99% Confidence interval for $p<0.01$.

Table 8. Presence of Association for Home delivery

Outcome Variable	Measure of Association	Outcome Variable	Measure of Association
Pressure on lower abdomen	df (1) χ^2 = 14.7278 p value <0.001	Pain during pass stool	df (1) χ^2 = 2.3602 p value = 0.124
Heaviness on pelvic area	df (1) χ^2 = 16.6303 p value < 0.001	Strong sense urgency toilet	df (1) χ^2 = 0.0077 p value = 0.930
Bulge vaginal area	df (1) χ^2 = 18.6711 p value < 0.001	Part bowel pass rectum and Buldge	df (1) χ^2 = 5.1077 p value = 0.024
Push vagina bowel movement	df (1) χ^2 = 8.6128 p value = 0.003	Frequent urination	df (1) χ^2 = 6.0160 p value = 0.014
Incomplete bladder emptying after voiding	df (1) χ^2 = 17.2754 p value < 0.001	Feeling urine leakage	df (1) χ^2 = 9.1498 p value = 0.002
Push bulge vaginal area with fingers	df (1) χ^2 = 18.6075 p value < 0.001	Urine leakage related to coughing	df (1) χ^2 = 6.5748 p value = 0.010
Strain too hard for bowel movement	df (1) χ^2 = 7.0468 p value = 0.008	Small urine leakage	df (1) χ^2 = 21.3218 p value < 0.001
Feel completely emptied bowels	df (1) χ^2 = 8.4164 p value = 0.004	Difficulty emptying bladder	df (1) χ^2 = 9.7427 p value = 0.002
Lose stool beyond control well formed	df (1) χ^2 = 2.4697 p value = 0.116	Pain abdominal genital region	df (1) χ^2 = 7.9065 p value = 0.005
Lose stool beyond control loose	df (1) χ^2 = 5.7614 p value = 0.016	Leak urine feces out of control	df (1) χ^2 = 13.1740 p value < 0.001
Lose gas from rectum beyond control	df (1) χ^2 = 9.0627 p value = 0.003		

Home delivery presented association at 95% confidence ($p<0.05$) with 18 outcome variables 7 of them were at 99% Confidence interval for $p<0.01$.

8.6 Findings from Physical examination

Not all women interviewed were examined, only those who were symptomatic complaints were asked to be examined by physical examination. There were 138 were ready to be followed up for physical investigation.

During the physical examination for 138 women, a total of 32 women (23.19%) declared to have disturbing symptoms related to pelvic organ protrusion (POP) and urinary fistula.

Among these only 133 could finally attend pelvic examination and 31 women (23.31%) had a visible mass in the vaginal area (31: 2,607) or 12 per 1000 women. The average mass size by the measure of furthest point of protrusion was 3.7 ± 2.5with minimum mass size of 1 cm and the maximum mass size of 9 cm.

Table 9. Presence of association between the 5 risk demographic values versus signs of POP during physical examination

	Marital Status	Age group at marriage	Current Age group	Age categories by Reproductive age	Religion	Occupation	Parity
Visible protrusion	df (3), χ^2 = 0.9938 P value = 0.803	df (2), χ^2 = 1.5296 P value = 0.465	df (5), χ^2 = 15.8267 P value = 0.007	df (1), χ^2 = 5.3638 P value = 0.021	df (1), χ^2 = 0.6171 P value = 0.432	df (1), χ^2 = 3.4028 P value = 0.065	df (2), χ^2 = 26.5118 P value< 0.001
Loss urine while straining	df (3), χ^2 = 5.3710 P value = 0.147	df (2), χ^2 = 4.8318 P value = 0.089	df (5), χ^2 = 2.7886 P value = 0.733	df (1), χ^2 = 0.0986 P value = 0.754	df (1), χ^2 = 0.4297 P value = 0.512	df (1), χ^2 = 0.4423 P value = 0.506	df (2), χ^2 = 17.5112 P value< 0.001
Presence of fistula	df (3), χ^2 = 2.2269 P value = 0.527	df (2), χ^2 = 1.4054 P value = 0.495	df (5), χ^2 = 4.4249 P value = 0.490	df (1), χ^2 = 0.6790 P value = 0.410	df (1), χ^2 = 0.1394 P value = 0.709	df (1), χ^2 = 0.0002 P value = 0.988	df (2), χ^2 = 0.1646 P value = 0.921
Loss of stool on examination	df (3), χ^2 = 0.8999 P value = 0.825	df (2), χ^2 = 0.6359 P value = 0.728	df (5), χ^2 = 5.0615 P value = 0.408	df (1), χ^2 = 0.1977 P value = 0.657	df (1), χ^2 = 0.0441 P value = 0.834	df (1), χ^2 = 1.5326 P value = 0.216	df (2), χ^2 = 7.9696 P value = 0.019

When home delivery was taken to be risk factor, only visible protrusion showed significant association with a df (1), $\chi 2$ = 7.3661 p value = 0.007. Visible protrusion could show association at 95% confidence ($p<0.05$) with 2 risk variables (age at interview and reproductive age) and then of them were at 99% Confidence interval for Parity as risk factor $p<0.01$. Parity was also associated with Loss urine while straining at 99% confidence interval and Loss of stool on examination at 95% confidence interval.

The frequency distribution of mass protrusion is shown in figure 5 below.

Figure 5. Frequency distribution by the measure of furthest point of protrusion among women with visible masses among those who agreed to be examined during the survey in Tigray

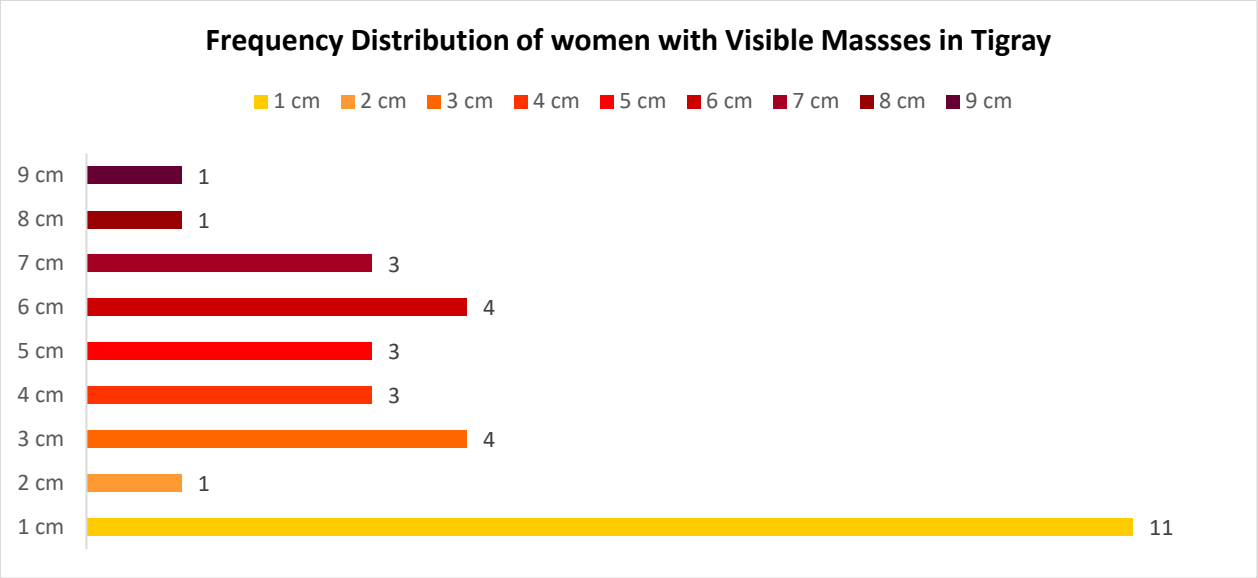


Figure 6. Percentile distribution of visible masses among 31 women with Pelvic Organ Protrusion and Urinary fistula of Tigrey in 2015

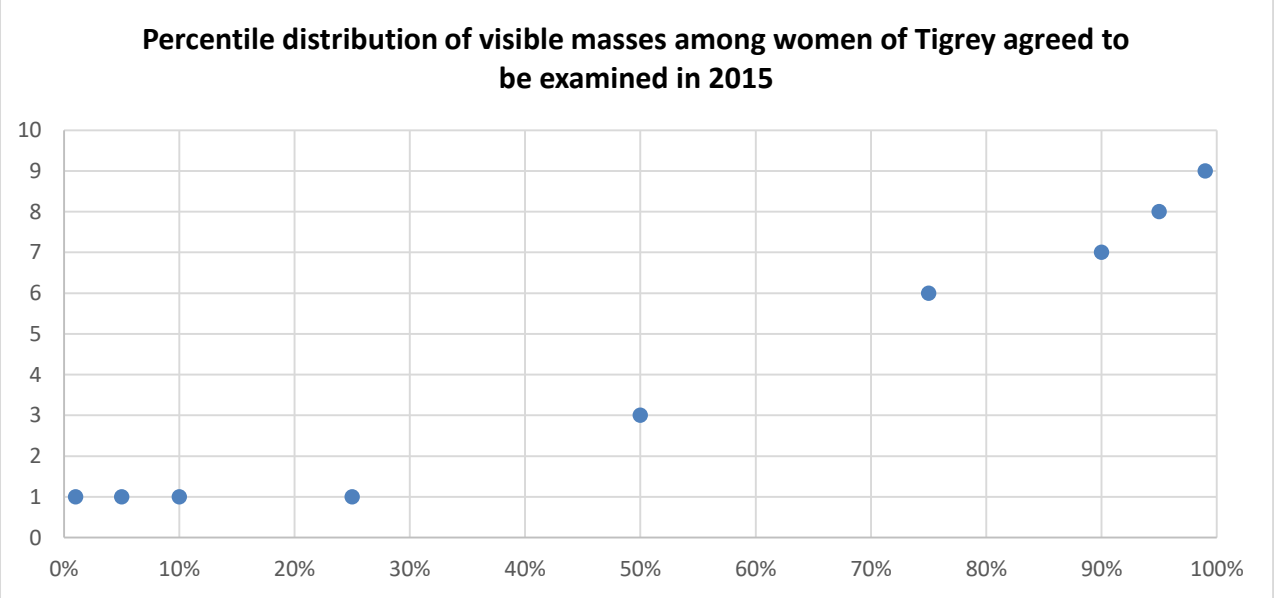


Table 10.Percentile distribution with measure of central tendency for the measure of the furthest point of protrusion

Percentiles		Smallest	
1%	1		1
5%	1		1
10%	1		1
25%	1		1
50%	3		
		Largest	
75%	6		7
90%	7		7
95%	8		8
99%	9		9
Observations			31
Sum of Weight.			31
Mean			3.677419
Std. Dev.			2.521733
Variance			6.35914
Skewness			0.383851

In general it can be summarized that in Tigray prevalence of POP is 31 per 2,607 (12 per 1000 women)

There were 143 women with loss urine while straining where 25 women (17.48%) of them has a clear visible urine loss during straining. Again, there were a total of 140 women who suspected themselves as having fistula, but only 9 women (6.43%) of them were finally diagnosed to have fistula.

There were 141 women who suspected themselves as having loss of stool out of their control. Among those women who suspected themselves as having loss of stool only 3 women (2.13%) had a clear loss of stool on examination.

Obstetric fistulae in Tigray was 9 per 2,607; 3 per 1000 women (30 per 10,000).

CHAPTER 9: DISCUSSION

Prevalence of POP in Tigray was 31 per 2,607 (12 per 1000 women) while prevalence was 10 per 1000 women in other rural areas of Ethiopia (70). Similarly, Obstetric fistulae in Tigray was 9 per 2,607; 3 per 1000 women [30 per 10,000] while in other rural regions it was 6:10,000 reproductive-aged women [95 % confidence interval (CI) 3–8], of untreated fistula 2:10,000 (95 % CI 0–4) and symptomatic POP 100:10,000 (95 % CI 86–114) i.e 10 per 1000 women.

Our study could provide evidence for common risk factors that are significantly associated with development of POP and Obstetric Fistula. One of the most important risk was higher age of the woman as supported by a study conducted in Bahir Dar, North West Ethiopia in 2016 (71). . In another study at Jimma University Specialized Hospital, Southwest Ethiopia (72). the likelihood of POP was increasing with age as 31-40 years (AOR= 6.88: 95% CI 1.68, 28.23), 41-50 years (AOR= 11.10: 95% CI 2.54, 48.49) and above 50 years (AOR= 35.42: 95% CI 6.94, 180.85).

Exceptionally our study have shown that 95 women out of 2607 (3.9%) were married at the age younger than 10 year and 2,097 (86.2%) at the age between 11 and 20. Furthermore, Age at marriage had a significant association (95% confidence, $p<0.05$) with 16 POP distress symptoms in which 5 of them presented with a p value <0.01 namely Pressure on lower abdomen, Heaviness on pelvic area, Bulge in the vaginal area, Strain bowel movement and Push bulge vaginal area with fingers.

Another striking risk factor is that was found is Parity. While a study in Bahir Dar showed a parity of *6.5± 2.6,* our study presented with a parity of 3.7 ± 2.2 children per woman with high significant association at 95% confidence ($p<0.05$) with 21 outcome variables of distress symptoms out of 23 symptoms. Again, 19 out of 21 of them were at 99% Confidence interval for $p<0.01$.

Our study could further point out the women activities that involve lifting heavy objects as occupation to be the risk for development of POP and Obstetric fistula. This was presented in a similar pattern by a study Amhara region, Ethiopia by Janne Lillelid Gjerde and colleagues in 2017 (73). . The study in Amahara showed that physical strain in women body, during childbirth, work related with food searching or hard physical work can cause serious pelvic wall destruction and then pop and fistula. This was a reason that a study done by Andualem Henok on the prevalence and factors associated with Pelvic Organ Prolapse (74). among pedestrian back-loading women in Bench Maji Zone yielded prevalence of 13.3%, i.e. Fifty-six women out of 422 women with back loading experience.

Our study interviewed women at average age of 34.8 ± 12.5 years of age while a similar study done by Karen Ballard and colleagues in 2016 with relatively low prevalence rate assessed a group of women with an average age of 29.5 ± 8.05 years (70). . The fact that higher age is significant risk factor for development of POP and Obstetric fistula. It can be explained why

the prevalence of Obstetric fistula was relatively higher in our study compared to the study in rural Ethiopia that assessed younger women.

Our study has provided additional risk factor of home delivery which presents association at 95% confidence ($p<0.05$) with 18 outcomes of POP and Fistula Distress with 7 of them showing $p<0.01$ (99% Confidence interval). The three (3) distress outcome that do not have association were leaving Lose stool beyond control well formed, Pain during pass stool and Strong sense urgency in toilet. The physical outcome of visible protrusion was also associated with home delivery at 99% Confidence interval i.e df (1), $\chi 2 = 7.3661$ p value = 0.007. This can be explained by the fact that home delivery is done by non-skillful birth attendant therefore exposing women to pelvic floor damage. This finding is also supported by a study in Bahir Dar, North West Ethiopia (71), where delivery assisted by non-health professionals was clearly highlighted as significant factor.

Surprisingly majority of women with distress symptoms showed a second degree of being bothered by the distress symptoms as "*somewhat bothered*". There was an exception among women who presented with distress of Bulge on vaginal area where majority said "*Quite a bit*" as a highest degree of being bothered. This phenomenon was explained by a study in Gondar University hospital, Northwest Ethiopia (75). Fear of disclosing illness due to social stigma made women to hide the disease giving out the picture of why most of women with distress symptoms saying "somewhat bothered". The same reason can explain why majority of total women interviewed from a sample of 2, 607said they would "not at all" affected in their physical activities, social interaction or emotionally. May be lower socio economic status (2/3 were from rural areas of Tigray with lower socio-economic status) was another reason. We could note that as women would also fear for attending hospital due to lack of money and they feel they can continue with life while experiencing these distress symptoms. Another hypothesis can be high age of occurrence of POP such that some women gave up because they feel they do not have sexual role with their spouse at higher age.

Studies have repeatedly showing a huge gaps between symptomatic prolapse and asymptomatic prolapse. The patterns of symptoms is ranging from 5-50 different ways with discrepancies (44, 45, 47 and 48).

Again we could note that distress of Bulge in the vaginal area can affect the sexual life and marriage and because of fear of divorce most of women with bulge in the vaginal area said they were "quite a bit bothered". Unfortunately, our findings in the level of being bothered could be affected by lack of clear definition of the levels of bothering in clear, socially and medically translated phrases.

When hot spots areas and most common risks are recognized, the introduction of family planning and health education programs targeting women at risks is useful to decline the prevalence (76). . The scale up of women empowerment programs for prevention and treatment of POP and Obstetric fistula can restore quality of life of women related to POP and general community socio economic status.

CHAPTER 10: STUDY LIMITATIONS

Our study was prone to information bias in some questions that needed clarification such as the level of bothering the distress or defining some medical terminology like caesarian section to lay people in the rural areas were defined differently by different interviewer.

The proof that some questions in our questionnaire needed to be validated with clear, socially and medically translated phrases can be seen in the number of women who delivered by caesarian section. One woman said was operated for caesarian section 8 times where in the principles of obstetrics this was not possible but rather the women was delivered by episiotomy as assisted vaginal delivery but did not understand the meaning caesarian section.

CHAPTER 11. CONCLUSION

Prevalence of Pelvic organ Prolapse in Tigray by 2015 was 12 women out of 1000 women and the Prevalence of Obstetric Fistula in Tigray by 2015 was 3 out of 1000 women. It is possible to eliminate Obstetric fistula and reduce POP and in Tigray by focusing on risk factors for POP and Fistula like Parity, Occupation, Age, age at Marriage, Marital status and home delivery and they are significantly associated with stillbirth, 12 common distress symptoms related to Pelvic Vaginal, Colo-Anal and Urinary distress symptoms. Visible protrusion is significantly associated with Age and Parity. Parity is further associated with Loss urine while straining and Loss of stool on in a careful pelvic examination.

CHAPTER 12. RECOMMENDATIONS

A special campaign with a well guided strategy on treatment and evidence based community prevention measures on women rights in choice of life style is needed. Strategy shall include choice of women for light duty works after parity of 3, gynecological medical checkup with increasing age, community intervention on prevention of early age at marriage, marital status counseling and home delivery prevention.

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APPENDICES

Appendix1: Data Collection Instruments

1. Code _____
2. Marital status a) married b) divorced c) single d) widowed
3. Age at marriage (years) _____, Current age (years)_____
4. Weight _____ (kg) height _____ (cm)
5. Address (wereda)_____ a) Urban _____ b) Rural _____
6. Religion a) ChrIstian _____ b) Muslim _____ c) Other _____
7. Occupation: a) light work b) heavy work
8. Yearly estimated income in birr _____
9. Have you ever been pregnant? A) Yes b) No
10. Have you ever had an abortion or a stillbirth? A) Yes b) No
    a. If yes, how many abortions or stillbirths: _____
11. Parity: How many births have you had? _____
    a. Number of vaginal deliveries_____

    Did you deliver at home? Number of home deliveries _____

    Have you ever delivered at a health center or a hospital?

    a. Number of deliveries at a health center or a hospital _____

    b. Number of cesarean deliveries_____

PFDI Survey - Pelvic Floor Distress Inventory Short Form 20

This were translated into Tigrinya and the questions were asked by interview, rather than by written questionnaire. For each question, the woman we reasked whether or not she had certain symptoms and, if present, how much certain symptoms bother her.

Pelvic Organ Prolapse Distress Inventory

1. Do you usually experience pressure in the lower abdomen?

   No - 0 Yes

   If Yes, how much does it bother you?

   1 – Not at all 2 – somewhat 3 – Moderately 4 – Quite a bit

2. Do you usually experience heaviness or dullness in the pelvic area?

No - 0 Yes

If Yes, how much does it bother you?

1 – Not at all 2 – somewhat 3 – Moderately 4 – Quite a bit

3. Do you usually have a bulge or something falling out that you can see or feel in your vaginal area?

No - 0 Yes

If Yes, how much does it bother you?

1 – Not at all 2 – somewhat 3 – Moderately 4 – Quite a bit

4. Do you ever have to push on the vagina or around the rectum to have or to complete a bowel movement?

No - 0 Yes

If Yes, how much does it bother you?

1 – Not at all 2 – somewhat 3 – Moderately 4 – Quite a bit

5. Do you usually experience a feeling of incomplete bladder emptying after voiding?

No - 0 Yes

If Yes, how much does it bother you?

1 – Not at all 2 – somewhat 3 – Moderately 4 – Quite a bit

6. Do you ever have to push up on a bulge in the vaginal area with your fingers to start or to complete urination?

No - 0 Yes

If Yes, how much does it bother you?

1 – Not at all 2 – somewhat 3 – Moderately 4 – Quite a bit

Colo-Anal Distress Inventory

7. Do you feel you need to strain too hard to have a bowel movement?

No - 0 Yes

If Yes, how much does it bother you?

1 – Not at all 2 – somewhat 3 – Moderately 4 – Quite a bit

8. Do you feel you have not completely emptied your bowels at the end of a bowel movement?

No - 0 Yes

If Yes, how much does it bother you?

1 – Not at all 2 – somewhat 3 – Moderately 4 – Quite a bit

9. Do you usually lose stool beyond your control if your stool was well formed?

No - 0 Yes

If Yes, how much does it bother you?

1 – Not at all 2 – somewhat 3 – Moderately 4 – Quite a bit

10. Do you usually lose stool beyond your control if your stool was loose?

No - 0 Yes

If Yes, how much does it bother you?

1 – Not at all 2 – somewhat 3 – Moderately 4 – Quite a bit

11. Do you usually lose gas from the rectum beyond your control?

No - 0 Yes

If Yes, how much does it bother you?

1 – Not at all 2 – somewhat 3 – Moderately 4 – Quite a bit

12. Do you usually have pain when you pass your stool?

No - 0 Yes

If Yes, how much does it bother you?

1 – Not at all 2 – somewhat 3 – Moderately 4 – Quite a bit

13. Do you experience a strong sense of urgency and have to rush to the toilet to have a bowel movement?

No - 0 Yes

If Yes, how much does it bother you?

1 – Not at all 2 – somewhat 3 – Moderately 4 – Quite a bit

14. Does part of your bowel ever pass through the rectum and buldge outside during or after a bowel movement?

No - 0 Yes

If Yes, how much does it bother you?

1 – Not at all 2 – somewhat 3 – Moderately 4 – Quite a bit

Urinary Distress Inventory

15. Do you usually experience frequent urination?

No - 0 Yes

If Yes, how much does it bother you?

1 – Not at all 2 – somewhat 3 – Moderately 4 – Quite a bit

16. Do you usually experience urine leakage associated with a feeling or urgency that was, a strong sensation of need to go to the toilet?

No - 0 Yes

If Yes, how much does it bother you?

1 – Not at all 2 – somewhat 3 – Moderately 4 – Quite a bit

17. Do you usually experience leakage related to coughing, sneezing, or laughing?

No - 0 Yes

If Yes, how much does it bother you?

1 – Not at all 2 – somewhat 3 – Moderately 4 – Quite a bit

18. Do you usually experience small amounts of urine leakage (that was, drops?)

No - 0 Yes

If Yes, how much does it bother you?

1 – Not at all 2 – somewhat 3 – Moderately 4 – Quite a bit

19. Do you usually experience difficulty emptying your bladder?

No - 0 Yes

If Yes, how much does it bother you?

1 – Not at all 2 – somewhat 3 – Moderately 4 – Quite a bit

20. Do you usually experience pain or dwascomfort in the lower abdomen or genital region?

No - 0 Yes

If Yes, how much does it bother you?

1 – Not at all 2 – somewhat 3 – Moderately 4 – Quite a bit

Scale Scores: Obtain the mean value of all the answered items within the corresponding scale (possible value 0 to 4) and then multiply by 25 to obtain the scale score (range 0 to 100). Missing items are dealt with by using the mean from answered items only.

PFDI-20 Summary Score: Add the scores of the 3 scales together to obtain the summary score (range 0 to 300).

Fistula Survey

I would like to ask you about your deliveries. Sometimes women experience very difficult and long labor before childbirth. This long labor can injure some women and leave them unable to control their urine and/or feces. These women leak urine/feces constantly.

Do **you** have this condition now? That was, do **you,** leak urine/feces constantly without being able to control it? a) Yes b) No

If yes, she will need a physical examination.

I would like to ask you about your sisters. Do you have any sisters?

a) Yes b) No - if NO, go on to prolapse questions PFDI and PFIQ

If YES, get the name of each sister and inquire whether they are living or dead

Number of living sisters: _____ Number of dead sisters _____

Had [NAME] ever given birth? By given birth, I mean had she had any pregnancies that ended in either a live birth or a stillbirth? If NO, end of these questions; If YES, How many times had [NAME] given birth in the last 5 years?

Sometimes women experience very difficult and long labor before childbirth. This long labor can injure some women and leave them unable to control their urine and/or feces. These women leak urine/feces constantly.

Does [Name of sister] have this condition now? That was, does [Name of sister] leak urine/feces constantly without being able to control it? Yes No

In what year did this happen to [NAME]?

If NO, did [NAME] ever have this condition? If [NAME] ever had the condition, in what year did this condition start? In what year did it stop?

If YES for current or past fistula symptoms, did [NAME] seek treatment at the hospital for this problem?

Pelvic Floor Impact Questionnaire – Short Form 7

This questionnaire were translated into Tigrinya and administered by the interviewer.

Some women find that bladder, bowel, or vaginal symptoms affect their activities, relationships, and feelings. For each question you were asked to state the response that best describes how much your activities, relationships, or feelings have been affected by your bladder, bowel, or vaginal symptoms ***over the past 3 months***.

With respect to bladder or urinary symptoms:

1. How do bladder or urinary symptoms affect your ability to do household chores (cooking, housecleaning or laundry)?

a). Not at all
b). Somewhat
c). Moderately

d). Quite a bit

2. How do bladder or urinary symptoms affect your ability to do physical activities such as walking, carrying water, going out to the fields or other exercwase?

a). Not at all
b). Somewhat
c). Moderately
d). Quite a bit

3. How do bladder or urinary symptoms affect your ability to attend religious services or go to community events where you will have to be in one place for an extended period of time?

a). Not at all
b). Somewhat
c). Moderately
d). Quite a bit

4. How do bladder or urinary symptoms affect your ability to travel by car, bus, or taxi for a dwastance greater than 30 minutes from home?

a). Not at all
b). Somewhat
c). Moderately
d). Quite a bit

5. How do bladder or urinary symptoms affect your ability to participate in social activities outside your home?

a). Not at all
b). Somewhat
c). Moderately
d). Quite a bit

6. How do bladder or urinary symptoms affect your emotional health (nervousness, depression, etc)?

a). Not at all
b). Somewhat
c). Moderately
d). Quite a bit

7. How do bladder or urinary symptoms make you feel frustrated?

a). Not at all
b). Somewhat
c). Moderately
d). Quite a bit

With respect to bowel or rectal symptoms:

8. How do bowel or rectal symptoms affect your ability to do household chores (cooking, housecleaning, laundry, etc)?

a). Not at all
b). Somewhat
c). Moderately
d). Quite a bit

9. How do bowel or rectal symptoms affect your ability to do physical activities such as walking, carrying water, going out to the fields or other exercwase?

a). Not at all
b). Somewhat
c). Moderately
d). Quite a bit

10. How do bowel or rectal symptoms affect your ability to attend religious services or go to community events where you will have to be in one place for an extended period of time?

a). Not at all
b). Somewhat
c). Moderately
d). Quite a bit

11. How do bowel or rectal symptoms affect your ability to travel by car, bus, or taxi for a disstance greater than 30 minutes from home?

a). Not at all
b). Somewhat
c). Moderately
d). Quite a bit

12. How do bowel or rectal symptoms affect your ability to participate in social activities outside your home?

a). Not at all
b). Somewhat
c). Moderately
d). Quite a bit

13. How do bowel or rectal symptoms affect your emotional health (nervousness, depression) ?

a). Not at all

b). Somewhat
c). Moderately
d). Quite a bit

14. Do bowel or rectal symptoms make you feel frustrated?

a). Not at all
b). Somewhat
c). Moderately
d). Quite a bit

With respect to vaginal or pelvic symptoms:

15. How do vaginal or pelvic symptoms affect your ability to do household chores (cooking, housecleaning, laundry, etc)?

a). Not at all
b). Somewhat
c). Moderately
d). Quite a bit

16. How do vaginal or pelvic symptoms affect your ability to do physical activities such as walking, carrying water, going out to the fields or other exercwase?

a). Not at all
b). Somewhat
c). Moderately
d). Quite a bit

17. How do vaginal or pelvic symptoms affect your ability to attend religious services or go to community events where you will have to be in one place for an extended period of time?

a). Not at all
b). Somewhat
c). Moderately
d). Quite a bit

18. How do vaginal or pelvic symptoms affect your ability to travel by car, bus, or taxi for a disstance greater than 30 minutes from home?

a). Not at all
b). Somewhat
c). Moderately
d). Quite a bit

19. How do vaginal or pelvic symptoms affect your ability to participate in social activities outside your home?

a). Not at all
b). Somewhat
c). Moderately
d). Quite a bit

20. How do vaginal or pelvic symptoms affect your emotional health (nervousness, depression, etc)?.

a). Not at all
b). Somewhat
c). Moderately
d). Quite a bit

21. Do vaginal or pelvic symptoms make you feel frustrated?

a). Not at all
b). Somewhat
c). Moderately
d). Quite a bit

Physical Examination

1. Does the woman have symptoms of protrusion or a bulge? Yes No

2. Was there a visible protrusion present? Yes No

3. Have the woman bear down as hard as she can and measure the furthest point of protrusion in centimeters from the plane of the hymen. _____ cm

4. Was loss of urine demonstrated while she was straining? Yes No

5. Was there loss of stool present on examination? Yes No

Appendix II: Participant Information sheet / English Version

Name of researching organization(s) : Mums for Mums, Mekelle University, Mekelle Fistula Centre and Tigray Regional Heath Bureau
Title of the project: Prevalence of pelvic organ prolapse, fistula and associated risk factors in Tigray region, Northern Ethiopia

Research budget covered by: Mekelle University, college of health sciences (MU-CHS)

This information sheet was prepared for patients with pelvic organ prolapse and/ or fistula in Tigray region that full fill the admission criteria and involved in a study. This information sheet was prepared by the technical working group (TWG) established to run the study.

Research objective: To determine the prevalence of pelvic organ prolapse, fistula and associated risk factors in Tigray region, Northern Ethiopia

Significance of the study: Because of your participation, prevalence of pelvic organ prolapse, fistula and associated risk factors in Tigray region, Northern Ethiopia were determined and known. Therefore your participation was essential for the reducing and prevention of complication in patients with pelvic organ prolapse and fistula in our country.

Study procedure: To achieve the planned objective, a standardized questionnaire were used to collect the socio-demographic and risk factors for pelvic organ prolapse and fistula. Physical and clinical examination were made by senior obstetrician/gynecologist. The attending obstetrician/gynecologist will tell you the results of your physical and clinical examination and then you will get appropriate treatment based on the findings.

Risks: There will not be major risks during physical and clinical examination and treatment of your case.

Participant's role: If you agree to participate, you were asked to give personal identification information (age, sex, address) and concerning associated factors of pelvic organ prolapse and fistula. Besides, you were examined physically and clinically to get appropriate diagnosis and medical treatment.

Participant's right: Since participation was on volunteer bases, participant had the right to participate in study and can withdraw from participation under any condition. You have full right to refuse to answer questionnaire and/or to be examined physically and clinically. Nothing will happen to you because of your refusal to participate. However, if you are willing to participate, you will not be charged for the physical and clinical examination and treatment.

Benefit: You will not be charged for the physical and clinical examination and treatment, and you will have full right to know whether you have pelvic organ prolapse and fistula which can be managed so that your health were good.

Incentives: There are no special incentives because of participation. Participation was your free choice.

Confidentiality: Your answers to interview were registered in questionnaire format. Your name will not be mentioned in any report, instead code were used. All of your answers and test results will keep confidential and will not be given to other institution and/ or person except for the responsible obstetrician / gynecologist. Your information were used only for above mentioned purpose**.**

Agreement: You were asked to sign for signature of agreement. This was to make sure that your agreement to participate in the mentioned study was on volunteer and informed bases. Otherwise there was no other reason for signing. The study was approved by Mekelle University, College of health sciences ethical review committee. Getting signatures of agreement from participant was one of the criteria of the committee for the indication of no one can participate in the study without participant consent and agreement. Participants will make agreements on their volunteer bases. You have full right to get full information about study procedures and other related issues with languages of your choice. Your signature approves that you get satisfactory answers for your questions to the researcher.

Whom to contact: If you need further information you can contact any one of the senior experts: 1) Dr Samson Mulugeta (MD, Assistant Professor of Gyn/Obs); **Cell**: +251912917860**, 2) Dr Yibrah Berhe (MD,** Assistant Professor of Gyn/Obs); **Cell**: +2519139653545, 3) Mr. Ashenafi Asmelash (Executive Director **of Mums for Mums); Cell:** +2519214720866

Appendix III: Participant Information Sheet / Tigrigna version
ናይ ምርምር ፅንዓት መብራህርሂ ቅጥዒ/ትግርኛ ቅዳሕ

ሽም እቲ/ቶም ድርጅት/ታት:- እኖታት ንእኖታት፤ ዩንቨርስቲ መቐለ፤ መቐለ ፈስቱላ ማእኸልን ቢሮ ሓለዋ ጥዕና ክልል ትገራይን

ወፃኢኡ ዝሸፈኖ ድርጅት:- ዩንቨርስቲ መቐለ

ብዩንቨርስቲ መቐለ መእተዊ መስፈርቲ አማሊኦም ዝርከቡ ብማህፀን ምልሕላሕን ፈሰቱላን ንምፍላጥ ኣብ ዝግበር ፅንዓት ተሳታፈ ዝኾኑ ታሓከምቲ ዝተዛገጀወ መብራህርሂ ፅሑፍ እዩ። ናይዚ ፅንዓት እዚ ብሓላፍነት ዝሰርሕ ዩንቨርስቲ መቐለ እዙይ መብራህርሂ ፅሑፍ ዝተዘገጀወ ብ ዩንቨርስቲ መቐለ ምርምር ቡድን ኣቢሉ እዩ።

ናይዚ ፅንዓት ዓላማ፡- ናይዚ ፅንዓት ዓላማ ኣብ ኣዴታት ዝርከብ ናይ ማህፀን ምልሕላሕን ፈሰቱላ ሕማምን መንቀሊኦምን ምፍላጥ እዩ።

ካብቲ ፅንዓት ዝርከብ ጥቅሚ፡- ኣብዚ ፅንዓት እዚ ብምሰታፈን ናይ ማህፀን ምልሕላሕን ፈሰቱላን ኣብ ትግራይ ዘለዎም ዝርገሐ ምፍላጥ ይሕግዝ። ብተወሳኺ ናይዞም ሕማማት መንቀሊ ዝኾኑ ምክንያታትን ምፍላትን ግቡእ ሕክምናን ክረኽባ የኽእለን እዩ። ስለ ዝኾነ ናሃተን ተሳትፎ ኣብ ሃገርና ውሽጢ ናይቲ ሕማም ዘለዎ ዝርገሐ ንምዕጋት የኽእል ማለት እዩ።

ናይቲ ፅንዓት ኣከይዳ፡- ዝተዓለመሉ ሽዶ ንኽወቅዕ ብመጀመርያ ግዜ ኣድላይ ዝባሃል ሓበሬታ ኩሉ ንዝምልከቶ ሓኪም ብግልፂ ምሃብ ይኽውን። ካብዚ ብምቀፃል ብላዕለዋይ ናይ ሕክምና ባዓል ሞያ ኣድላይ ዝተባሃለ ምርመራ ይግበረለን። በቲ ውፅኢት መሰረት እውን ኣድላይይ ዝተባሃለ ሕክምና ይረኽባ ማለት እዩ።

ስግኣታት፡- ብምርመራና ሕክምና ምክንያት እዙይ ዝባሃል ሳዕቤን/ሓደጋ የብሉን።

ናይ ተሳታፊ ሓላፍነት፡- ንምስታፍ እንድሕር ተስማዕሚዐን ኣድላይ ዝባሃል ሓበሬታ ኩሉ ንዝምልከቶ ሓኪም ንኽህባ ይሕተታ እየን። ብተወሳኺ እውን ናይ ማህፀን ምልሕላሕን ፌስቱላን ሕማማት ምርመራ ኣብ ዝግበረሉ እዋን ኣደላይይ ዘበለ ምትሕብባር ንክገብራ ይሕተታ እየን። በቲ ውፅኢት መሰረት እውን ኣድላይይ ዝተባሃለ ሕክምና ንኽረኽባ ይሕተታ እየን።

መሰል ተሳታፈት፡- ተሳትፎአን ኣብ ድሌት ዝተመስረተ ስለ ዝኾነ ተሳተፍቲ ኣብቲ ፅንዓት ን ምስታፍ ኮነ ንዘይምስታፍ መሰል ኣለወን። ነቲ ቅጥዒ መልሲ ዘይምሃብ ኮነ ምርመራ ዘይምግባር መሰለን ዝተሓለወ እዩ። ኮይኑ ግና ንምስታፍ ደሌት እንተኾይነን ኣድላይ ዝተባሃለ ሕክምና ብዘይ ክፍሊት ብላዕለዋይ ሓኪም ይረኽባ ማለት እዩ።

ጥቕሚ፡- ተሳተፍቲ ንምርመራ ይኹን ንሕክምና ምንም ዝከፍለኦ ክፍሊት የለን። ኮይኑ ግና ኣብ ዝኮነ ሰዓት ናይ ምርመራ ውፅኢት ንምፍላጥ ሙሉእ መሰል ኣለወን። ስለ ዝኾነ ኣድላይ ሕክምና ብምርካብ ናይ ባዕለን ናይ ማህፀን ጥዕና ብዝግባእ ይሕሎ ማለት እዩ።

መበራታትዒ፡- ብምስታፈን ዝኮነ ዝተፈለየ ዓይነት መበራታትዒ ኣይህሉን። ተሳትፎአን ብናይ ባዕለን ድሌት እዩ።

ሚስጥር ምሕላው፡- ንዝሀተቱ ሕቶታት መልሲ ኣብ ቅጥዒ ይምዝገብ። ሽመን ኣብ ዝኾነ ሪፖርት ኣይግለፅን። ኣብ ክንድኡ ናይ ሚስጢር ቁፅሪ ይቕመጥ። ዝኾነ መልሲ፤ ናይ ምርመራ ውፅኢት ብሚስጥር ይታሓዙ። ንዝምልከቶ ሓኪም እንተዘይ ኾይኑ ንዝኾነ ገለሰብ ኮነ ድርጅት ኣይወሃብን። ንዝዋሃብ መብርሂ ንዝተገለፀ ምክንያት ጥራሕ ኣገልግሎት ይውዕል።

ሰምምዕነት፡- ብመጀመርያ ምሰዕመዐን ዝገልፅ ክታም ንከቕምጣ ይሕተታ። ኣብ ዝተገለፀ ፅንዓት ጥራሕ ዝውዕል ፈሊጡንን ፍቃደኛ ኮይነንን ምስምዕምዐን ይረጋገፅ። እቲ ክታም ካብዚ ወፃኢ ካሊእ ምኽንያት የብሉን። እቲ ፅንዓት ብ ዩንቨርሲቲ መቐለ ናይ ምርምር ስርዓት ዝተረጋገፀ እዩ። ዝኾነ ሰብ ብዘይፍቐድ ኮነ ስምምዕ ኣብ ፅንዓት ክሳተፍ የብሉን ዝብል ናይቲ ኮሚቴ ሕጊ መሰረት እዙይ ናይ ስምዕነት ክታም ካብ ተሳታፊ ምርካብ ሓደ ናይቲ ኮሚቴ ቀዳማይ መለክዒ እዩ። በተወሳኺ ተሳተፍቲ ኣብ ድሌት ዝተመስረተ ስምምዕ ይፍፅሙ። ናይቲ ፅንዓት መምርሕታትን ምስኦም ዝተታሓሓዙ ጉዳያት ዝምልከት ሙሉእ ሓበሬታ ብዝመረፀኦ ቋንቋ ናይ ምርካብ ግቡእ ኣለወን። ብክታመን ንተማራማሪ ዘቕረብዎም ሕቶታት እኹል መልሲ ምርካብ ይረጋገፅ።

ንዝበለፀ ሓበሬታ ካብዞም ቀፂሎም ዘለው ላዕለዎት ኣካላት ክረኽቡ ይከእሉ።

1. ዶ/ር ሳምሶን ሙሉጌታ (ኣብ ዩኒቨርሲቲ መቐለ ናይ ማህፀንን ጥንስን ሰፔሻሊሰት)፣ ቁ/ስልኪ፡ 0912917860
2. ዶ/ር ይብራህ በርሀ (ኣብ ዩኒቨርሲቲ መቐለ ናይ ማህፀንን ጥንስን ሰፔሻሊሰት)፤ ቁ/ስልኪ፡ 0939653545
3. ኣቶ ኣሸናፊ ኣሰመላሽ (ኣብ እኖታት ንእኖታት ዋና ዳይሬክተር)፤ ቁ/ስልክ፡ 0914720866

Appendix IV: Informed Consent / English version

Name of researching organization(s) : Mums for Mums, Mekelle University, Mekelle Fistula Centre and Tigray Regional Heath Bureau
Title of the project: Prevalence of pelvic organ prolapse, fistula and associated risk factors in Tigray region, Northern Ethiopia

Participant's Name: _____ Age: ____**zone:**_____ Kebele _____ Gott: _____ Study ID: _____

I understand that this informed consent was prepared for a study which aims at **prevalence of pelvic organ prolapse, fistula and associated risk factors in Tigray region, Northern Ethiopia**. I have been informed that I may be probably having **pelvic organ prolapse and/ or fistula** and I should start appropriate diagnosis and treatment. Physical and clinical examination was performed by senior gynecologists and obstetricians from Mekelle university through a protocol especially designed for the research purpose. I have been informed by gynecologists and obstetricians that I can get health services. But if I am volunteer, it was possible to know whether I had really pelvic organ prolapse and/ or fistula. Examination and treatment were free of charge. I will not be paid because of my participation. My participation was based on volunteer base and I can withdraw without any prerequisite and at any time. I have been told that all the physical and clinical examination information were registered on questionnaire format, and kept confidential. I can ask questions and will get brief explanation in the language of my preference. I agree to participate and give necessary information and examination. I agree to be interviewed about assessment of risk factors associated with disease development. Moreover I would like to confirm my agreement by signing.

1. Participant's name _____Signature _____date_____

2. Name of the principal investigator_____ Signature _____date_____

Thank you for your participation!

Appendix V: Informed Consent / Tigrigna version

ናይ ፍቓደኛ መረጋገፂ ቅጥዒ/<u>ትግርኛ ቅዳሕ</u>

ናይ ተሳታፊት ሽም፡ _____ ዕድመ _____

ዞባ_____ቀበሌ፡_____ቁሸት_____

ናይ ተሳታፊት ሚስጥራዊ ቁፅሪ_____

እዙይ ናይ ሓበሬታ ወረቐት ዝተዘጋጀወሉ ናይ ፅንዓት ዓላማ ብ ዩኒቨረሲቲ መቐለ ኣብ ኣዴታት ዝርከብ ናይ ማህፀን ምልሕላሕን ፊሰቱላን ሕማማማት መንቀሊኦምን ንምፍላጥ ምኺኑ ተረዲአ ኣለኩ።

ናይ ማህፀን ምልሕላሕን ፊሰቱላን ሕማማማት እንድሕር ተረኺቡኒ ኣደላይይ ዘበለ ሕክምና ምውሳድ ከም ዘለኒ ፈሊጠ ኣለኹ። ብተወሳኺ እቲ ምርመራ ካብ ዩኒቨርሲቲ መቐለ ዝመፁ ላዕለዎት ናይ ማህፀንን ጥንስን ሓካይም ዝካየድ ምኺኑ ተገንዚበ ኣለኹ። ብነፃ ግቡእ ናይ ሕክምና ኣገልግሎት ዝረክብ ምኺነይ እውን ከምኡ፤ እንተኾነ ግና ብምስታፈይ ምኽንያት ክፍሊት ዘይረክብ ምኺነይን ተሳትፎይ ኣብ ድሌት ዝተመስረተ እዩ። ሰለ ዝኾነ ኣብ ዝኾነ ግዜ ተሳትፎ ናይ ምቁራፅ መሰል ኣለኒ። ብተወሳኺ ኩሉ ናሃተይ ዘበለ ናይ ምርመራ ውፂኢት ኮነ ሕክምና ኣብቲ መሕተቲ ቅጥዒ ከምዝምዝገብን ብሚስጥር ከምዝታሓዝን ተነጊሩኒ እዩ። ብተወሳኺ ምሰቲ ሕማም ዝተተሐዙ ምኽንያታት ዝምልከት መልሲ ንምሃብ ከምዝተስማዕማዕኩ ብክታመይ የረጋግፅ።

ናይ ተሳታፊት ሽም_____ ክታም፡_____ዕለት_____

ናይ ተማራማሪ ሽም:_____ ክታም፡ _____ ዕለት_____

የቐንየለይ!!