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## **Unsafe abortion in legally restricted areas – how politics and abortion laws decides women’s future**

*A literature review on the incidence of induced abortion and adverse health consequences in Sub-Saharan African countries with restrictive abortion laws*

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## Preface

After spending three months on clinical rotation in Zimbabwe during my 4<sup>th</sup> year of medical school, I developed an interest in global health and especially women's reproductive health. During my stay, I saw a lot of women admitted for complications following possibly unsafe abortions, and I noticed how vulnerable and stigmatized these women were. Zimbabwe do not permit abortion for any social reason, and it became clear to me during my stay in the Sub-Saharan African country that health is politics, and that a large proportion of the world's population are suffering from the decisions of others. A woman dying of pregnancy-related causes is one of the world's biggest tragedies, and I wanted to write my thesis about a subject that is important for global health, and even more important for me as a future doctor and citizen of the world. Writing a master thesis on unsafe abortion in countries with restrictive abortion laws is my contribution to the global community.

I want to express my gratitude to my supervisor Jon Øyvind Odland for helping me shed some light on these important matters, for his engagement, and for being optimistic, helpful and supportive during the work of this thesis.

I also want to thank my family and friends for their support, and last, but not least, Rune. Thank you for being patient and loving throughout this period, and for listening and participating in every thought, every worry and every moment of achievement with me.

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## Summary

**Introduction:** Sub-Saharan Africa has one of the world's highest rates of unsafe abortions, and most maternal deaths due to unsafe abortion arises from this region. Abortion is restricted by law in most of these countries. The aim of the thesis is to address the impact of restrictive abortion laws on the incidence, morbidity and mortality from unsafe abortion in Sub-Saharan African countries.

**Material and methods:** A systematic literature search was performed in April 2017 for studies published between January 2000 and April 2017. The studies were selected based on the following inclusions-criteria; incidence and complications of induced abortions, maternal deaths due to unsafe abortion, and abortion laws in Sub-Saharan Africa. Selected studies were then assessed for their relevance to the thesis and for scientific quality.

**Results:** 37 studies were found eligible, and included in the final list. Many countries in Sub-Saharan Africa have liberalized their abortion laws the past decade, and there is a political trend towards a liberal law change in the region. Estimates of induced abortion showed that a substantial proportion of women are still having unsafe abortions in Sub-Saharan African countries, and that the rates varied between rural and urban regions, with the highest estimates in the urban regions. Sepsis was the most reported complication after unsafe abortion, and contributed to the high estimated proportion of maternal deaths in this region. Unsafe abortion affects adolescents more than any other pregnancy-related complication. Estimating unsafe abortion incidence, morbidity and mortality is challenging in a restrictive law setting.

**Conclusions:** Restrictive abortion laws will not lower the incidence of abortion. High rates of complications and mortality arises from Sub-Saharan African countries in a restrictive law setting, in addition to high levels of induced unsafe abortions. Liberalizing abortion laws is not sufficient alone. Access to high-quality health facilities and trained health personal are equally important measures towards lowering morbidity and mortality following unsafe abortion.

## Abbreviations

WHO: World Health Organization

UN: United Nations

MDG: Millennium Developmental Goals

PAC: Post-Abortion care

MMR: Maternal Mortality Ratio

HDI: Human Development Index

AICM: Abortion Incidence Complications Method

MVA: Manual Vacuum Aspiration

D&C: Dilatation & Curettage

RCT: Randomized Controlled Trial

AR: Abortion Rate

CFR: Case-fatality rate

ACR: Abortion Complication Rate

HFS: Health Facilities Survey

HPS: Health Personal Survey

PMS: Prospective Morbidity Survey

PID: Pelvic Inflammatory Disease

# 1 Introduction

## 1.1 Maternal mortality and UN's Millennium Developmental Goal 5

The World Health Organization's (WHO) Millennium Development Goal (MDG) 5 was set to improve maternal health by reducing the maternal mortality ratio (MMR) and give universal access to reproductive health, all this by 2015 (1). Many interventions were done, and one of their main working areas was evaluating the burden of maternal mortality. When the results of the MDG report were presented, it showed that the MMR had been reduced by 45% worldwide, from 380 to 210 deaths per 100,000 live births, meaning that although significant progress was made, the global goal of reducing MMR by two thirds was not reached (1). The report also showed that the pre-existing gap between developing and developed regions was largest when it came to maternal health (1). This leaves an unfinished agenda where further efforts will be needed in preventing women from dying of pregnancy-related causes, especially in the developing world.

## 1.2 Unsafe abortion and the current global scenario

One of the main contributors to maternal deaths worldwide is unsafe abortion. Unsafe abortion is defined by WHO as a procedure for terminating an unintended pregnancy carried out either by persons lacking the necessary skills or in an environment that does not conform to minimal medical standards, or both (2). Safe, medical, abortions done according to medical guidelines carry approximately the same risk as getting a shot of penicillin, with a mortality rate of 1/100,000 (3, 4). In contrast, unsafe abortions provide a high risk of morbidity and death (2, 5, 6). The estimated incidence of induced abortion in developed countries, here presented as abortions per 1000 women aged 15-49 (excluding Eastern-Europe) was 17/1000 in 2008, in contrast to developing countries (excluding China) with an estimate of 29/1000 (7). In addition to the higher estimate of induced abortion in developing countries, the most important difference between developing and developed countries is the proportion of unsafe and safe abortions. Nearly 100% of abortions in developed countries (excluding Eastern-Europe) are performed safely, whereas in developing countries (excluding China), almost 75% of abortions is performed unsafe (7). Thus, it is no secret that

the poorest countries in the world that has the highest rates of induced abortion, and that the majority of these are unsafe (8). In fact, 86% of all abortions took place in the developing world in 2008, an increase from 78% in 2003 (7, 8) .

### 1.3 Worldwide abortion laws

Abortion has been a controversy throughout many ages, cultures, religions and societies, and access to abortion services and good post-abortion care (PAC) is not evenly distributed worldwide (2). In some countries, abortion is broadly accessible and free of charge, whereas in other countries, the women risk imprisonment if she is obtaining an abortion against the laws of her nation (9) . There are many ways to study and classify the worlds abortion laws. Some uses six or more categories, others five or four. In this thesis the laws will be divided into five categories as used by Boland et al. (9); to save the woman's life or prohibited altogether, to preserve the woman's physical health, to preserve the woman's mental health, on socioeconomic grounds, or without restriction as to reason. That makes around 40% of women in childbearing age (15-49 years) live in countries with highly restrictive laws which prohibit abortion for all causes, or only allow the procedure to save a woman's life, or to protect her physical or mental health (10). WHO states that abortion also take place in countries where it is strictly illegal, and not just countries where it is legally available (2). In fact, the estimated abortion incidence is higher among women living under restrictive abortion laws, compared to countries with liberal abortion laws (2, 7). It is well documented that morbidity and mortality resulting from abortion tend to be high in countries and regions that has these restrictive abortion laws, and the women most harmed by these laws are usually those without financial or social means, in other words; women who are poor, survivors of sexual violence, ethnic discrimination or others in vulnerable circumstances (11).

### 1.4 Sub-Saharan Africa and unsafe abortion

Together with Latin-America and the Caribbean, Sub-Saharan Africa is the region in the world with the highest rates of unsafe induced abortion, with almost 97% unsafe abortions (7). Sub-Saharan Africa is a region which comprises 49 out of the 54 states of Africa, and was



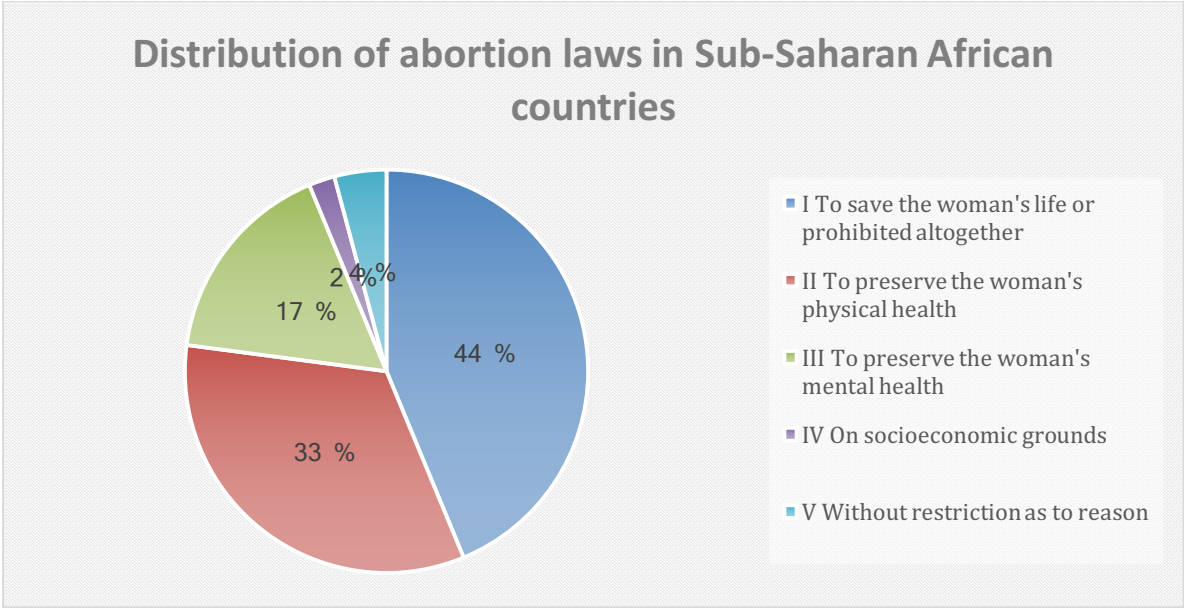
in 2010 home to more than 854 million people (12). Because of the enormous population growth in Africa, Unicef estimates that by mid-century, one in three persons will live in Africa (13). In the HDI (Human development index) by the United Nations (UN), 28 of Sub-Saharan African countries was listed among the 30 least developed countries in the world, which states Sub-Saharan Africa as the world's poorest region (14) (see Figure 1).

**Figure 1** Map showing Sub-Saharan African countries in green. The blue countries are Northern-African countries which is not counted as a part of the Sub-Saharan African region (15).



The estimated induced abortion rate (AR) for Africa as a continent in 2008 was 29/1000 women aged 15-49 (7, 8) with Eastern-Africa (38/1000), Middle-Africa (36/1000), Western-Africa (28/1000) and Southern-Africa (15/1000). Abortions are almost exclusively unsafe in these regions, and the rates varied from 20-40/1000 between countries in sub-Saharan Africa (8). Only Southern-Africa had an estimate lower than 20/1000 women aged 15-49 (8). The Sub-Saharan region also has the highest estimated rate of complications following an induced unsafe abortion (8.8/1000 women aged 15-44) (6). Almost all abortion-related deaths occurs in developing regions (99%), and the vast majority of these deaths occur in Sub-Saharan Africa (2, 16). As of 2015, an estimated 90% of women aged 15-44 in Africa live in countries with restrictive abortion laws (i.e. falling into the first three categories shown in Figure 2) (9). Eleven of these countries do not permit abortion for any reason at all (9, 17) .

**Figure 2** The distribution of abortion laws in Sub-Saharan African countries (9)



**1.5 Estimating abortion incidence in developing countries**

Assessing the magnitude of the problem with unsafe abortion and its consequences is one of the least documented reproductive health problems (5). In developing regions, data of abortion incidence is often unavailable, incomplete or non-existing, mostly because of the

sensitive nature of abortion (18). Thus, numbers and counts must be estimated, using various number of methods. One of the best documented and used methods are The Abortion Incidence Complications Method (AICM) (7, 18-20). This is an indirect method for estimating abortion incidence in countries where data and statistics are unreliable and scarce (20). It builds on the number of women treated in medical facilities for abortion complications to eventually estimate the total number of abortions (20). Another method for estimating complications or mortality from abortion is the sisterhood method. In this method, women are interviewed about the survival of their adult sisters, and thus giving an estimate of maternal mortality in a community (19-21).

## 1.6 Aim of the thesis

This thesis aims to address the association between restrictive abortion laws and the estimated incidence, morbidity and mortality of unsafe induced abortions in the region of Sub-Saharan Africa. It will assess this seemingly close relationship between the law and how it impacts the health of the women seeking those abortions. Thus, I will be studying the rate of complications after unsafe abortions, and assess the severity of abortion complications in addition to the incidence of induced abortions in this region. Ultimately, I want to study the proportion of maternal deaths due to unsafe abortion and how it differs between countries in Sub-Saharan Africa.

## 2 Material and Methods

### 2.1 Search strategy and selection criteria for the literature

Relevant literature for this thesis was obtained from the MEDLINE database by using the search engine PubMed, covering January 2000 to April 2017. The goal was to identify publications on estimated abortion rates and ratios, complications and adverse health effects from induced abortion, and abortion-related deaths contributing to MMR in Sub-Saharan countries in Africa with restrictive abortion laws. These were the inclusion criteria for this thesis. In the search, combination of the following MeSH-headings were used, but not limited to "Abortion, criminal", "Abortion, induced", "Abortion, legal", "Maternal mortality", "Abortion, septic", "Africa". I then chose to make an additional systematic search in PubMed without the use of MeSH-headings, because some central and important terms for my study was not found to be a MeSH-term and it was a possibility that some studies would be missed in the search process. I therefore used a combination of the terms "Induced Abortion Estimates Africa", "Unsafe Abortion Estimates", "Unsafe Abortion Complications", "Criminal Abortion", "Unsafe Abortion Mortality", "Unsafe Abortion Rate", "Unsafe Abortion Death" and "Induced Abortion Maternal Mortality". I combined all the search terms with the term "Africa" to get more specific search results. When combining the two search methods described above, a total of 625 studies was found to be relevant. Out of these studies, 396 was found to be duplicates because of overlap in searching terms, and thus excluded. The remaining 229 studies were then retrieved and screened for relevancy by reading the abstract. 4 additional studies were obtained from reference lists from publications by WHO, United Nations, and some systematic review papers and included in the list now containing 233 studies.

Further 169 studies were excluded, either because of irrelevancy or that the study discussed topics outside the scopes of this thesis, i.e. use of contraception, unintended pregnancy, second-trimester abortions, abortion methods (i.e. use of misoprostol, manual vacuum aspiration (MVA) vs. dilatation and curettage (D&C)), sociodemographic profiles of the women seeking abortion, PAC, or economic consequences of abortion. Studies were also excluded if they were written in another language than English, not classified as a scientific

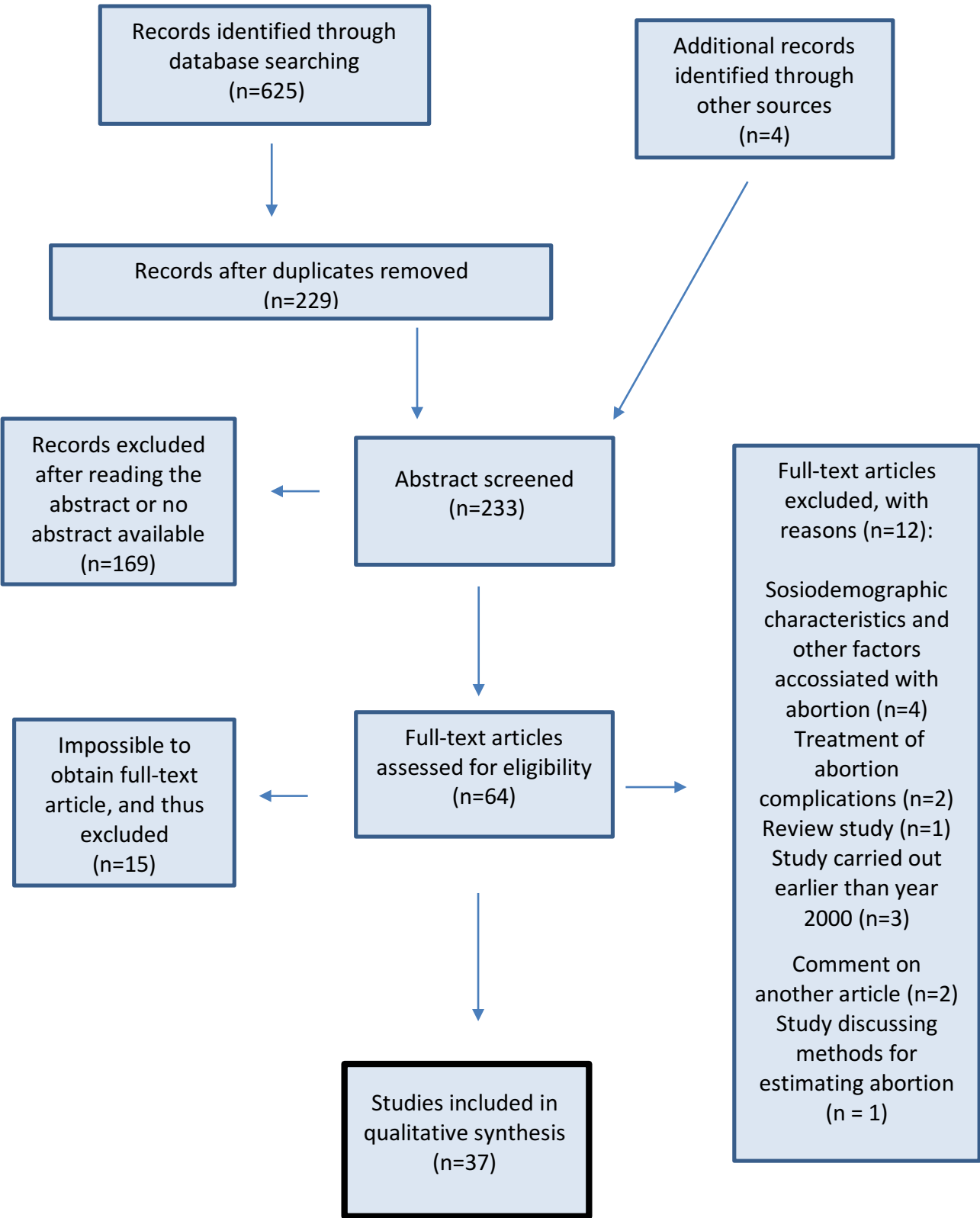
study, or from countries other than Sub-Saharan African countries. Articles without an abstract, and with just one author was also excluded. I then collected the full text of the remaining 64 articles. If it was impossible to obtain the full text of the study, it was also excluded (n=15). After retrieving the full text of the remaining articles, and assessing them for scientific quality, 37 articles was chosen as eligible and of high relevancy to this thesis, and was included in the final review.

## 2.2 Data collection

I then collected data and information from the remaining 37 articles in this order; information/citation data (including name of the journal which the article is published in), author information, study design, purpose of the study, study population, results of the study and conclusion. The final list of articles was put in a digital library of references using EndNote X8 (2017, Thomson Reuter).



**Figure 3** Modified PRISMA diagram showing a summary of the literature search and selection of studies (22)



### 3 Main results

The results of the search process are presented in Figure 3, and the final list of studies are attached (see Appendix).

#### 3.1 Selection of articles

Out of the 37 studies, 11 of them described estimates of induced and unsafe abortion, while 26 of them described the different complications of abortion, the severity of the complications, and the proportion of unsafe abortion related to maternal deaths. The study design of the selected studies were mainly prospective or retrospective descriptive studies or cross-sectional studies. Two studies were case-control studies, and none were randomized controlled trials (RCT) or cohort studies. All the selected studies originated from different countries in Sub-Saharan Africa, in line with the inclusion-criteria of this study. There was some variation in how many studies who originated from which country (not shown).

##### 3.1.1 Estimating induced abortion

Of the studies who described incidence of induced abortion, different methods of estimating these numbers were used by the authors. Some used indirect methods, like the AICM, while others used sisterhood or confidants' methods for capturing abortion numbers. Different denominators for calculating the AR was also used; some reported AR per 1000 women aged 15-49, while others reported per 1000 women aged 15-44. The incidence of induced abortion was reported differently in the various studies, but either one of these estimates were used; per 1000 women annually (AR), per 100 live births (abortion ratio) annually, or total numbers.

##### 3.1.2 Estimating maternal mortality and complications of induced abortion

Of the studies who described and estimated maternal mortality and complications of induced abortion, different ways of measuring the outcome and methods of calculating

these ratios and rates have been used. Some calculated an abortion complication rate (ACR) of how many women treated for abortion complications in selected hospitals per 1000 women annually, while others used the current MMR and calculated the proportion of unsafe abortion as a direct cause. Some also used case-fatality-rate (CFR) to describe the magnitude of abortion complications, which is the proportion of deaths within a population contributed to a specific cause.

### 3.2 Abortion Laws and Sub-Saharan Countries

As previously stated, almost every country in Sub-Saharan Africa have restrictive abortion laws (9). However, there are some countries that have liberalized their abortion laws the recent years to lower the high MMRs and unsafe abortion rates, and some are discussing a possible law change. South-Africa liberalized their abortion law in 1994, and are now offering abortion on request up to 12 weeks of pregnancy (23, 24). Ethiopia liberalized their abortion law in 2005, thus giving women access to legal abortion when the pregnancy results from rape or incest, when continuation of the pregnancy endangers the health or life of the woman or the fetus, in cases of fetal impairment, for women with physical and mental disabilities, and for minors who are physically unprepared to raise a child (25). Malawi is currently debating on whether to liberalize their abortion law, which is currently highly restricted and giving women permission to have an abortion only if their physical or mental health is at risk (26). Kenya accepted a new abortion law in 2010 which now grants permission to have an abortion if there is need for emergency treatment, or if the life or health of a woman is in danger (27). When implementing the new abortion law, the politicians discussed how this new law would be interpreted by the citizens of the country, and in a study from Kenya by Gebreselassie et al. (28), the authors stated that different implications of the law are making it hard for women to access abortion even when there are legal indications for it, because the law is so unclear. Similar findings were observed in Burkina Faso, where even though the law states that abortion is allowed in order to save the woman's life, the country's medical professionals almost never performs any legal abortions (29). Abortions are generally restricted in Sub-Saharan Africa, and an overview of the Sub-Saharan African countries studied in this thesis, and the current status of their abortion laws

is presented in Table 1.

**Table 1** Overview of the Sub-Saharan African countries studied in this thesis, categorized by the different abortion laws from category I-V<sup>1</sup> (9, 30)

	I	II	III	IV	V
<b>Sub-Saharan African countries</b>	Ivory Coast, Senegal, Nigeria, Uganda, Malawi, Tanzania	Benin, Burkina Faso, Cameroon, Rwanda, Ethiopia, Kenya	Ghana		South Africa

**3.3 Estimates of induced abortion**

In countries with restrictive abortion laws, the ARs continue to be high, as shown in a recent study from Kenya by Mohamed et al. (31) where the abortion incidence was estimated to be 48/1000 women aged 15-49. The authors of the study used the AICM to estimate the incidence, and data was collected through three surveys; Health Facilities Survey (HFS), Health Professionals Survey (HPS) and Prospective Morbidity Survey (PMS). The HFS was a survey of a sample of nationally representative health facilities, both public and private, who offers PAC. The HPS was interviews with a sample of health professionals from different regions in Kenya who have knowledge about abortion and PAC-issues. The PMS was a survey of patients presenting with complications from induced abortion in a 30-day period in selected health facilities. A total of 328 facilities participated in the HFS, 326 participated in the PMS and 124 in the HPS. Estimates on how many PAC-patients treated at the facility in a

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<sup>1</sup> I: To save the woman’s life or prohibited altogether, II: To preserve the woman’s physical health, III: To preserve the woman’s mental health, IV: On socioeconomic grounds, IV: Without restriction as to reason

typical year and past year was collected by either the head of the obstetrical department at large hospitals, or midwife or nurse at smaller facilities. These numbers, collected retrospectively, gave data to the HFS. The staff at each facility was also trained to recognize patients who met the inclusions-criteria for the PMS, and collected these patients prospectively over a month. Finally, interviews with Health Professionals in the HPS gave information about the likelihood of women experiencing abortion complications getting treated at health facilities in Kenya. These three surveys finally gave enough data to estimate the incidence of induced abortion in Kenya (31). The same method for estimating abortion incidence was also used by Levandowski et al. (32) and Polis et al. (26) in Malawi, Singh et al. (33) and Prada et al. (34) in Uganda, Bankole et al. in Nigeria (35), Sedgh et al. in Senegal (36), Basinga et al. in Rwanda (37), Keogh et al. in Tanzania (38) and Singh et al. in Ethiopia (25) (16). Some of the authors did not use the PMS-survey for additional information, but all used both the HFS and the HPS.

The estimate for Kenya (48/1000) is higher than the estimate for other countries in the same region with similar abortion laws. In Malawi, the abortion incidence has increased by 104% from 2009 to 2015, with 23/1000 women aged 15-44 to 38/1000 (26, 32). A recent study from Tanzania, a country in the same region as Malawi, showed similar results with an estimated induced AR of 36/1000 women aged 15-49 (38). Some studies showed an AR lower than expected, like a study from Senegal where the estimated AR was 17/1000 (36). This is in contrast to estimates from Nigeria and Burkina Faso, countries in the same region (Western Africa), with AR's of 33/100 and 40/1000 women aged 15-49 respectively (29, 35). Both Nigeria and Senegal have abortion laws stating that abortion is illegal on demand, but can be done to save the woman's life (35, 36). The authors of the study from Senegal stated that the desired family size among the population has declined, but the contraceptive usage remains low with only 16% use of modern methods (36). This suggest that there is a high level of excess fertility in Senegal with more pregnancies ending in births than abortions, and that there is an unmet need for contraceptive services and family planning (36) . Similar findings where done in a study from Uganda where desired family size was decreasing, but the use of contraceptives in the population was only 14% (33). The AR of Uganda in this study was estimated to be 54/1000 women aged 15-49, and showed a gap between actual



and wanted family size (33). However, a more recent study from the same country showed an increase of contraceptive usage, now 26%, and an estimated abortion incidence of 39/1000 abortions per women aged 15-49 (34).

### 3.3.1 National and regional variations of abortion incidence

Of the studies estimating incidence of induced abortion, the rates varied across countries and regions, and in almost every study the authors described regional differences in AR nationwide. Because of this indirect methodology of estimating abortion incidence by measuring abortion complications treated in health facilities, the estimate would be affected by the number of women seeking care in the investigated health facility. The access to PAC and abortion services are often scarce outside of the urban centers, and an influx of women from rural areas seeking such services would promote regional differences in AR. In their study from 2008, Singh et. al. (25) estimated the national AR in Ethiopia to be 23/1000 women aged 15-44, with a variation of 13-16/1000 women in four rural regions combined, and 184/1000 in the two urban regions combined. A study from Rwanda, by Basinga et al. (37) showed similar results, where the estimated AR for the urban center Kigali was 87/1000 women aged 15-44, in contrast to the estimated AR for the whole nation with 25/1000 women aged 15-44. There are several studies showing the same tendency as both Rwanda and Ethiopia. Studies from Senegal and Uganda also observed higher estimated abortion incidence in urban centers, and lower estimates for rural regions (34, 36).

## 3.4 Health consequences

### 3.4.1 Rate of admission to hospital due to unsafe abortion

In countries with restrictive abortion laws, the proportion of women treated in health facilities for complications from induced abortion tends to be high in comparison to countries with less restrictive abortion laws (5, 6). All East-African, Central-African and West-African countries have restrictive abortion laws, but some countries have liberalized their laws to apply for a broader range of conditions, but is still restricted for the clear majority of abortion-seeking women (2). This is especially the case for Ethiopia, who in 2005 liberalized

their abortion laws and now offers women abortion for a broad range of reasons (25). The rate of complications due to abortion in Ethiopia was estimated to be 3.5/1000 women aged 15-49 (25, 39). A study from Malawi, where abortion is highly restricted, estimated the ACR to be 6.5/1000 women aged 15-44 in 2009 (32), but a more recent study from the South-East African country showed an 177% increase in ACR (14/1000) (26). Similar results were found in two studies from Kenya, also a country from the East-African region. The first study was a cross-sectional hospital-based study from 2005 where records of women presenting with abortion-related complications at selected hospitals during a three-week period was included, and an initial ACR of 3/1000 women aged 15-49 was estimated (28). The more recent study from 2015, using similar and comparable methods for estimating AR as the previous study, presented an ACR of 12/1000 women aged 15-49 (31). These numbers are in contrast with findings from Tanzania, who reports a lower ACR with 5.9/1000 women aged 15-49 (38). Two Ugandan studies conducted in 2003 and repeated in 2013 showed a reduction of hospitalization rate due to abortion complication from 20/1000 to 12/1000 women aged 15-49, probably due to increased use of contraceptives (33, 34). Still the number is higher than other countries in the same region with similar abortion laws. Nigeria makes up almost 65% of Western and Central Africa, and a recent study estimated the rate of admission to hospital to be 5.6/1000 women aged 15-49 (35), which is lower than the above mentioned estimates from Uganda, Malawi, Tanzania and Kenya . Like the estimated incidence of induced abortion, the rate of complications due to unsafe abortion showed great national variations. A study from Rwanda showed local differences in ACR from 4.5/1000 in a rural area to 19/1000 in an urban area for women aged 15-44, with a national estimate of 7/1000 (37). This was also the case for Ethiopia, where the rates in Addis Ababa (6.7/1000) and in two combined urban regions (25.4/1000) were higher than the national average (3.5/1000) (25). This is likely because of better access to health facilities. Ethiopia's four rural areas combined (2.2/1000) showed a lower rate than the national average estimate (25).

### 3.4.2 The burden of unsafe abortion

The most reported complication due to unsafe abortion was sepsis, retained products of conception, hemorrhage, genital trauma and fever, but there was also reports of other, far

more serious complications like uterine and/or bowel perforation (28, 40-44). Infection and/or sepsis was the most frequent reported complication in all the studies who investigated either causes of maternal death due to unsafe abortion, or complications from unsafe abortion regardless of the outcome. In two independent studies from two different tertiary referral hospitals in Nigeria, the authors found post-abortion sepsis to be the cause of maternal death due to unsafe abortion in respectively 55% (41) and 73% (43), while a study from Ghana reported sepsis as a cause of death in 78% of deaths from unsafe abortion (45). Similar numbers were reported in a study from a University Teaching Hospital in Cameroon with 66% of unsafe abortion deaths related to post-abortion sepsis (46). A study combining results from Benin, Cameroon and Senegal also reported infection and/or sepsis as the most important risk factor for maternal morbidity and death (47). Hemorrhage was reported as the second most frequent complication due to unsafe abortion, and in a study from Nigeria conducting 2093 patients treated for complications of abortion or miscarriage, or seeking abortion, one in five were in need of a blood transfusion (48).

**Table 2.** Definition of severity categories, grouped by clinical symptoms and findings (49)

<b>Severity categories</b>	<b>Definition</b>
Low or mild	Temperature < 37.3 °C and No clinical signs of infection and No system or organ failure and No suspicious findings on evacuation
Moderate	Temperature of 37.3 – 37.9°C or Offensive products or Localized peritonitis
High or severe	Temperature over 38.0°C or Organ failure or Peritonitis or Pulse ≥ 120 or Death or

	Foreign body/mechanical injury on evacuation
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Severity of complications is classified as mild/low, moderate and severe/high based on the criteria by Rees et al. (49) and used in other studies (24, 28, 49, 50) (see Table 2). In a recent study conducted in Kenya, 3/4 of all abortion admissions had a moderate or severe complications, 40% and 37%, respectively (51). This is an increase from a study done in 2010 which reported moderate and severe complications of 16.3% and 27.9%, respectively (28). These numbers are higher than numbers from both Malawi (27.3% severe and moderate combined) (44) and Ethiopia (41% severe and moderate combined) (39). A study from South-Africa done after the abortion law change in 1994 found an increase in women presenting with no sign of infection on admission to hospital relating to abortion from 79,5% in 1994 to 90.1% in 2000 (23). Another study from South-Africa done in 2005, almost 10 years after the liberalization of the abortion law, had similar findings (24) . A possible decrease in patients with high severity (16.5% to 9,7%), and a simultaneous increase in the low severity group (66.2% to 72,4%) was showed when comparing numbers from before the liberalization, although the numbers where not statistically significant (24). The study also showed a reduction in morbidity among adolescents; women over the age of 30 were significantly less likely than those 21-30 years, or under 21 to be of low severity, and more likely to have offensive, retained products than the younger women (24). Complications from unsafe abortion tend to affect the lower age groups, in contrast to other pregnancy-related complications. Two different studies from Nigeria found a large contribution of adolescent (age 15-19) morbidity and mortality from unsafe abortion. One study found that 40% of all unsafe abortion deaths occurred in the age group 20-24 when doing autopsies of all maternal deaths over a 5-year period (41). Another study on maternal deaths among adolescents in Jos, North-Central Nigeria showed that unsafe abortion was the leading cause of death (36.9%), and that the adolescent burden of maternal mortality accounted for 11.5% of the total maternal mortality of the hospital investigated in the study (52).

### 3.4.3 Maternal mortality due to unsafe abortion

Like the rate of hospitalization due to induced abortion, the attributes of unsafe abortion to maternal mortality showed great variations throughout the regions and countries of Sub-Saharan Africa. A study from Ghana found that unsafe abortion was the direct cause of death in 29.1% of cases of maternal deaths (53), whereas other studies from the same country reported numbers varying from 11.5% to 21.8% maternal mortality due to unsafe abortion (45, 54-56) with the most recent study reporting 21,8% (56). This was also the case for Nigeria where the numbers varied from 11.8% to 24.7% of maternal mortality related to abortion complications (40-43, 57), although the most recent studies from 2014 show a variation of 22% to 24% (41, 42). Cameroon, which is also a West-African country together with Ghana and Nigeria, reported maternal deaths due to unsafe abortion to be 25% in a recent case-control study (46). The East-African country Kenya are showing similar attributes. A study conducting verbal autopsies from maternal deaths from two slums in Nairobi, the capital of Kenya, presented abortion as the main reason for maternal death in 31% of cases (58). In 2011, a study from Uganda recording all maternal deaths in a district hospital in a period of 1 year, reported that the proportion of maternal deaths due to unsafe abortion was 29% (59). However, the Ugandan ministry of Health reports that the contribution of unsafe abortion to maternal mortality seems to be declining over time; a 2007 study conducted in 553 health facilities found that complications from abortion were directly responsible for 11% of maternal deaths (34, 60). There seem to be some discrepancy between the different estimates the maternal deaths due to unsafe abortion in these countries, and due to different study design and variations in study population, not all the estimated numbers are directly comparable to each other. Still, the proportion of unsafe abortion mortality and morbidity in Sub-Saharan Africa seem to be a large contribution to maternal ill-health and death.



## 4 Discussion

### 4.1 Abortion rates and estimated incidence

The estimated incidence of induced abortion in Sub-Saharan Africa is characterized by the fact that little research has been done on the subject the past decades. Some of the included studies in this thesis showed the country's first nation-wide estimate of induced abortion, and has therefore no basis for comparison. What the numbers showed though, is that higher estimates of induced abortion reside in countries with restrictive abortion laws. Both the Eastern-Africa, Middle-Africa and Western-Africa region has (with the exception of Ghana in category III) abortion laws in either category I or II, and shows higher estimates for induced abortion than for Africa, which is 29/1000 women aged 15-49 (8). However, there are a few exceptions. Ethiopia has a lower estimate for induced abortion than estimated for the Eastern-Africa region, which can be attributed to the fact that the country liberalized their abortion laws in 2005, and increased the focus on contraceptives and family planning. South-Africa has been offering abortion on request since 1994, and has a lower estimate than the other regions in Sub-Sahara Africa. There is no evidence that a restrictive abortion law leads to lower AR. The exact opposite is demonstrated in several developed countries, especially the Netherlands which has unrestricted access to free abortion and contraception, and has one of the lowest AR in the world with 9.7/1000 women aged 15-49 (61).

### 4.2 Abortion laws and unsafe abortion

Broad legal access to safe abortion is associated with improvement in sexual and reproductive health, thus an important measure to reduce the health burden of unsafe abortion is a legal change of restrictive abortion laws worldwide (10, 62). More and more evidence is accumulating to show that when abortion is legal and accessible, mortality and severe morbidity from unsafe abortion declines. This happened in the USA in the 1970s, and both in Romania and South-Africa in the 1990s (62-64). The last decade has shown an increased trend towards liberalizing abortion laws worldwide, and between 1995 and 2015, 13 countries from Sub-Saharan Africa increased their access to legal abortion; Benin, Burkina Faso, Chad, Ethiopia, Kenya, Mali, Mozambique, Guinea, Togo, West-Africa, Swaziland, Niger

and South Africa (5, 9, 30, 65). Both South-Africa and Mozambique are now offering abortion on request up to 12 weeks of pregnancy (30). In addition, abortion has been on the agenda of several African countries recently, among them Malawi, Nigeria and Kenya (10, 26, 28). However, whilst efforts are made in Sub-Saharan African countries towards more liberal abortion laws, there seem to be little to no change in mortality from unsafe abortion in these countries the last decade. In fact, Africa (and thus Sub-Saharan Africa) is struggling to keep up with other developing regions such as Latin-America, the Caribbean and Asia (except China) which shows a substantial decline in mortality from unsafe abortion the last decade (down 70% for Latin-America and the Caribbean, and 50% for Asia) (2).

#### 4.2.1 Legal access to abortions, what now?

What the abortion laws states on paper, does not always match the reality in how these laws are interpreted and performed in a society, and in the health system of a country. There are many safe abortions in countries with legal restrictions on abortion, and there are also unsafe abortions in countries with no legal restrictions (62). Although the liberalizing of abortion laws is one important step towards lowering deaths and suffering from unsafe abortion, it seems insufficient alone as a measure to create safe abortion services and thus reduce maternal mortality. Ethiopia changed their abortion law in 2005 to allow abortion under a broader range of conditions, but the process towards securing safe, legal abortion in the hope of lowering maternal mortality and high abortion incidence has been slow (25, 39, 50). 14% of Ethiopian women seeking PAC states that they have tried to end their pregnancy before being admitted to hospital, even though many of them would have been eligible for a legal abortion (39). In addition, one out of four who sought care in a health center were referred to a hospital for further care, which implicates that many of the health centers were unable to give adequate care for their abortion patients (39). This can explain why these measures take so long to show results in these Sub-Saharan African countries; women and their families knowledge about their reproductive rights, and access to safe abortion services is not optimal. This claim is also supported by evidence from both Rwanda and Kenya. The authors of a Rwandan study from 2012 concludes that programs to educate women and couples about the specifics of the abortion law and how to obtain a legal procedure are needed, because the Rwandan people are under the impression that abortion

is illegal under all circumstances (37). After allowing abortion to save the woman's life and health in Kenya in 2010, the access to PAC services has not improved (31), and the condition of the women admitted to hospital for complications after unsafe abortion are still severe (51). So even if making abortion legal on broad socioeconomic reasons is a well-documented and necessary measure to reduce the impacts of unsafe abortion, it seems equally important to ensure that every part of the population gets the right information and access to safe abortion services.

### 4.3 Maternal deaths from unsafe abortion in a restrictive law setting

When trying to estimate or calculate the incidence of induced abortion, the numbers are likely to be highly unreported in studies that measure abortion incidence using both indirect and direct techniques, and especially in settings where abortion is legally restricted (19). Legal abortions are authorized procedures and are, or should be, registered or recorded at the health facility where they are performed. Illegal abortions are often performed outside of the health facilities, and outside the boundaries of the law, and not recorded by any health professional or health facility. Thus, the incidence of induced abortion will have to be estimated in these countries with restrictive abortion laws (20). The same difficulties arise when you want to estimate the proportion of maternal deaths due to unsafe abortion in these settings. In a systematic analysis of global causes of maternal deaths, published in *The Lancet* in 2014, the estimated proportion of maternal deaths due to unsafe abortion in Sub-Saharan Africa was 9.6%, whereas the global estimate was 7.9% (16). The numbers from the studies presented in this current thesis all showed higher attributes, and most of them were over twice as high. These differences point in the direction that the estimated proportion of unsafe abortion deaths for Sub-Saharan Africa as a region may be underreported in the 2014-study. Hospital records are often used as a source of data to these estimates, and do most often not represent a complete picture of the situation. A study from Nigeria found a disparity between the hospital clinical diagnosis and autopsy diagnosis of cause of maternal death in 38% of the cases (41), while a study from Ghana comparing hospital records to verbal autopsies found a MMR of 357/100,000 live births, compared to 128/100,000 derived from hospital records (56). Many maternal deaths are

wrongly classified as due to the direct cause of sepsis or hemorrhage, when in fact they origin from unsafe abortion complications (66). These misinterpretations can be due to the woman's fear of being prosecuted for the crime of having had an abortion, or medical providers fear of having committed a crime by granting abortion in a legally restricted area (10). In a study from Zambia in which women were interviewed in a safe setting without fear of legal repercussions, 69% stated that they knew one or more women who had died from an unsafe abortion (67). This shows how estimated numbers can be highly underestimated.

#### 4.3.1 Health care and post-abortion services

For every woman treated for abortion complication in a health facility in Sub-Saharan Africa, there are many who don't seek medical care, either because they don't experience serious enough complications or lack of recognition of symptoms, or because of social stigma, fear of abuse, legal reprisals, inability to pay for the hospital stay or that they die before reaching hospital (2). Thus, the estimated number of abortion complications treated in health facilities does not represent the actual burden of unsafe abortion in a community. A high ACR suggests that women have good access to health facilities who offers PAC, but states simultaneously that there could be a high incidence of complications following an induced abortion, whether it is clandestine or not. Conversely, a low ACR could mean that there is a low proportion of women having complications after induced abortion, but also that there could be poor access to PAC and health facilities. Since hospitals tends to be located in urban centers, rural women have particularly poor access and are less likely to obtain care when they experience complications from abortion (6). In Ethiopia, the prevalence of high-severity abortion-related morbidity was lower in Addis Ababa than in the remainder of the country, probably because the access of health facilities who provides safe abortion services in the rural areas are negligible in contrast to the urban area of Addis Ababa (25).

#### 4.4 Ill-health resulting from unsafe abortion

Even though there is room for improvement in how to estimate both incidence and morbidity from unsafe abortion, we can all agree that there is a substantial proportion of post-abortion patients in these regions that experience severe symptoms and possible long-

term complications from unsafe abortion. As much as 5 million women is treated for abortion complications every year in developing countries (6), and every 8 minute a woman in a developing country will die from these complications (68). Just for comparison; the CFR for unsafe abortion in Sub-Sahara Africa is over 750 times greater than in the United States (470/100.000 vs. 0,6/100.000) (2). Sadly, there are limited research on long-term consequences, but a report from WHO estimated that millions of women worldwide are suffering from secondary infertility due to unsafe abortion (2). Chronic conditions such as fatigue, inflammation of the reproductive tract, chronic pelvic pain and pelvic inflammatory disease (PID) resulting from unsafe abortions may reduce the quality of life severely for the woman (2). In addition, women and their households may experience economic repercussions after being treated for unsafe abortion complications. In a study from Nigeria, the average cost of treating severe abortion complications was 74,407 Naira (US\$ 488) (69). The minimum monthly salary in Nigeria at the time of the study was 18,000 Naira (US\$ 118) (69). This is an enormous economic burden for these women and their families, and can be a contributing factor towards worsening their poverty status.

#### 4.4.1 The adolescent burden of unsafe abortion

Adolescents contributes to 25% of all unsafe abortions in Africa (5). Studies from both South-Africa and Zambia shows that a law change have had a positive impact on adolescent mortality and morbidity from unsafe abortion (24, 67). Given the high risks of both short-term and long-term consequences from unsafe abortion, it is a positive tendency that the adolescent population is benefitting from these law changes. A possible teenage pregnancy can cause the affected girl to be forced to drop out of school, and research show that adolescent, unmarried girls states possible loss of education as one of their main motivation for terminating a pregnancy (67). With the high numbers of adolescent unsafe abortion in Sub-Saharan Africa, this is a group that needs increased access to family planning services and contraceptive education to prevent teenage pregnancy and possible unsafe abortion complications.

## 4.5 Hope for the future

Women will continue to become pregnant, regardless of the status of the abortion laws in their country. Some of these pregnancies will always be unwanted, and some women will ultimately seek to terminate their pregnancy for a various number of reasons. Even if abortion is illegal in a country, there are still many preventions a nation can do to lower the risk of complications and death following an unsafe abortion.

### 4.5.1 Access to health care

One of the most important factors towards lowering the burden of unsafe abortion is to ensure access to facilities and trained providers who offer high-quality PAC in line with updated guidelines. Even in countries where abortion is allowed, restrictions of facilities and health personal shows to be great obstacles when a woman is seeking abortion. This is shown in India, where the country permits abortion on a broad range of socioeconomic reasons, but recent research are reporting that almost 60% of women are still having unsafe abortions due to lack of access to providers of PAC (70).

### 4.5.2 Access to contraceptives

Another important measure is to prevent the women of having an unwanted pregnancy in the first place. Access to family planning services and modern methods of contraception has proven to be very effective in lowering incidence of induced abortion and possible clandestine abortions, and research indicate that abortion is less common where contraceptive availability and use are widespread (18). For comparison; the contraceptive prevalence for any method was almost 90% in 2005 in Norway (71), and the current AR for this country is now historically low at 11/1000 women aged 15-49 (72) .

### 4.5.3 The human rights perspective

A woman's right to safe abortion is increasingly used as an argument for human rights. In 2005, The Human Rights committee ruled against the Peru for refusing a 15 year old girl, pregnant with an anencephalic fetus to have an abortion (73). The year after, The Inter-

American Commission on Human Rights ruled in favor of a 13-year-old Mexican girl who had been raped and denied access to abortion (74). The Mexican Government issued access to abortion for rape victims after this event. Advocacy for safe abortion as a human right will be an important measure towards eliminating this preventable cause of maternal death and suffering. Unsafe abortion is almost entirely preventable, and the tools are inexpensive and available. To address this unfortunate pandemic, political will has to be present to ensure that efforts are being made in the right direction.

#### 4.6 Limitations of the thesis

During the literature search process, it was not possible to find exact MeSH-headings that were representative for the main topics of this thesis. A manual, systematic search had to be done, which could mean that some articles that would have been relevant for this thesis could have been lost. In addition, some of the articles that was appropriate for this thesis, where not accessible through the University of Tromsø's online access. Mostly this was articles from African Journals that the University had not bought access to. It is possible that some key articles were not included in this thesis because of this restriction.

The different studies used different methods in how to estimate and calculate the incidence of induced abortion. Because the numbers were estimated, and reliable data and research for these countries are scarce, almost every estimate had wide confidence intervals. This shows that there is some degree of uncertainty in these numbers, although they are most likely underestimated due the legal restriction and social stigma of abortion in these regions. Some studies also used different age groups (15-44 vs. 15-49) when estimating both incidence of induced abortion and incidence of complications of induced abortions. This could have affected the incidence, but the proportion of women aged 45-49 having abortions or complications from abortions are so small that it probably would be a negligible difference when comparing numbers.

When estimating complication rates and maternal mortality, some of the studies where from tertiary referral hospitals, meaning that they treated the most difficult cases of

abortion complications. This could overestimate the rates of complication, the severity of complications, and the abortion-related maternal deaths. Also, these estimates varied greatly, both independent studies from the same nation, but also between countries. The varying rates can be attributed to the fact that most of these studies are based on scarce hospital-records, and often rural or tertiary hospitals as mentioned. Many of the studies estimating unsafe abortion deaths are small-scale, with limited number of patients. This means that the population in which these estimates and numbers are obtained from, does not necessarily represent the general population in the country. In addition, good quality data from rural areas in these countries are not available, giving a biased impression of the true burden of unsafe abortion and maternal mortality. Ultimately, and most importantly, lack of consistent data show that additional research is needed to ensure good-quality data for these vulnerable countries in Sub-Saharan Africa today.



## 5 Conclusion

Women in every part of the world will always be pregnant, and some will ultimately have abortions. Based on the studies investigated in this thesis, there is no evidence stating that having restrictive abortion laws in Sub-Saharan African countries will secure low AR. On the contrary, AR in a restrictive law setting in these countries continue to be high in comparison to countries with liberal abortion laws. The morbidity and mortality rates from unsafe abortion are also substantially higher in these regions compared to the rest of the world, with infection and/or sepsis being the main cause of complications and ultimately death. Although more and more Sub-Saharan African countries are liberalizing their abortion laws, or currently discussion a possible law change, the development towards improving women's reproductive health in these countries has been rather slow. This thesis has shown that a sudden law-change in a developing country with limited health resources and facilities who offers PAC, has little importance alone on public health, and most importantly maternal health. Access to high-quality health services and trained health providers, family-planning services, and information about where and when to obtain medical care are more important measures towards lowering morbidity and mortality from unsafe abortion.

Estimating abortion incidence, morbidity and mortality in a restrictive law setting is challenging, both because of the sensible nature of the subject, but also due to fear of repercussions for both the provider and the woman. The use of hospital data to estimate these numbers is not a reliable source in developing countries with poor resources, and incidences often tend to be underestimated. Increased research is essential in securing accurate data on this matter, and ultimately establish which interventions are needed to lower the burden of unsafe abortion in Sub-Saharan African countries.

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- 3. **Contract with the Supervisor**

## 1. Summary of original articles

Article number	First author	Name of study; Journal, year	Study design	Purpose	Study population	Results	Conclusion
1	H-M. Gebreselassie	Caring for women with abortion complications in Ethiopia: National estimates and future implications;  International perspectives on sexual and reproductive health, 2010	Cross-sectional study with indirect methods for analyzing	Explore the current burden of unsafe abortion and PAC in Ethiopia nationwide, after liberalizing their abortion laws	All women seeking post abortion care in 344 public and private health facilities, between 2007-2008	58.000 patients to post-abortion care, 41% with severe complications. CFR: 628/100.000	Still huge burden of unsafe abortions after liberalization of abortion laws. Strengthen PAC. Increased information to women about PAC and contraception.
2	S. Keogh	Incidence of induced abortion and post-abortion care in Tanzania;  PLOS one, 2015	Cross-sectional study with the AICM method for analyzing	Tanzania has the highest MMR in the world, mostly because of unsafe abortion. No study of incidence has been done before.	All women aged 15-49 treated for abortion complications in Tanzania in 2013 in 952 facilities	AR: 36/1000,  For every woman treated for PAC in a hospital, 6 is not.	Abortion rate is like other countries in the same region. Unmet need for better PAC-care

							and contraception usage.
3	L. Phiri	The severity of abortion complications in Malawi;  International Journal of Gynecology and Obstetrics (2015)	Prospective, cross-sectional study	To assess the severity of abortion-complications in Malawi and risk-factors	All women treated for abortion complications in 166 facilities in Malawi in 2009	27,4 % with severe and moderate complications (most from rural areas). Sepsis (13,7%) Retained products (12,7%) Fever (12,3%)	Advocacy is needed to influence policies to expand access to safe abortion services, also for rural areas.
4	E. Prada	Incidence of Induced abortion in Uganda 2013;  PLOS one, 2016	Cross-sectional with AICM-method	To estimate the proportion of unsafe abortion in 2013, after a study done in 2003	All women aged 15-49 treated for abortion complications in 418 Health Facilities in Uganda in 2013	AR: 39/1000, down from 51/1000 in 2003. Large differences between regions.	Increased use of contraception last decade, but still in need of more long-term methods, and safe PAC.
5	A. Bankole	The Incidence of Abortion in Nigeria;  Int. Perspect Sex Reprod Health, 2015	Cross-sectional study with AICM-method	To magnify abortion incidence in Nigeria where abortion laws is restrictive	All women aged 15-49 treated for abortion complications after induced abortion in	AR: 33/1000. 5,6/1000 treated for complications.	Still very high rates of unintended pregnancies, and unsafe abortions in Nigeria. Efforts

					2012 in 722 health facilities.		regarding access to safe abortion and PAC should be taken.
6	B. Levandowski	The incidence of Induced abortion in Malawi;  International Perspectives on Sexual and Reproductive Health, 2013	Cross-sectional study with the AICM-method	Abortion is legally restricted in Malawi, and no data are available on the incidence of the procedure.	All women aged 15-44 treated for abortion complications at 166 health facilities in 2009	AR: 23/1000 6.5/1000 treated for complications.	Unsafe abortion is common in Malawi, and interventions are needed.
7	S. Singh	The incidence of induced abortion in Uganda;  International Family Planning Perspectives, 2005	Cross-sectional study with the AICM-method	Although Uganda's law permits induced abortion only to save a woman's life, many women obtain unsafe abortions. No national quantitative studies exist.	All women aged 15-49 treated for abortion complications in 313 health facilities in 2003	AR: 54/1000 15/1000 treated for complications	Unsafe abortion exacts a heavy toll on women in Uganda. Increased access to contraceptives.
8	S. F. Mohamed	The estimated incidence of induced abortion in Kenya: a cross-sectional study;	Cross-sectional study with	The study aims to determine the incidence of induced	All women aged 15-49 treated for complications of	AR: 48/1000. 12/1000 treated for complications	Urgent need for improving safe abortion care.

		BioMed Central, 2015	the AICM-method	abortion in Kenya in 2012.	abortion in 328 facilities in 2012		
9	G. Sedgh	Estimates of the incidence of induced abortion and consequences of unsafe abortion in Senegal;  Int Perspect Sex Reprod Health, 2016	Cross-sectional study with AICM-method	Abortion is highly restricted by law in Senegal. No national estimate of abortion incidence exists.	All women aged 15-44 treated for abortion complications in 168 health facilities in 2012	AR: 17/1000. 16.700 treated for complications.	Reducing barriers to effective contraceptive use, and PAC without legal consequences.
10	P. Basinga	Abortion incidence and postabortion care in Rwanda;  Studies in family planning, 2012	Cross-sectional with AICM-method	Estimate the incidence of induced abortion, abortion is illegal in Rwanda.	All women aged 15-44 treated for abortion complications in 466 facilities in 2009	AR: 25/1000. 7/1000 treated for complications.	Urgent need to strengthen family planning services, legal abortion and PAC.
11	D. W. Geelhoed	Trends in maternal mortality: a 13-year hospital-based study in rural Ghana;  European journal of	Retrospective analysis	To measure the impact of Safe Motherhood Initiative since its start in 1987.	229 maternal deaths in a district hospital in rural Ghana between 1.	Overall maternal mortality rate did not change significantly during the period. However, the relative contributions of sepsis	Safe Motherhood Initiative has helped lower the causes against which interventions

		Obstetrics & Gynecology, 2002			January 1987 and 1. January 2000.	and hemorrhage diminished, while abortion complications increased significantly.	were directed, but abortion complications need to be included in these interventions.
12	E. Prada	Maternal Near-Miss due to Unsafe abortion and associated Short-term Health and Socio-economic consequences in Nigeria; Afr J Reprod Health, 2015	Cross-sectional study with prospective analysis	Little is known about maternal-near-miss due to unsafe abortion in Nigeria.	All women presenting with criteria for MNM in 8 large hospitals between July 2011 and January 2012.	137 MNM were identified, 9,5% due to unsafe abortion. Severe bleeding, pain and fever were the most common immediate abortion complications.	Unsafe abortion and delays in care are important contributors to MNM
13	F. Baiden	Unmet need for essential obstetric services in a rural district in northern Ghana: Complications of unsafe abortion remain a major cause of mortality; Public Health, 2006	A descriptive analysis and cross-sectional study	To review 4 years of hospital data on antenatal services, deliveries and maternal deaths as a baseline evaluation for a future program for intervention.	All women attending antenatal clinic in a rural hospital in Ghana over 4-year period from 2001-2003.	Unsafe abortion accounted for 29.1% of all maternal deaths.	High level of unmet need for essential obstetric services, including contraceptives.

14	R. Jewkes	The impact of age on the epidemiology of incomplete abortions in South Africa after legislative change;  BJOG: an international journal of obstetrics and gynecology (2005)	Multicentre, prospective, descriptive study	In 1996 termination of pregnancy was legalized in South Africa. This article examines the impact of age on the epidemiology of incomplete abortion after legislative change.	Stratified random sample of all hospitals treating gynecological emergencies in South-Africa. All women of gestation under 22 weeks who presented with incomplete abortion during three weeks of data collection in 2000.	No evidence of change in incidence of incomplete abortion, but teenagers more likely to be of low severity than women in their 30s. Increased proportion of cases with no signs of infection on admission (from 79-90%).	The 1996 legislation has had a positive impact on morbidity from incomplete abortion, especially among the young. Further reduction could be achieved with improved access to PAC.
15	H. Gebreselassie	The magnitude of abortion complications in Kenya;  BJOG: an international journal of Obstetrics and Gynaecology, 2005	Cross-sectional, retrospective descriptive study	To estimate and describe the magnitude of abortion complications presenting at public hospitals in Kenya.	Records of all women aged 15-49 presenting prior to 22 weeks with abortion-related complications at selected hospitals during a 3-week period in 2002.	3/1000 treated for abortion complications. CFR: 0,87%.	High rate of abortion-related mortality and morbidity highlights a critical need for change.



16	S. Singh	The estimated Incidence of Induced abortion in Ethiopia, 2008;  International Perspectives on Sexual and Reproductive Health, 2010	Cross-sectional, with the AICM-method	No national quantitative study of abortion incidence exists. In 2005 the penal code was revised to broaden the indications under which induced abortion is legal.	All women aged 15-44 treated for abortion complications in 2007-2008 from 347 health facilities.	AR: 23/1000. 27% of all abortions was performed legally. 3.2/1000 women treated for abortion complications.	Unsafe abortion is still common in Ethiopia. Need for access to PAC.
17	R. Jewkes	Prevalence of morbidity associated with abortion before and after legalization in South-Africa;  British Medical Journal, 2002	Cross-sectional	A repeat of a study done in 1994, to estimate prevalence of morbidity after legalization of abortion in South Africa	All women presenting with incomplete abortion under 22 weeks of gestation to all public hospitals in the nine provinces of South Africa during three weeks of 2000.	Incidence of incomplete abortion was 362 compared to 375 in 1994. There was 3 deaths in 1994, 1 in 2000.	Immediate decrease in morbidity after legalization, but the magnitude was not substantial. Still more interventions needs to be done.
18	Y. Gebrehiwot	Trends of abortion complications in a transition of abortion law revisions in Ethiopia;	Cross-sectional	This study aimed to assess the trend of hospital-based abortion complications	773 medical records of women with abortion	The overall and abortion-related maternal mortality ratios (AMMRs)	Decreased trends of AR and AMMR were identified, but the severity of

		Journal of Public Health, 2008		during the transition of legalization in Ethiopia in May 2005.	complications from 2003 to 2007	showed a non-statistically significant downward trend over the 5-year period. The CFR of abortion increased from 1.1% in 2003 to 3.6% in 2007	abortion complications and the case fatality rate increased during the transition of legal revision.
19	A. Ziraba	Unsafe abortion in Kenya: a cross-sectional study of abortion complication severity and associated factors;  BMC Pregnancy and Childbirth, 2015	Cross-sectional prospective study	Complications due to unsafe abortion cause high maternal morbidity and mortality, especially in developing countries. This study describes post-abortion complication severity and associated factors in Kenya.	2,625 women presenting with abortion complications in 326 health facilities in 2012	Over three quarters of abortions clients presented with moderate or severe complications.	Moderate and severe post-abortion complications are common in Kenya and a sizeable proportion of these are not properly managed. Targeted interventions are needed.

20	L. C. Ikeako	<p>Patterns and outcome of induced abortion in Abakaliki, southeast of Nigeria;</p> <p>Annals of Medical and Health sciences research, 2014</p>	A descriptive retrospective study	The aim of this study is to determine the pattern of unsafe abortion and the extent to which unsafe abortion contributes to maternal morbidity and mortality in our setting as well as assess the impact of post-abortion care	Patients who were admitted for complications following induced abortions between January 1, 2001 and December 31, 2008 at the Federal Medical Center, South East of Nigeria	<p>83 patients presented with complications arising from induced abortion. Adolescents constituted 32.5%. Nearly 15.7% of these patients died while the remaining 84.3% had various complications, which were mainly septicemia 59.0%, anemia 47.0%, peritonitis 41.0%, hemorrhages 34.9% and uterine perforation 30.1%. Abortion related deaths accounted for 34.2% of these gynecological deaths.</p>	Unsafe abortion remains one of the most neglected sexual and reproductive health problems in developing countries today. Solutions include access to safe and sustainable family planning methods
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21	E. E. Nwogu-Ikojo	Abortion-related mortality in a tertiary medical centre in Enugu, Nigeria;  Journal of Obstetrics and Gynaecology, 2009	Retrospective descriptive analysis	This study aims to identify maternal characteristics, abortion types, provider characteristics, complications and causes of death	Cases of abortion-related maternal deaths from January 2000 to December 2005 at the University of Nigeria Teaching Hospital, Enugu, Nigeria.	Abortion-related mortality accounted for 11.8% of all maternal deaths. Three (27.3%) were teenagers. The cause of death was sepsis and hemorrhage in eight (72.7%) and three (27.3%) of the women, respectively.	Abortion-related mortality is a major contributor to maternal mortality in this study. Improved access to family planning and reproductive health services may reduce abortion-related maternal deaths.
22	P. Bergsjø	Recording of maternal deaths in an East-African University Hospital;  Acta Obstetrica et Gynecologica, 2010	Descriptive, retrospective study	To trace all maternal deaths at a tertiary East African university hospital with a systematic registration of all births	119 cases of maternal death which occurred in the period from 2000 to 2007	There was considerable under-reporting of deaths in the medical birth registry. 14/119 died of unsafe abortion. 20/ 119 mothers died before 23 weeks' gestational age, most	Extending the birth registry monitoring system to all health institutions with obstetrical services in a region will give more reliable estimates to be

						of them of unsafe abortion.	followed over time.
23	S. K. Gumanga	Trends in maternal mortality in Tamale Teaching Hospital, Ghana;  Ghana medical journal, 2011	Retrospective descriptive study	To determine the yearly maternal mortality ratio over the period 2006-2010 and trends in the causes of maternal deaths.	139 audited maternal deaths from 2008-2010 at the Tamale Teaching Hospital in Ghana.	The maternal mortality ratio dropped from 1870 per 100,000 live births in 2006 to 493 per 100,000 live births in 2010, a fall of nearly 74%. The main causes of 139 audited maternal deaths from 2008 to 2010 were sepsis (19.8%) hypertensive disorders(18.6%), haemorrhage (15.8%), unsafe abortion (11.5%), obstructed labour (5.7 Nearly 50% of the maternal deaths were aged 20-	There has been significant reduction in maternal mortality at the Tamale Teaching Hospital, it is however still unacceptably high.

						29 years and about 10% were 14-19 years.	
24	P. M. Tebeu	Maternal mortality in Cameroon: a university teaching hospital report;  Pan African Medical Journal, 2015	Case-control study	There is insufficient information on the risk factors of maternal mortality in Cameroon. This study aimed at establishing causes and risk factors of maternal mortality.	Cases were maternal deaths; controls were women who delivered normally in the period of 1st January 2006 to 31st December 2010 at a University Teaching Hospital.	Causes of deaths were: postpartum hemorrhage (25%), unsafe abortion (25%), ectopic pregnancy (12.5%), hypertension in pregnancy (8.3%), malaria (8.3%), anemia (8.3	The risk factor directly associated with maternal death in our study was the non-attendance at antenatal care. We recommend further studies for better understanding of maternal mortality issue in Cameroon.
25	S. K. Henshaw	Severity and costs of unsafe abortion complications treated in Nigerian hospitals;  International Family	Descriptive retrospective study	Each year, thousands of Nigerian women have unintended pregnancies that end in illegal abortion. This study aimst to better understand morbidity	Between 2002–2003, a survey of all women admitted for treatment of abortion, and those seeking termination of pregnancy in 33	Among women admitted for abortion-related reasons, 36% had attempted to end the pregnancy before coming to the hospital. Of women	Policy and program interventions are needed to improve access to contraceptive services and PAC

		Planning Perspectives, 2008		resulting from unsafe abortion in this area.	hospitals in eight states across Nigeria	with serious complications, 24% had sepsis, 21% pelvic infection and 11% instrumental injury; 22% required blood transfusion.	to reduce abortion-related morbidity and mortality.
26	C. Rossier	Estimating clandestine abortions with the confidants method – results from Ougadougou Burkina Faso;  Social Science & Medicine, 2006	Quantitative study, cross-sectional with confidants-method	Data on abortion in Sub-Saharan Africa is rare and non-representative. This study presents a new way to estimate induced abortion.	A survey of 963 women aged 15-49 in Ougadougou in 2001 was interviewed.	AR: 40/1000 aged 15-49. 60% experienced adverse health effects, and 14% ended in hospital. About 1000 treated for induced abortion in hospital annually.	The confidants method, similar to the sisterhood method, might generate accurate estimates of illegal abortion in certain contexts.
27	C. B. Polis	Incidence of induced abortion in Malawi, 2015;  PLOS one, 2017	Cross-sectional study with AICM-method	Malawians are currently debating whether to provide additional exceptions under which an abortion may be legally obtained. Most induced abortions in	All women treated for abortion complications in 202 facilities in Malawi from October to December 2015	AR: 38/1,000 women aged 15–49 which varied by geographical zone.	The estimated abortion rate in 2015 is higher than in 2009 (potentially due to methodological differences). Our findings should

				Malawi are performed under unsafe conditions, contributing to Malawi's high maternal mortality ratio.			inform ongoing efforts to reduce maternal morbidity and mortality and to improve public health in Malawi.
28	G. O. Ibgerase	Maternal mortality in a rural referral hospital in the Niger Delta, Nigeria;  Journal of obstetrics and gynecology, 2007	Retrospective, descriptive study	To determine the incidence and causes of maternal mortality in a rural referral hospital in Nigeria	An audit of 115 consecutive maternal mortalities of a 10-year period at a rural-based tertiary hospital.	MMR: 2232/100.000 live births. Abortion accounted for 22.6% of deaths.	Maternal mortality will continue to increase unless appropriate steps are taken to improve the use of antenatal care.
29	A. Ziraba	Maternal mortality in the informal settlements of Nairobi city: what do we know;  Reproductive Health, 2009	Retrospective descriptive analysis	A major challenge to effective monitoring of maternal deaths in developing countries is lack of reliable data. This paper aims to	Verbal autopsy interviews on nearly all female deaths aged 15-49 between jan. 2003 and dec. 2005 in	MMR: 706/100.000 live births. Major causes: abortion complications (31%), hemorrhage (13,8%),	Urgent need to address burden of unwanted and unsafe abortions among urban poor. Verbal



				estimate the burden and identified causes of maternal mortality in to slums of Nairobi, Kenya.	two slum communities in Nairobi, Kenya.	sepsis (10%) , eclampsia (7%).	autopsy give a better capture of abortion deaths than facility records.
30	P. Thonneau	Determinants of maternal deaths in induced abortion complications in Ivory Coast;  Contraception, 2004	Cross-sectional, retrospective study	Persistently high levels of maternal mortality have been reported in Ivory Coast, high prevalence of deaths related to induced abortion.	Women admitted for abortion complications during the first 6 months of 1999 at four reference hospitals throughout Ivory Coast.	60% induced the abortion themselves at home. CFR for the hospital was 5.5%.	While waiting on a law change, there is an urgent need to improve PAC.
31	G. Y. K. Ganyaglo	A 6-year (2004-2009) review of maternal mortality at the Eastern Regional Hospital, Koforidua, Ghana;  Seminars in Perinatology, 2012	Descriptive, retrospective study	The study aims to establish the trend of maternal deaths, and determine causes.	All maternal deaths in 1 of 10 regional hospitals in Ghana in the period 2004-2006.	MMR: 957/100.000 live births. Main causes were post-partum hemorrhage (22.5%), abortion (19.3%), hypertensive disorders in pregnancy (17.8%).	Timely referral of patients to hospital could help reduce preventable maternal deaths.

32	N. Goyaux	Complications of induced abortion and miscarriage in three African countries: a hospital-based study among WHO collaborating centers;  Acta Obstet Gynecol Scand, 2001	Prospective, descriptive study	To describe two of the outcomes of pregnancy, induced abortion and miscarriage in three African countries; Benin, Cameroon and Senegal.	Medical files of 1957 women admitted to participating health care structures in these countries.	26 maternal deaths was identified, 22 of them due to of unsafe abortion. Infection was the most important risk factor for death.	This study highlightst the Importance of effective emergency services, to help reduse maternal deaths.
33	J. Adomako	Community-based surveillance of maternal deaths in rural Ghana;  Bull World Health Organ, 2016	Retrospective, cross-sectional descriptive study	To examine the feasibility and effectiveness of community-based maternal mortality surveillance.	Interviews of family member of women of reproductive age who died in Bosomtwe district the previous five years. Verbal autopsies were done if there was a positive answer to at least one yes-no-question.	108 verbal autopsies found that 64 women had a maternal death, and the most common causes was hemorrhage (15) and abortion (14). MMR: 357/100.000 live births, compared with 128/100.000 derived from hospital records.	This method for identification of maternal deaths was effective in contrast to hospital records.

34	A. Dinyain	Autopsy-certified maternal mortality at Ile-Ife, Nigeria;  International Journal of Women's Health, 2014	Descriptive, retrospective study	To accurately determine the causes of maternal death as seen in a tertiary health facility in Nigeria	All maternal deaths at the selected health facility over a 5-year period between 2005 and 2009 in Ile-Ife, Nigeria.	84 maternal deaths were used for this study. Leading causes were obstetric hemorrhage (30,9%), complications of abortion (23,8%), and non-genital infection (14,2%). MMR: 1713/100.000	Leading causes of maternal mortality are similar to those in other developing countries.
35	E. Somigliana	A comprehensive and integrated project to improve reproductive health at Oyam district, northern Uganda: insights from maternal death review at the district hospital;  Arch Gynecol Obstet, 2011	A prospective, descriptive study	To assess the benefits and limits of an integrated and comprehensive project for reproductive health in northern Uganda.	All maternal deaths occurring at the district hospital from 1. April 2009 to 31. March 2010.	17 cases was recorded. Post-partum hemorrhage in 5 cases, abortion-related causes in 5 cases, eclampsia in 2 cases.	Three main targets for future inventions were identified; improving the quality of assistance in the health centers, implementing an emergency room service at the hospital and

							counteract unsafe abortion.
36	I. A. O. Ujah	Maternal mortality among adolescent women in Jos, north-central, Nigeria;  Journal of Obstetrics and Gynaecology, 2005	Descriptive, retrospective study	To determine the magnitude, characteristics and risk factors for maternal deaths in the adolescent women of Jos.	All adolescent women (10-19) dying in pregnancy and childbirth of Jos University Teaching Hospital between January 1991 and December 2001.	Adolescent maternal death accounted for 11.8% of all maternal deaths. Unsafe abortion was the leading direct cause of adolescent maternal death (37%), followed by eclampsia and sepsis (26.3% each).	Aggressive and sustained social programs should be developed to discourage early marriage and early pregnancy. Liberalization of abortion laws in Nigeria is advocated.
37	A. O. Fabamwo	Correlates of abortion related maternal mortality at the Lagos State University Teaching Hospital, Ikeja;	Descriptive, retrospective study / case-control-study	To highlight the probable correlates of mortality among patients managed for abortion related complications at a	All admitted cases of induced abortion between 1st of January 2000 and 31st of December 2003 at Department of Obstetrics and	Abortion-related deaths accounted for 24,7% of all 158 maternal deaths occurring in the study period. CFR=11.5%. All abortion related	Restrictive laws in Nigeria needs to be liberalized. Increased access to contraceptive services is an

		African Journal of Reproductive Health, 2009		University Teaching Hospital in Nigeria.	Gynecology of the Lagos State University Teaching Hospital, Ikeja, Nigeria. Study subjects were patients who died while under care, and survivors served as controls.	deaths followed induced abortion. The survivors often had minor complications like anemia, retained products and PID, while the fatalities had mainly multiple complications like hemorrhagic shock, septicemia and bowel injuries.	important measure.
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## 2. Summary of GRADE

<b>Reference:</b> Singh S, Fetters T, Gebreselassie H, Abdella A, Gebrehiwot Y, Kumbi S, et al. The Estimated Incidence of Induced Abortion in Ethiopia, 2008. <i>International Perspectives on Sexual and Reproductive Health</i> . 2010;36(1):16-25			<b>GRADE Low/moderate</b> ☺(☺)
			<b>Documentation</b> III
			<b>Recommendation</b> C
Purpose	Material and Methods	Results	Discussion and comments
<p>To estimate abortion incidence in Ethiopia, to shed light on the extent to which unsafe abortion is occurring and estimate the level of use of legal abortion procedures following the 2005 change in the abortion law and 2006 Ministry of Health (MOH) safe abortion guidelines.</p>	<p><i>Study design:</i> Cross-sectional, prospective. This study uses an indirect method for estimating abortion incidence in a legally restricted area; Abortion Incidence Complication Method (AICM).  <i>Sampling:</i> A National representative survey of a sample of 347 health facilities (HFS) that provide post abortion care (PAC), and a survey of 80 health professionals (HPS) knowledgeable about PAC. Sample period was Nov. 2007 – March 2008. <i>Inclusion:</i> Facilities who provide treatment for abortion complications or PAC. <i>Exclusion:</i> Health posts, health stations, and medium- and low-level private clinics, and facilities who did not provide PAC.</p>	<p>The annual rate of women treated in health facilities for abortion complications was 3.5/1000 women aged 15-44, while the rate of women treated for complications for induced abortion was 3.2. Higher rates in the urban areas versus the rural areas. Urban women are more likely to obtain abortion from a health worker than rural women.</p>	<p><i>Defined population:</i> Yes, both women aged 15-44 treated for abortion complications in sampled facilities during the sampling time, and health facilities.  <i>Is the selection representative for the population:</i> Yes, both rural and urban areas studied, but rural women less access to health facilities? Both public, private hospitals included.  <i>Does responders deviate from not-responders:</i> Yes, facilities with no PAC, women with miscarriages.  <i>Response rate:</i> 88%  <i>Standardized data analysis:</i> Yes  <i>Objective criteria of outcome:</i> Yes, abortion rates and ratios, percentages.  <i>Adequate methods in computer analysis:</i> Yes</p>
<p><b>Conclusion</b></p> <p>Unsafe abortion is still common, and exacts a heavy toll on women in Ethiopia. Increased access to high-quality contraceptive care and safe abortion services is needed to reduce unsafe abortion and unplanned pregnancy.</p>	<p><i>Study Population:</i> All women aged 15-44 treated for complications of induced abortion during the sample period, in 347 health facilities.  <i>Calculations and statistics:</i> Weights were calculated for each stratum based on the sample fraction and the level of nonresponse; the data were adjusted for strata that contained few eligible or participating facilities. The AICM where applied to calculate the abortion incidence, by first estimate the annual number of women treated for induced abortion complications, by removing the estimated number of women treated for complications from miscarriages from the total number of women treated for all abortion complications. Then, a multiplier is added, derived from the HPS, to account for all the women who had induced abortions, but did not obtain care at a health facility.  <i>Outcome measures:</i> Abortion rates, abortion ratios and unintended pregnancy rates for the nation and major regions.</p>	<p>Abortion incidence was estimated to be 23/1000 women aged 15-44 (range of 20-26). 13/100 live births. Incidence varied across regions, twice as high rate in the capital vs. other areas.</p> <p>Legal abortions accounted for 27% of all induced abortions that year (2008). Incidence of facility-based legal abortion was 6/1000 women aged 15-44, with almost zero in rural areas. There was a slightly decline in unwanted pregnancies the last five years, from 37% to 35%. The rate of unintended pregnancy in 2008 was 101/1000 women.</p>	<p>The patterns of reproductive behavior in Ethiopia supports the finding in the study. Increased use of contraceptives, and a desire for smaller family sizes. The abortion incidence in the capital was high, more women seek abortion there from the surrounding areas. Total fertility rate (TFR) in urban areas lower than rural areas, consistent with the findings on induced This is the first nationwide estimate; no conclusions can be drawn on overall trends. Still, more than half of all abortions in 2008 resulted in complications, unmet need for PAC (only ¼ who need treatment for complications receive it), and family planning services.</p> <p><i>Strengths:</i> Well documented method for estimating (AICM), defined populations, adjusted for confounding in sampling, confounding factors opposite  <i>Weaknesses:</i> Estimated numbers, depend on respondents' perceptions to calculate multiplier (HPS), incomplete official records to base estimates.</p>
<p><b>Country</b></p> <p>Ethiopia</p>			
<p><b>Year of Data sampling:</b></p> <p>2008</p>			

<b>Reference:</b> Mohamed SF, Izugbara C, Mutua M, Kimani-Murage EW, Ziraba AK, Egesa C, et al. The estimated incidence of induced abortion in Kenya: A cross-sectional study. BMC Pregnancy and Childbirth. 2015;15(1)		<b>GRADE</b> Low/moderate ☺ (☺)	
		<b>Documentation</b>	<b>III</b>
		<b>Recommendation</b>	<b>C</b>
<b>Purpose</b>	<b>Material and Methods</b>	<b>Results</b>	<b>Discussion and comments</b>
To present estimates of the national and regional incidence of induced abortion in Kenya in 2012, due to unacceptably high maternal mortality. Also, Kenya has a restrictive abortion law, only to preserve health.	<i>Study design:</i> Cross-sectional, prospective. This study uses an indirect method for estimating abortion incidence in a legally restricted area; Abortion Incidence Complication Method (AICM). <i>Sampling:</i> Stratified random sampling approach was used to select health facilities. A national representative survey of a sample of 328 health facilities (HFS) that provide post abortion care (PAC), 326 facilities conducted surveys of patients seeking post-abortion care over a 30-day period (PMS), and a survey of 124 health professionals (HPS) knowledgeable about PAC. <i>Inclusion:</i> Facilities who provide treatment for abortion complications or PAC, level V and VI facilities. <i>Exclusion:</i> Facilities who did not provide PAC, unwillingness to participate/answer survey-questions <i>Study Population:</i> All women aged 15-49 treated for complications of induced abortion during the sample period in 328 facilities in 2012. <i>Calculations and data:</i> The AICM was applied to calculate the abortion incidence, by first estimate the annual number of women treated for induced abortion complications, by removing the estimated number of women treated for complications from miscarriages from the total number of women treated for all abortion complications. Then, a multiplier is added, derived from the HPS, to account for all the women who had induced abortions, but did not obtain care at a health facility. <i>Outcome measures:</i> Abortion numbers, rates, ratios and unintended pregnancy rates for the nation and five geographical regions.	12/1000 women aged 15-49 received health care for unsafe abortion complications in Kenya in 2012. Variations in regions from 5-16.  A national rate of induced abortion was estimated to be 48/1000 women aged 15-49. The incidence varied across regions. One in three pregnancies ends in abortion (abortion ratio 30/100 live births).  Highest abortion rate among women aged 20-24.  49% of all pregnancies was unintended, and unintended pregnancy rate was 120/1000 women aged 15-49; 41% of pregnancies ended in abortions.	<i>Defined population:</i> Yes, both women aged 15-49 treated for abortion complications in sampled facilities during the sampling time, and health facilities also sampled. <i>Is the selection representative for the population:</i> Yes, variation in facilities. Both public, private and private-for-profit and non-profit. Women included are representative, though rural women perhaps not well enough represented because of access? <i>Does responders deviate from not-responders:</i> Yes, facilities with no PAC, women with miscarriages. <i>Response rate:</i> 94% <i>Standardized data analysis:</i> Yes <i>Objective criteria of outcome:</i> Yes, abortion rates and ratios, unintended pregnancy rates. <i>Adequate methods in computer analysis:</i> Yes  This study is the first nationally-representative estimate of induced abortion in Kenya. The abortion rate is higher than the whole Eastern region, and Ethiopia, Malawi, Rwanda and Burkina Faso. The new abortion law (2010) has not translated into improved service delivery. Women are unsure of the interpretation of the new law, and their rights. National policy priorities are not in line with women's health needs. <i>Strengths:</i> Well documented method for estimating (AICM), population representative, confounding factors opposite, large number in facilities sampled and good response-rate <i>Weaknesses:</i> Estimated numbers with AICM, distinguish between spontaneous and induced abortion, the HPS and interpretations done by these key informants could be biased.
<b>Conclusion</b>	This study provides the first nationally-representative estimates of incidence of induced abortion in Kenya. Urgent need exists for improving facilities capacity to provide safe PAC. All efforts should be made to address underlying factors to reduce risk of unsafe abortion.		
<b>Country</b>	Kenya		
<b>Year of data sampling:</b>	2012		

**Reference:** Ziraba AK, Izugbara C, Levandowski BA, Gebreselassie H, Mutua M, Mohamed SF, et al. Unsafe abortion in Kenya: a cross-sectional study of abortion complication severity and associated factors. BMC pregnancy and childbirth. 2015;15(1):34

**GRADE Moderate** ☺ ☺

<b>Documentation</b>	<b>III</b>
<b>Recommendation</b>	<b>C</b>

Purpose	Materials and Methods	Results	Discussion and Comments
<p>Complications due to unsafe abortion cause high maternal morbidity and mortality, especially in developing countries. This study describes post-abortion complication severity and associated factors in Kenya, to inform policy, planning and implementation of interventions.</p>	<p><i>Study design:</i> Cross-sectional, prospective study.  <i>Sampling:</i> 30-day prospective abortion-related survey conducted in a nationally-representative sample of health care facilities in Kenya. The sample was selected from a master list of all facilities in Kenya and stratified on the level of service and geo-political region. 350 facilities sampled, 326 participated. <i>Inclusion:</i> All level V-VI facilities, and a random sample of Level II-IV facilities. <i>Study Population:</i> All women presenting at participating facility for termination of pregnancy (TOP) (n=528) or treatment for abortion complications with a gestational age less than 24 weeks (n=2625). <i>Calculations and data:</i> The study population was interviewed, and data collected was socio-demographic characteristics, complaints, history of interference with pregnancy, symptoms, diagnoses, procedures and final clinical outcome. Descriptive (with chi-squared for the various variables) and multivariate analyses (factors associated with levels of complication severity). Ordered logistic regression used since the dependent variable (severity level) has three ordinal categories (mild, moderate, severe). <i>Outcome measures:</i> Abortion complication severity level, and case-fatality-rate (socio-demographic characteristics), estimates of annual deaths due to unsafe abortion, evacuation procedures. <i>Confounding:</i> Multivariate analyses performed to assess factors associated with level of severity, randomized selection of sample facilities.</p>	<p>40,1% and 37,1% of women with abortions had moderate and severe post-abortion complications, respectively. Divorced women, students, farmers/unskilled women had sign. higher proportion of severe compl. compared to other categories.</p> <p>65% were managed with MVA. Odds of having moderate and severe complications for mistimed pregnancies were 43% higher than for wanted pregnancies. Women who reported inducing the abortion had 2.4 times higher odds of having a severe complication compared to those who reported that it was spontaneous. Women who had a delay of more than 6 hours to get to a health facility had at least 2 times higher odds of having moderate/severe complications compared to those who sought care within 6 hours from onset of complications.</p> <p>The health-facility-based CFR was 266 deaths per 100.000 post-abortion care clients.</p>	<p><i>Defined population:</i> Yes, both facilities and women are predefined.  <i>Is the selection representative for the population:</i> Partly, the selection of facilities are sampled and randomized. The population of women are only women presenting at hospitals, which may not be representative for the whole population.  <i>Does responders deviate from not-responders:</i> No  <i>Response rate:</i> 93%  <i>Standardized data analysis:</i> Yes  <i>Objective criteria of outcome:</i> Yes, severity-categories, and rates/ratios  <i>Adequate methods in computer analysis:</i> Yes</p> <p>Over ¾ of women in Kenya seeking PAC had moderate to severe complications, ranging from peritonitis to sepsis and death. Higher proportion than Malawi and Ethiopia, and higher than estimates from 2002 (44% moderate and severe combined), although possible selection bias from the older study. Some of the factors associated with more severe forms of complications are amendable to intervention from the community and health provider perspectives.  <i>Strengths:</i> Randomized sampling, assessed for confounding in methods, no selection bias (both public and private facilities represented), did not rely on medical records – prospective in nature,  <i>Weaknesses:</i> Facility-based data, it did not account for the women with complications who did NOT present at a facility</p>
<p><b>Conclusion</b></p> <p>Moderate and severe post-abortion complications are common in Kenya and a sizeable proportion of these are not properly managed. Factors such as delays in seeking care, interference, unwanted pregnancies are important determinants of complication severity.</p>			
<p><b>Country</b></p> <p>Kenya</p>			
<p><b>Year of data sampling:</b></p> <p>2012</p>			

**Table 1 Classification of abortion complication severity level based on symptoms and clinical findings among women with abortion complications, Kenya 2012**

Level of morbidity severity	Symptoms and signs
Severe (requires at least one criteria)	Death Sepsis Temperature >37.9 degrees Celsius Evidence of mechanical injury/foreign body Shock Pulse >119 beats/minute Organ or system failure Generalized peritonitis Tetanus
Moderate (requires at least one criteria if subject isn't in severe)	Offensive products of conception Temperature 37.3-37.9 degrees Celsius Localized peritonitis (tender uterus, discharge)
Low morbidity	Temperature <37.3 degrees Celsius No signs of infection No system or organ failure

Note: A woman may have presented with several of these signs. For purposes of classification, complications in the most severe category determined the severity category a woman was assigned to. Adapted from: Rees et al. [15].



<b>Reference:</b> Dinyain A, Omoniyi-Esan G, Olaofe O, Sabageh D, Komolafe A, Ojo O. Autopsy-certified maternal mortality at Ile-Ife, Nigeria. International Journal of Women's Health. 2013;2014(default):41-6.			<b>GRADE</b> Low
			<b>Documentation</b> III
			<b>Recommendation</b> C
Purpose	Material and Methods	Results	Discussion and Comments
Maternal mortality is a major health problem, especially in Nigeria, where accurate autopsy-based data on the prevalent causes are not readily available. The aim of this study was to accurately determine the causes of maternal death as seen in a tertiary health facility in Nigeria.	Study design: Retrospective, descriptive study <i>Sampling period and place:</i> 1. January 2005 to 31. December 2009 at the Department of Morbid Anatomy and Forensic Medicine, at OAUTHC hospital in Ile-Ife. <i>Inclusion:</i> Those that satisfied WHO's definition of maternal death. <i>Exclusion:</i> Incomplete clinical and/or autopsy information. <i>Study Population:</i> All autopsies of maternal deaths at OAUTHC during the sampling period. At OAUTHC, all cases of pregnancy-related deaths undergo a full postmortem autopsy. <i>Calculations and data:</i> Data was obtained from the department autopsy records and register, and the patient's clinical notes. Age, parity, occupation, gestational age, delivery, clinical diagnosis, anatomical diagnosis was extracted. The patients were grouped into different parity groups, and compared to various causes of maternal death. Univariate analysis and Chi-square analysis performed. <i>Outcome measures:</i> Direct or indirect cause of death. Further classification of direct maternal deaths; 1) Obstetric hemorrhage, 2) Complications of labor, 3) Complications of unsafe abortion. Indirect causes classified as anemia, neoplasms, preexisting hypertension and non-genital infections. Presented in frequencies and percentages. <i>Confounding:</i> One large hospital, selection bias?	A total of 1969 autopsies were performed in the OAUTHC Department of Morbid Anatomy and Forensic Medicine. A total of 128 maternal deaths occurred during 7472 live births; MMR of 1713/100.000 live births for this hospital.  128 maternal deaths during the period, autopsies performed on 102, only 84 had complete clinical and autopsy information and included. 71.4% direct causes and 28.6% indirect causes of maternal deaths. Overall, three leading causes of maternal deaths: obstetric hemorrhage (30.9%), complication of abortion (23.8%), complication of labor (11.7%) and non-genital infections (14.2%). Of direct causes: Obstetric hemorrhage and abortion most important. Of indirect causes: Non-genital infections and anemia most important. 33.3% of all maternal deaths due to infectious diseases.  Mean age 27.9 (+/- 7,5 year). 40% of unsafe abortion deaths occurred in the age groups 20-24.  Complications of abortion were predominantly due to post abortion sepsis (55.0%), severe hemorrhage (25.0%) and uterine perforation (20.0%). All deaths from unsafe abortion occurred in the first (45.0%) and second (55.0%) trimester.  There was a disparity between clinical diagnosis and autopsy diagnosis in 38.2% of cases.	<i>Defined population:</i> Yes, all autopsies <i>Is the selection representative for the population:</i> Unclear, the autopsies were done on maternal deaths at Nigeria's largest tertiary referral hospital. <i>Response rate:</i> Not relevant <i>Standardized data analysis:</i> Yes <i>Objective criteria of outcome:</i> Yes <i>Adequate methods in computer analysis:</i> Yes  Direct causes accounted for the vast majority of maternal deaths (71.4%). Obstetric hemorrhage the single most frequent cause of maternal death overall.  Complications of unsafe abortion remain a major cause of maternal mortality in developing countries, due to the fact that abortion is illegal in most of such countries. The types of complications (sepsis, hemorrhage, uterine perforation) suggest use of unqualified personal or inappropriate care centers. Also most of the women affected were young.  Poverty and poor education are well-known to contribute to maternal mortality. 70% of maternal deaths in this study occurred among the unskilled, unemployed and student populations.  Strengths: Large sample time (5 years), autopsies validating Weaknesses: Nigeria's largest tertiary referral hospital, not representative population,
Conclusion	The leading causes of maternal death in this study are similar to those in other developing countries. Autopsy is an invaluable tool in accurately determining the cause of maternal death.		
Country	Nigeria		
Year of data sampling:	2005-2009		

<b>Reference:</b> Polis CB, Mhango C, Philbin J, Chimwaza W, Chipeta E, Msusa A. Incidence of induced abortion in Malawi, 2015.(Research Article). PLoS ONE. 2017;12(4):e0173639.		<b>GRADE</b> Low/moderate ☺ (☺)	
		<b>Documentation</b> III	
		<b>Recommendation</b> C	
Purpose	Material and Methods	Results	Discussion and comments
Malawians are currently debating whether to provide additional exceptions under which an abortion may be legally obtained. Most induced abortions in Malawi are performed under unsafe conditions, contributing to Malawi's high maternal mortality ratio. This study aims to determine the current estimates of induced abortions in Malawi.	<i>Study design:</i> Cross-sectional, prospective. This study uses an indirect method for estimating abortion incidence in a legally restricted area; Abortion Incidence Complication Method (AICM). <i>Sampling:</i> Stratified random sampling approach was used to select health facilities. A national representative survey of a sample of 202 health facilities (HFS) that provide post abortion care (PAC), and a survey of 124 key informants (KIS) knowledgeable about PAC. Sampling period was October to December 2015. <i>Inclusion:</i> Facilities who provide treatment for abortion complications. <i>Exclusion:</i> Facilities who did not provide PAC, facilities who were too specialized to provide PAC, refusing to participate, not enough staff members <i>Study Population:</i> All women aged 15-49 treated for complications of induced abortion during the sample period in 202 health facilities.	PAC caseload of 14/1000 women aged 15-49.  Urban non-poor women obtain abortions from doctors etc. more than poor women, and self-induce less than poor women. Poor and rural women see traditional healers more than urban women. Fewer complications from obtaining abortions from doctors vs. traditional healers and self-induction. 38% of women having induced abortions were treated at health facilities.	<i>Defined population:</i> Yes, both women aged 15-49 treated for abortion complications in sampled facilities during the sampling time, and health facilities. <i>Is the selection representative for the population:</i> Yes, both rural and urban areas studied, both in health facilities and women urban/rural, poor/non-poor. <i>Does responders deviate from not-responders:</i> Yes, facilities with no PAC, more specialized, women with miscarriages. <i>Response rate:</i> 88% <i>Standardized data analysis:</i> Yes <i>Objective criteria of outcome:</i> Yes, abortion rates and ratios, percentages. <i>Adequate methods in computer analysis:</i> Yes
<b>Conclusion</b>	<i>Calculations and data:</i> The AICM where applied to calculate the abortion incidence, by first estimate the annual number of women treated for induced abortion complications, by removing the estimated number of women treated for complications from miscarriages from the total number of women treated for all abortion complications. Then, a multiplier is added, derived from the KIS, to account for all the women who had induced abortions, but did not obtain care at a health facility. Taylor linearized variance estimating to calculate CIs. <i>Outcome measures:</i> Abortion numbers, rates, ratios and unintended pregnancy rates for the nation and five geographical regions. <i>Confidants:</i> Sampling, avoided double-counting, miscarriages, respons rate varied among regions	The greatest proportion having no complications following an unsafe abortion was among urban non-poor women, smallest among rural poor women. 38/1000 women aged 15-49. Variations between regions. Pregnancy rate of 238/1000 women aged 15-49. Unintended pregnancy rate was 126/1000, thus 53% are unintended. 30% ended in abortion.	Updates estimates of induced abortion in Malawi from a study done in 2009, the current incidence is substantially higher than the previous estimate, but similar to nearby countries. Although the studies from Malawi used the same AICM approach, some differences in sampling and calculation exists. Thus, it is difficult to compare numbers. Although contraceptive usage has increased, overall pregnancy rate has not translated into lower fertility rates. Explanations may be that contraceptive usage is occurring among women with low risk of pregnancies, contraceptive discontinuation. An effort to strengthen PAC-services are needed. <i>Strengths:</i> Avoided confounding in methods, high representativeness for facilities, <i>Weaknesses:</i> Rate of response varied across regions, estimated numbers, miscarriage vs. induced abortion, wide confidence intervals, parting in social groups like poor/urban etc.
<b>Country</b>	Malawi		
<b>Year of data sampling:</b>	2015		