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The Costs of Treating Unsafe Abortion Complications in Public Health Facilities in Kenya

February 2018

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Foreword

Despite improvements in several key health indicators over the past decades, maternal mortality and morbidity have remained high in Kenya. A significant proportion of these deaths and morbidities is driven by complications of unsafe abortion.

A nationwide study on the incidence of abortion in Kenya conducted by the African Population and Health Research Center (APHRC), in collaboration with the Ministry of Health (MoH) and other partners, revealed that about half a million induced abortions occurred in the country in 2012. Most of these abortions were unsafe and resulted in various complications. The study also revealed that most women with complications from unsafe abortion are treated in public health facilities, exerting pressure on scarce health system resources.

In this report, we present national and other estimates of the direct costs of treating complications of unsafe abortion in public health facilities in Kenya. The report furnishes up-to-date and critical evidence to guide interventions to reduce the costs of unsafe abortion in the country and improve women's access to high quality, comprehensive post-abortion care.

The evidence in this report shows that the costs of managing complications of unsafe abortion in public health facilities in Kenya are substantial. Many complications from unsafe abortion are emergencies and require extended hospital stays, intensive care, and attendance by highly skilled health providers. In diverting scarce human and financial resources within the public health system, treating these complications clearly hinders efforts to provide good maternal health care.

Taken together, the report findings provide a rationale for key stakeholders in the field of women's health and rights in Kenya to work together to address unsafe abortion and support the development and delivery of innovative interventions to promote women's wellbeing, while also impelling a more concerted effort to improve access to family planning for all women across the country.

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List of Acronyms

APHRC	African Population and Health Research Center
D&C	Dilation and curettage
EVA	Electric vacuum aspiration
HFS	Health Facility Survey
KEMRI	Kenya Medical Research Institute
MPAC	Misoprostol for post-Abortion care
MVA	Manual vacuum aspiration
PAC	Post-abortion care
PMS	Prospective Morbidity Survey
WHO	World Health Organization



Executive Summary

Unsafe abortion—the termination of pregnancy either by persons lacking the necessary skills or in an environment lacking the minimal medical standards, or both—is a leading cause of maternal mortality and morbidity globally. In addition to immediate complications such as organ failure and sepsis which sometimes result in death, unsafe abortion often has several later health consequences, including secondary infertility and chronic reproductive tract infections.

Research indicates that nearly half a million induced abortions—unsafe for the most part—occurred in Kenya in 2012, resulting in different forms and intensities of medical complications. Most of these complications were treated in public health facilities. Currently, limited up-to-date data exist on the costs of these interventions, which prevents health system administrators from being able to accurately budget and allocate human resources.

This report presents findings of a national study on estimated costs based on reported cases, by severity of complications. The study relies on nationally representative primary and secondary data drawn from a variety of authoritative sources: individual and panel interviews with a sample of current, knowledgeable and experienced providers of post-abortion care in Kenyan public facilities; data on the direct costs of all key inputs (health care provider time, drugs, and supplies) needed to provide complete treatment to one patient; and secondary data on women hospitalized in public health facilities for complications of induced abortion.

Study results show that the financial cost of treating of unsafe abortion complications in public health facilities is staggering. On average, to treat a woman for complications from an unsafe abortion requires 7.4 hours of health care personnel time. This time ranged from 5.5 hours for mild complications to 6.7 hours for moderate complications, and up to 12.4 hours for the treatment of severe complications, involving procedures such as pelvis abscess drainage or cervical/vaginal tear repair. Most of these were time spent by nurses and medical officers.

The average cost of a typical treatment stood at 4,943 Kenyan shillings (Ksh) or 58 US dollars (US\$) . This cost varied from Ksh 3,264 (US\$39) for mild complications and Ksh 4,362 (US\$52) for moderate complications to Ksh 9,133 (US\$108) for severe complications.

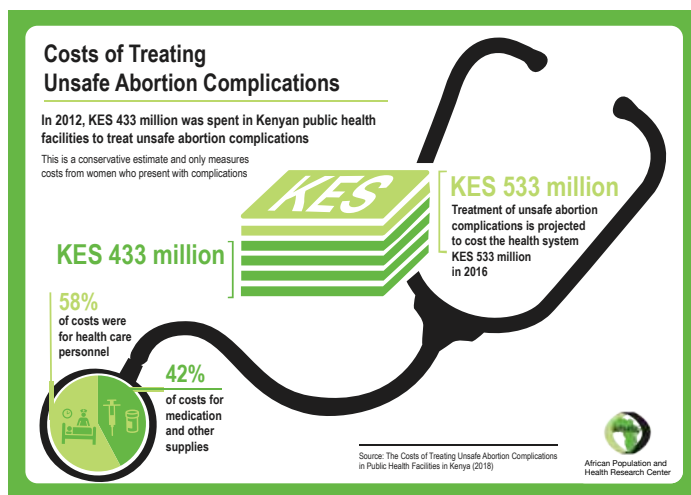
¹ Using an average exchange rate of Ksh 84.56 = 1US\$ in 2012. <https://www.centralbank.go.ke/index.php/rate-and-statistics/exchange-rates-2>

Personnel costs accounted for most of these expenses and ranged from Ksh 1,930 (US\$23) for mild cases and Ksh 2,353 (US\$28) for moderate complications to Ksh 5,653 (US\$67) for severe complications. On average, it costs more to treat abortion complications patients in Nairobi (Ksh 7,674/ US\$91) and Eastern (Ksh 5,390/ US\$64) regions than elsewhere in the country

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In 2012, the treatment of unsafe abortion complications cost the public health system a total of Ksh 432.7 million (about US\$5.1 million) in health personnel salaries and medical supplies. Most was spent in the treatment of severe medical complications. In 2016, the treatment costs for these complications in public facilities will reach an estimated Ksh 533 million (about US\$6.3 million).

Addressing unsafe abortion in Kenya requires strengthening governmental institutions and agencies mandated to protect women's health to implement life-saving measures within the limits of the law. These measures include promoting women's access to quality post-abortion care, including post-abortion family planning counseling and improved provision and education about family planning. Increasing access for both women and men to effective contraceptive methods, particularly long-acting reversible contraceptives, will also tackle one of the root causes of unsafe abortion. Kenya must also rethink the structure of sexual and reproductive health care delivery to ensure both access to, and the availability of, quality providers at all levels of care. These measures call for strong political will, strategic planning, and more research.





Background

The World Health Organization (WHO) [1] defines unsafe abortion as the termination of pregnancy either by persons lacking the necessary skills or in an environment lacking the minimal medical standards, or both. Currently, unsafe abortion accounts for 47,000 annual maternal deaths worldwide, with over 90% of these deaths occurring in low- and middle-income countries. Countless other women who undergo unsafe abortion suffer serious and life-threatening injuries [1]. Unless women can avoid unplanned pregnancies, millions of them risk experiencing an unsafe abortion during their lives, particularly in low- and middle-income countries [1-3].

In Kenya, unsafe abortion is a major social and public health problem[4]. Recent nationwide research showed that about half a million induced abortions—unsafe for the most part—occurred in the country in 2012, corresponding to an induced abortion ratio of 30 abortions per 100 live births and a rate of 48 abortions per 1,000 women of reproductive age [5]. The study established that most unsafe abortion-related admissions in Kenya are managed in public health facilities [5]. It also indicated that 77% of women who sought post-abortion care (PAC) in Kenyan health facilities were treated for moderately severe or severe complications, such as sepsis, shock, and organ failure [5]. Death due to unsafe abortion is also common in Kenya [5].

The management and treatment of complications from unsafe abortion exerts a substantial toll on health system resources [6-16]. Many of these complications are emergencies and require extended hospital stays, intensive care and attendance by highly skilled health providers. Up-to-date information on treatment costs has implications for budgeting and resource allocation. Such evidence has the potential to guide interventions, reduce costs to the health system and improve women's access to high-quality comprehensive post-abortion care, counselling, family planning services and other reproductive health services at all levels of the health system.

This study estimates the personnel, medications and medical supplies costs of treating complications of unsafe abortion in the Kenyan public health system. The estimates presented exclude costs for facility utility and space, referrals, overheads, and other direct and indirect costs to women and their families.

Study Methodology

Data Sources

In this study, health care personnel, medication, and medical supplies costs (i.e., direct costs) of treating abortion complications were estimated using three data sources.

1. Key inputs (i.e. personnel time, drugs, and supplies used for various treatment regimens for treating a typical patient)

Data were collected through panel discussions with knowledgeable and experienced post-abortion care providers in public health facilities. These providers were drawn from a nationally representative sample of 128 public health facilities that were part of the 2012 Kenya Incidence and Complications of Unsafe Abortion study [5]. All of the levels 4 to 6 public health facilities and 67% of the level 2 and level 3 public health facilities that had participated in the 2012 study were included in the costing study. The distribution of the sampled and participating health facilities by region and facility level is shown in Table 1. A total of 192 providers were recruited, in consultation with the Ministry of Health and based on the providers' experience in post-abortion care (PAC), obstetrics and gynecology; current involvement in PAC service provision in the sampled facilities; and knowledge of clinical regimens and service delivery for treatment of abortion complications. The distribution of providers participating in the panels by region, level of facility, cadre, gender, age, education level, and years of experience in PAC provision is shown in Table 2.

Using a modified Delphi survey approach [7], the panelists were presented with standardized questionnaires comprising three scenarios of women presenting signs and symptoms suggestive of mild, moderate and severe abortion complications (Table 3), and type of patient—out-patient and in-patient. For each scenario, each panelist first individually described, from personal practice at their respective facilities, the usual treatment protocol and amount of clinical supplies and medications used, the types of personnel involved in direct care of a typical patient presenting with complications from abortion, and the estimated personnel time ordinarily spent for each step taken during treatment of a typical case. Individual

²The health care facility level is a description of functionality as defined by the Kenyan Ministry of Health. Level 1 is the lowest (primary) level of care while Level 6 is the highest level of health care in Kenya, providing sophisticated diagnostics, therapeutic and rehabilitative services.

³The time captured only included the interaction time between the health provider and the patient. Waiting time was not considered.

providers were later paired with other providers from the same facility to review their written estimates jointly and to reach a consensus on all three scenarios. Finally, the providers were grouped into teams from the same facility level to develop a unified estimate for each of the three scenarios. Data from the group forms were used to estimate the costs for treating complications of abortion by severity.

Table 1 → **Participating facilities, by region and level**

Region	Level 6	Level 5	Level 4	Level 3	Level 2	Total
Central	0	2	6	5	5	18
Coast	0	1	6	2	4	13
Eastern	0	3	13	3	4	23
Nairobi	1	0	3	1	0	5
North Eastern	0	1	5	3	1	10
Nyanza	0	2	11	7	3	23
Rift Valley	1	2	9	5	5	22
Western	0	1	5	4	4	14
Total	2	12	58	30	26	128

Table 2 → **Characteristics of panel participants (N=192)**

Characteristics	No. of respondents (Unweighted N)	%
Region		
Central	26	8.7
Coast	18	11.1
Eastern	39	13.8
Nairobi	7	1.8
North Eastern	16	7.0
Nyanza	37	19.7
Rift Valley	29	24.2
Western	20	13.6
Level of facility		
Level 2	27	42.0
Level 3	31	30.3
Level 4	109	26.3
Level 5	22	1.3
Level 6	3	0.2
Cadre ‡		
OB/Gyn	3	0.6
Medical officer	5	0.8
Clinical officer	42	18.2
Nurse	122	71.2
Trained midwife	5	4.4
Other	15	4.8
Gender		
Male	76	46.4
Female	114	53.0
Not indicated	2	0.6
Age		
< 30 years	46	22.6
31-39 years	68	43.4
40+ years	69	30.0
Not indicated	9	4.1
Education level		
College (middle level)	161	91.3
Degree/Postgraduate	22	4.6
Other	9	4.1
Years of experience as PAC provider		
0-4 years	108	52.5
5-9 years	50	23.9
10+ years	30	20.0
Not indicated	4	3.5
Total	192	100.0

‡ Others include: health counselors, family planning counselors and reproductive health officer



Table 3 → **Classification of severity of abortion complications**

Classification	Signs and symptoms
1. Severe	Complications which are or can quickly become life-threatening if not treated immediately <ul style="list-style-type: none"> ● Body temperature of >37.9° C ● Organ or system failure ● Generalized peritonitis ● Pulse >119 beats/minute ● Evidence of foreign body or mechanical injury ● Sepsis ● Shock ● Tetanus
2. Moderate	Complications which are or can quickly become life-threatening if not treated immediately <ul style="list-style-type: none"> ● Body temperature between 37.3–37.9°C ● Adnexal or abdominal tenderness ● Localized peritonitis ● Offensive products of conception
3. Mild/Simple	<ul style="list-style-type: none"> ● Stable condition ● Some signs and symptoms of localized infection and/or light to moderate vaginal bleeding but no sign of life-threatening condition

Cases required only one sign or symptom to be included in a particular category (adapted from Jewkes, Fawcus et al. 1997[16] and Jewkes, Gumede et al. 2005[17]; also see APHRC, 2013[4]).

2. Direct costs of all key inputs (as used in treatment regimens)

Data on direct costs of all key inputs (personnel time, drugs and supplies, and excluding overheads) were computed using information on salaries and essential medicines from the Ministry of Health. These data were used to estimate the staff and supplies costs for treating each scenario.

Staff costs were calculated using 2012 information on average minimum salary plus allowances by health cadre per year provided by the Ministry of Health. The 2012 salary structure for civil servants by job groups was also used as an additional source of data [19]. Salaries were converted from Kenyan shillings to US dollars, and then to a per-hour rate. The per-hour rate was calculated based on the assumption that health personnel work eight hours per day for 222 days per year. This translates to a total of 1,776 hours per provider, per year. The amount of time each provider spent on all steps involved, from admission to discharge, was multiplied by the unit cost of that provider. For example, eight hours spent by a nurse multiplied by US\$2 salary cost per hour = US\$16 cost for a nurse's time.

Costs of medications and medical supplies were derived using prices from the Kenya Medical Supplies Authority (2013), the Mission for Essential Drugs and Supplies (2014), and the Management Sciences for Health

International Drug Price Indicator Guide (2013). This information was supplemented by key informant interviews with practicing senior clinicians. The cost of these resources was calculated by multiplying the amount used by the unit cost of that resource.

3. Nationally representative data on women hospitalized for unsafe abortion complications

The 2012 Kenya Incidence and Complications of Unsafe Abortion study [4] provided nationally representative data on women hospitalized for unsafe abortion complications, enabling computation of total caseload in public health facilities. Caseloads by scenario of complications and treatment procedures—manual vacuum aspiration (MVA), dilation & curettage (D&C), misoprostol for post-abortion care (MPAC)—were also computed.

Cost Estimation Procedures

National and regional estimates of the treatment costs were obtained by combining information on the per-case costs by scenario and the number/proportion of annual cases by scenario, using a multi-step process outlined in Table 4.

Table 4 → Estimation of national and regional costs of treating unsafe abortion complications

1	Per-case costs
For each scenario, we calculated:	
Per-case labor costs: Σ provider time in minutes \times provider unit cost (per-minute salary rate)	
Per-case supply costs: Σ quantity of supply used \times supply unit cost	
Per-case cost of PAC treatment: Σ per-case labor cost + per-case supply cost	
2	Number and proportion of annual cases
For each scenario, three indicators were extracted from the 2012 Incidence and Complications of Unsafe Abortion study [4]:	
The weighted average annual caseloads (From HFS and PMS) [§]	
The proportion of caseloads per scenario (From PMS) [§]	
The number of annual cases per scenario: proportion of caseloads per scenario \times total annual caseload	
3	Weighted per-case costs
Weighted per-case costs = weighted per-case labor cost + weighted per-case supply cost (including 95% confidence intervals)	
4	Annual costs
Annual costs = number of annual cases per scenario \times weighted per-case cost per scenario	

[§]PMS: Prospective Morbidity Survey; HFS: Health Facility Survey. Data weights, which are the inverse of sampling fractions, were used to adjust the statistics presented to match the distributions of the original population.



Ethical Approval

The study protocol was reviewed and approved by the research ethics boards of the Kenya Medical Research Institute (KEMRI), the Directorate of Medical Services, Ministry of Health, Kenya, and the University of Nairobi/Kenyatta National Hospital.

Findings

Per-Case Labor Costs

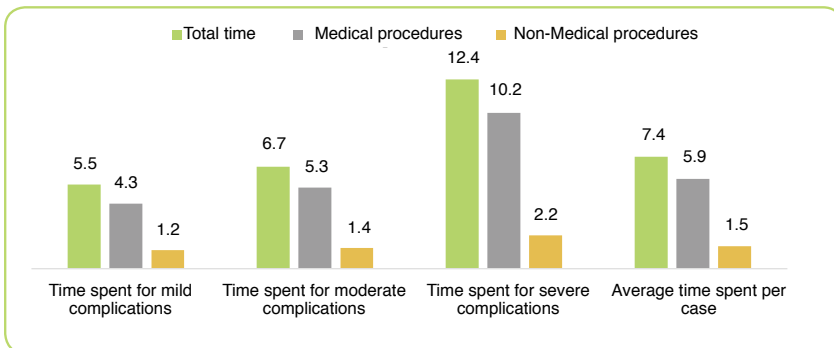
The treatment and care of a typical patient presenting with complications from an unsafe abortion in public facilities in Kenya uses 7.4 hours of health personnel time (Figure 1 & Appendix 1). This time includes 1.5 hours spent on non-medical processes such as registration, room preparation and post-procedure instrument/room cleaning performed by clerks and nurses. The total time spent for treating mild complications is 5.5 hours, and 6.7 hours for moderate complications. The treatment of a typical patient presenting with severe complications from an unsafe abortion takes, on average, 12.4 hours.

Personnel in public health facilities spend 6.5 hours treating an unsafe abortion patient with MVA. They spend 8.6 hours if the treatment is D&C and 6.2 hours for procedures performed with medical abortion drugs. On average, 16.0 hours are used to treat a typical patient presenting with severe complications that require surgical procedures such as pelvic abscess drainage, cervical/vaginal tear repair, or laparotomy/hysterectomy.

In terms of per-case labor costs (Figure 2), the average cost of treating a typical case of mild complications is Ksh 1,930 (US\$23)⁴. The average health personnel cost for a typical case with moderate complications is Ksh 2,353 (US\$28). A typical severe case costs about twice as much: Ksh 5,653 (US\$67).

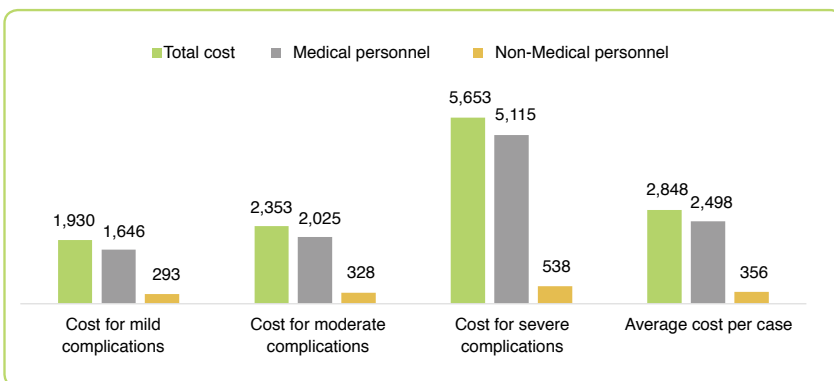
⁴ Using an average exchange rate of Ksh 84.56 = 1US\$ in 2012. <https://www.centralbank.go.ke/index.php/rate-and-statistics/exchange-rates-2>. The same exchange rates is used across.

Figure 1 → Average time (in hours) spent by health personnel per treatment of a typical case of complications of unsafe abortion, per scenario of complications



Numbers are weighted averages within each category presented in the figure

Figure 2 → Average health personnel costs (in Kenyan shillings) for treatment of a typical case of complications of unsafe abortion, per scenario of complications



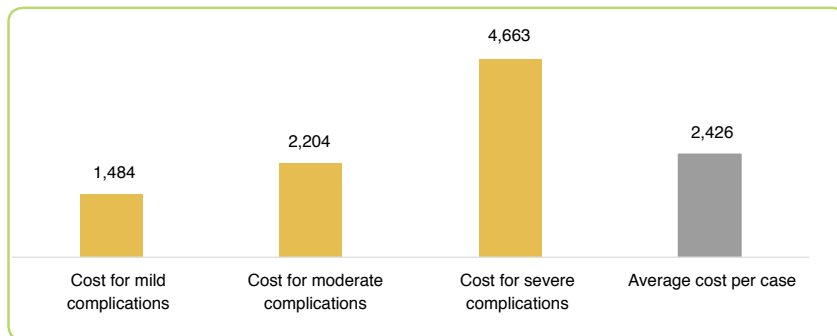
Numbers are weighted averages within each of the categories presented in the figure

Per-Case Supply Costs

Medical supplies are the second-largest contributor to the cost of unsafe abortion treatment (Figure 3 & Appendix 2). The treatment of a typical case of mild complications uses medical supplies and drugs worth Ksh 1,484 (US\$18). About Ksh 2,204 (US\$26) worth of medical supplies are required to treat a typical case of moderate complications. A severe case of unsafe abortion complications that requires uterine evacuation and/or surgical interventions uses medicines and medical supplies worth about Ksh 4,663 (US\$55).



Figure 3 → Average costs (in Kenyan shillings) of medications and medical supplies for treating a typical case of complications from unsafe abortion, per scenario of complications



Total Per-Case Costs

The overall average cost of treating a typical case of complications from unsafe abortion in Kenyan public health facilities is Ksh 4,943 (US\$58). The total average cost of treating a typical patient with mild complications is Ksh 3,264 (US\$39) (Figure 4). This amount increases to Ksh 4,362 (US\$52) for a typical case of moderate complications and Ksh 9,133 (US\$108) for a typical severe case requiring uterine evacuation and/or surgical interventions. Health personnel costs account for 54% of the total average cost of treatment.

Data from the 2012 Kenya Incidence and Complications of Unsafe Abortion study indicated that, among all abortion patients who underwent uterine evacuation in public facilities, 64.4% were managed with MVA/EVA, 5.9% through D&C, and 4.1% by medical abortion [5]. MVA/EVA was used in almost all cases presenting at level 6 facilities and in 80% of cases managed at level 5 facilities. About 70% of women in levels 4 and 3 were also treated with MVA/EVA. D&C procedures were used more frequently in level 4 facilities than elsewhere. The current study indicates that MVA is, on average, the cheapest option for treating unsafe abortion complications, costing Ksh 4,172 (US\$49) (Figure 5).

Figure 4 → Total average costs and personnel costs (in Kenyan shillings) for treating a typical case of complications from unsafe abortion, per scenario of complications

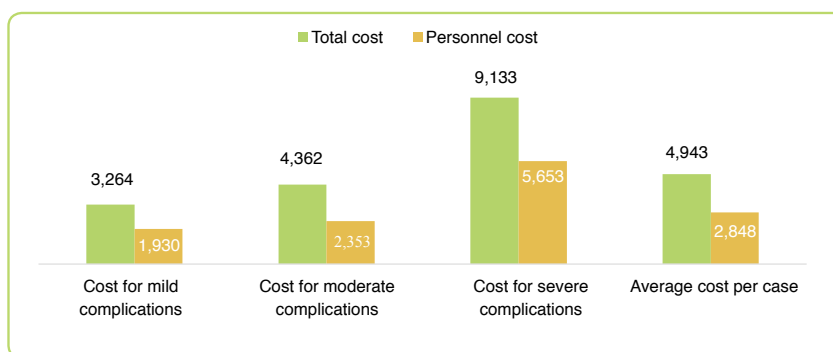
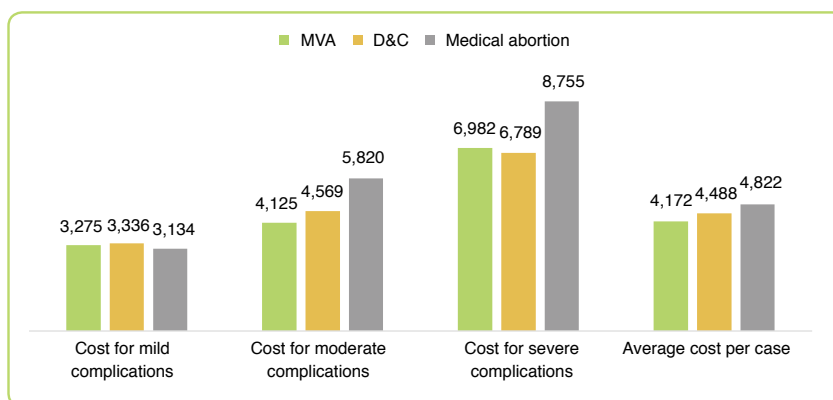


Figure 5 → Total average costs (in Kenyan shillings) for treating a typical case of complications from unsafe abortion, per treatment procedure and scenario of complications



For moderate and severe cases, medical abortion procedures were typically used in combination with other uterine evacuation procedures

Cost Variations by Level of Facility and Regions

As expected, higher-level facilities bear the highest burden of treatment for moderate and severe complications from unsafe abortion (Figure 6). Our analysis indicates differences in personnel time spent across facility levels for the same type of complications. For instance, a typical case of mild complications uses up to 4.8 hours of health personnel time in level 2 facilities, 5.6 hours in level 3 facilities, 5.8 hours in level 4 facilities, 7.0 hours in level 5 facilities and 10.7 hours in level 6 facilities (see Appendix 1). Differences in time used by health personnel in treating cases with moderate and severe complications are understandable since procedures at lower level facilities would typically only involve time for examinations, pain management, and referrals. Further analysis is needed to understand the differences in the time spent in treating mild complications and to explore time- and cost-saving strategies at higher-level facilities.



Variations in costs and time for treating unsafe abortion complications are also observed within regions (Figure 7). Per-case costs are higher in Nairobi (Ksh 7,674) and Eastern regions (Ksh 5,390). In the other regions, these costs range from Ksh 3,918 to Ksh 5,008. These variations can be explained by differences in personnel time spent per scenario (see Appendix 1). For instance, providers in public health facilities in the Nairobi region (Nairobi County) spend more time in treating mild complications (7.2 hours) than in other regions. The treatment of severe unsafe abortion complications takes longest (16.3 hours) in Eastern region. Further research is needed to understand the reasons for differences in the time used in treating complications by providers in different parts of the country

Figure 6 → Personnel costs relative to other costs (in Kenyan shillings) of treating a typical case of complications of unsafe abortion, by level of facility

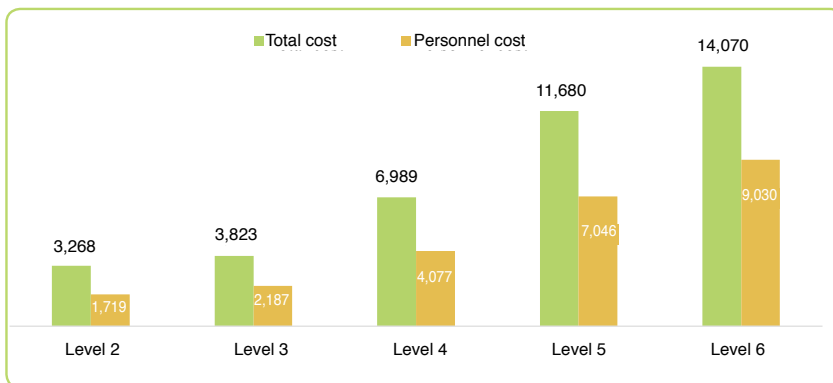
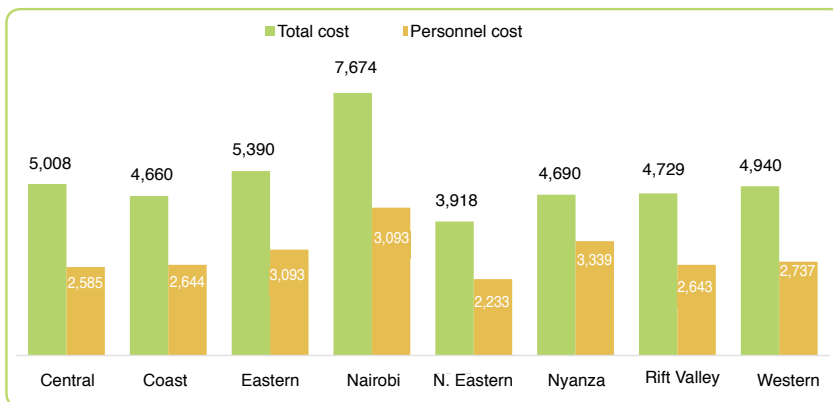


Figure 7 → Personnel costs relative to other costs (in Kenyan shillings) of treating a typical case of complications from unsafe abortion, by region





Cost of Treating Unsafe Abortion Complications in Kenyan Public Health Facilities in 2012

The 2012 Kenya Incidence and Complications of Unsafe Abortion study estimated that nearly half a million induced abortions (464,690) were performed in 2012 [4]. The study also estimated that 157,762 women received care for complications from induced and spontaneous abortions in health facilities (public and private) in the same year. Of these, 119,912 received care for complications from induced abortions. The total health system cost of treating these complications was estimated by multiplying the number of annual cases per scenario of complications by the weighted per-case-per-scenario cost. This estimation used the numbers of women who received care in public health facilities only (i.e., 75,581 women out of 119,912). The distribution of these women, by severity of complications, level of facility and region, is shown in Table 6.

Of the number of women treated in public health facilities, 22.4% had mild complications, 43.2% had moderate complications, and 34.4% had severe complications. A total of 29,511 of these women were treated in level 4 facilities, 17,651 in level 3 facilities, and 20,720 in level 2 facilities. The highest numbers of women treated were in the Rift Valley (17,507), Western (13,578) and Nyanza (10,686) regions.



Table 6 → **Annual caseload of unsafe abortion cases at public health facilities, by scenario of complications in 2012§**

	Mild complications (22.4%)	Moderate complications (43.2%)	Severe complications (34.4%)	Total
Total	16,900	32,659	26,022	75,581
Level of facility				
Level 2	2,212	9,210	9,298	20,720
Level 3	5,650	5,735	6,266	17,651
Level 4	6,828	14,135	8,548	29,511
Level 5	2,077	2,558	1,399	6,034
Level 6	132	1,022	511	1666
Region				
Central	2,236	3,801	2,380	8,417
Coast	1,332	4,928	1,212	7,472
Eastern	2,641	2,179	2,066	6,886
Nairobi	1,351	2,209	2,596	6,156
North Eastern	1,652	1,525	1,703	4,879
Nyanza	2,829	4,014	3,844	10,686
Rift Valley	3,535	7,567	6,404	17,507
Western	1,322	6,437	5,819	13,578

§ From the 2012 Kenya Incidence and Complications of Unsafe Abortion study, we computed the total caseloads as recorded in all public health facilities that were sampled in the costing study. Severity percentages were as computed from the PMS data for public facilities alone. The % cases by treatment procedure are also from the distribution of PMS cases in the magnitude study. Data weights, which are the inverses of sampling fractions, were used to adjust the statistics presented to match the distributions of the original population. Figures presented in this table are based on weighted counts of patient-cases that presented in all public healthcare facilities in Kenya in 2012. Some of the cases that presented in lower level facilities might have been referred for further treatment in higher level facilities. In rare instances, the numbers may not sum up to 100%. However, these differences (wherever they exist) have been maintained at a bare minimum of between -0.003% and 0.012% error rate.

The estimated cost of treating complications of unsafe abortion in Kenyan public health facilities (based on the annual estimate of 75,581 unsafe abortions cases in 2012) was **Ksh 432.7 million (about US\$5.1 million)**. The minimum and maximum ranges are about Ksh 278 million and Ksh 587 million, respectively (Table 7). About Ksh 221 million was spent in level 4 facilities, while the amounts spent in level 3 and 5 facilities were about Ksh 83 million and Ksh 65 million, respectively. About Ksh 112 million and Ksh 83 million were spent in public health facilities in the Rift Valley and Western regions, respectively. Detailed cost estimates by region are provided in Appendices 3-10.

While severe cases make up only 35% of the annual caseload in public health facilities, 54% of the total annual cost of abortion-related treatment is spent on these cases (Figure 8). Moderate and mild complications of unsafe abortion contribute 34% and 12%, respectively, of the total annual cost.

Table 7 → **Estimated annual costs of treating unsafe abortions in public health facilities, per scenario of complications^{1,2}**

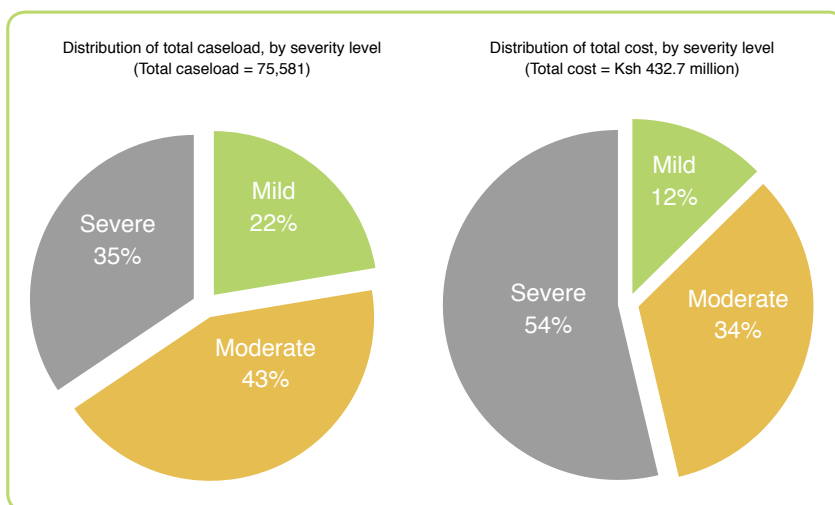
	Average per-case cost (Ksh)	Caseload ³	Annual cost (Ksh)	Annual costs (US\$)
Scenario of complications				
Mild [95% confidence interval]	3,264 [2,748 - 3,780]	16,907	54,645,518 [40,201,523 – 69,097,667]	646,234
Moderate [95% confidence interval]	4,362 [3,824 - 4,901]	32,659	145,666,463 [99,864,283 – 191,465,712]	1,722,640
Severe [95% confidence interval]	9,133 [7,678 - 10,588]	26,023	232,387,925 [138,117,887 – 326,671,657]	2,748,201
All procedures [95% confidence interval]	4,943 [4,518 - 5,368]	75,581	432,699,907 [278,183,693 – 587,235,036]	5,117,075

¹ Annual estimates for 2012

² Caseload data collection occurred in 2012. Cost data collection occurred in 2014 but our costs sources range from 2012 to 2014

³ The 2012 Kenya Incidence and Complications of Unsafe Abortion study reported conservative estimates of abortion incidence therefore the total annual costs reported here might be an under-estimation of the actual costs of unsafe abortion to the public sector.

Figure 8 → **Comparison of total annual caseload with total annual costs, by severity of complications**





Discussion

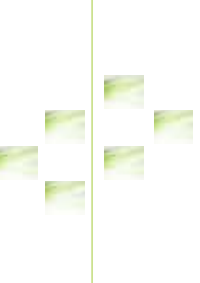
Unsafe abortion has extensive health, social, economic and other repercussions. Morbidity and mortality related to unsafe abortion have a serious impact on individual, household, community and national wellbeing and development [19]. In addition to immediate complications as organ failure, sepsis and uterine perforation, unsafe abortions often leads to several sequelae and adverse health outcomes, including secondary infertility and chronic reproductive tract infections [20]. Our aim in this study was to establish the costs of treating the complications of unsafe abortion in public health facilities in Kenya. The 2012 Kenya Incidence and Complications of Unsafe Abortion study showed that nearly half a million induced abortions were conducted in Kenya in 2012 [4]. Most of these abortions were unsafe, resulting in complications that required extended hospital stays, intensive care and attendance by highly skilled health providers. Most of these complications were managed in public health facilities.

The study results show that treating these complications consumes considerable financial resources. We found that the treatment of a typical case of unsafe abortion complications in Kenyan public health facilities uses an average of 7.4 hours of health personnel time. Interestingly, most of this is time spent by nurses and clinical officers. Previous research showed that some of the critical medical costs of unsafe abortion are related to intensive care and extended attendance by highly skilled health providers [22]. Task shifting has been advanced as one potential strategy for reducing the cost to the public health system of unsafe abortion [7, 23, 24]. In countries such as South Africa, Vietnam, and Nepal, research has shown that lower cadre health providers, including nurses, clinical officers and other auxiliary health care workers can be trained to manage some of the complications of unsafe abortion [24].

The average per-case cost of treating a typical patient in Kenyan public health facilities in 2012 following an unsafe abortion stood at Ksh 4,943 (US\$58). However, this cost varied from Ksh 3,264 (US\$39) for mild complications to Ksh 9,133 (US\$108) for severe complications. Personnel costs accounted for most of the cost and ranged from Ksh 1,930 (US\$23) for mild cases to Ksh 5,653 (US\$67) for severe complications.

To put these numbers in perspective, the WHO recommends an average health expenditure per capita of US\$34 per year in low- and middle-income countries to improve the health of the population [24]. The average annual per capita health expenditure for Kenya was about US\$35 to US\$45 between 2011 and 2013⁵. This means that, on average, the total annual

⁵ <http://data.worldbank.org/indicator/SH.XPD.PCAP>



health expenditure budget for two Kenyans was spent in public health facilities to treat a single case of unsafe abortion complications. This has major implications for budgeting and resource allocation.

We also found major facility-level and regional variations in the cost of treating women presenting with unsafe abortion complications in public health facilities Kenya. The average treatment cost per unsafe abortion complication patient was generally higher in Nairobi (Ksh 7,674) and Eastern regions (Ksh 5,390). In other regions, these costs range from about Ksh 4,000 to about Ksh 5,000. These differences may be due to disparities in inputs, particularly in the types of personnel used and the choice of drug combinations in the management of unsafe abortion patients at facility levels. As expected, the average treatment cost per patient was also generally higher in upper-level facilities, where most moderate or severe complications of unsafe abortion are treated.

Most of the cost of treating unsafe abortion patients in public health facilities in Kenya was incurred in Rift Valley (Ksh 112 million) and Western regions (Ksh 83 million), and in level 4 (Ksh 221 million) and level 3 facilities (Ksh 83 million). Fifty-four percent (54%) of the total cost was spent in the treatment of severe complications.

We estimate that Ksh 432.7 million (about US\$5.1 million) was spent to treat unsafe abortion complications in public health facilities in Kenya in 2012. This amount is twice as high as the estimated cost of increasing contraceptive prevalence by one percentage point: that is, providing effective contraceptives to about 100,000 Kenyan women of reproductive age [25]. The amount spent on treating abortion-related complications is also more than the entire amount of money spent by the Kenyan government for every fiscal quarter since 2013 in reimbursing lower-level health facilities nationwide for the abolition of fees at the primary level. The abolition of fees at dispensaries and health centers was a major step for Kenya in promoting universal access to health care. Their abolition has contributed to major successes in the fights to reduce the prevalence of malaria, and of respiratory diseases among children. A major impact was also observed in terms of the utilization of antenatal care and skilled deliveries [26].

This study estimates that about Ksh 533 million will be spent in 2016 on treating complications from unsafe abortion in public health facilities. While it can be assumed that a small proportion of the 2012 costs were recovered through payments by patients for registration cards or medical supplies, it is expected that the growing costs presented here will be borne solely by the public health system within the current context of free maternal health care.



Study Limitations

This study's findings should be interpreted in light of the following limitations. First, the costs are based on estimates of the amount of time spent by health personnel and the medical supplies used for treating typical cases of abortion complications (for both in- and out-patients). Cases are diverse and some may require lengthier personnel time. Second, the estimates are based on experts' opinions, not direct observations. Third, some elements of costs, such as space or utility costs, were not included in the analysis. Fourth, as in most previous studies, we did not capture the significant costs that would result if abortion patients who need hospital-based treatment for their complications but do not receive it were to obtain it in public facilities. Our study also did not include the critical costs of unsafe abortion complications to households, communities, organizations and individuals. Nor have we included the costs of managing or treating later sequelae of unsafe abortions such as secondary infertility, chronic reproductive tract infections and psychiatric disorders. The cost of women's death from these complications has also not been included in the current analysis. Essentially, the costs presented here do not tell the whole story and are likely an underestimate of the true costs [19]. Nonetheless, the findings illuminate the considerable cost that unsafe abortion poses to the Kenyan health system. Further studies are needed to elucidate the full societal cost of unsafe abortion in Kenya.



Conclusions and Policy Recommendations

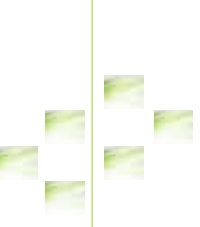
It is clear from the current analysis that the treatment of unsafe abortion consumes a large portion of the scarce public health system resources in Kenya. Yet, evidence from many countries indicates that unsafe abortion and its colossal public health system costs are avertable. Combating unsafe abortion and addressing its huge impact on Kenya's already fragile public health system requires strong political will and strategic action, as well as more research aimed at:

1. Tackling the root causes of unsafe abortion in the country by expanding budgetary allocation for family planning services and contraceptive choices
2. Implementing short- and long-term measures to save costs and lives, including:
 - Expanding access to cost-effective, high-quality post abortion care with the use of appropriate uterine evacuation technologies, including mifepristone, misoprostol and vacuum aspiration
 - Training health care providers, particularly mid-level cadres, to offer quality post abortion care and family planning services
3. Promoting task shifting in the context of post abortion care
4. Ensuring active implementation of existing sexual and reproductive health and rights policies including the National Reproductive Health Policy, the National Adolescent Sexual and Reproductive Health Policy, the National Guidelines for Quality Obstetrics and Perinatal Care, and the National Post-abortion Care Guidelines.
5. Strengthening the capacity of governmental institutions and agencies mandated to protect health to implement programs aimed at improving health outcomes among women.
6. Educating health providers, women, and communities about women's rights to contraception, prevention of unsafe abortion, and the post-abortion care.



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Appendices

Appendix 1 ➔ Average time (and 95% confidence interval) spent by health care personnel for treating a typical case of complications of unsafe abortion, per scenario of complications

	Case with mild complications	Case with moderate complications	Case with severe complications	Average time spent per case
Total	5.5 [4.7 - 6.3]	6.7 [5.7 - 7.6]	12.4 [10.7 - 14.3]	7.4 [6.7 - 8.0]
Procedure type				
Non-medical procedures	1.2 [1.0 - 1.5]	1.4 [1.1 - 1.6]	2.2 [1.8 - 2.6]	1.5 [1.3 - 1.6]
Medical procedures	4.3 [3.6 - 4.9]	5.3 [4.4 - 6.2]	10.2 [8.7 - 11.7]	5.9 [5.3 - 6.4]
Level of facility				
Level 2	4.8 [2.1 - 7.5]	5.7 [3.9 - 7.5]	n/a	5.2 [3.4 - 6.8]
Level 3	5.6 [4.7 - 6.4]	6.4 [4.8 - 8.0]	8.9 [6.7 - 11.1]	6.4 [5.6 - 7.2]
Level 4	5.8 [4.9 - 6.6]	7.8 [6.3 - 9.3]	13.5 [10.9 - 16.03]	9.6 [8.2 - 10.9]
Level 5	6.9 [6.3 - 7.7]	10.1 [9.2 - 10.9]	18.9 [16.4 - 21.5]	13.2 [11.6 - 14.7]
Level 6	10.7 [1.8 - 19.6]	8.5 [2.4 - 14.5]	26.1 [6.7 - 45.5]	15.2 [7.2 - 23.2]
Region				
Central	4.9 [3.9 - 5.9]	7.2 [5.9 - 8.6]	8.6 [6.5 - 10.8]	6.9 [5.9 - 7.9]
Coast	5.1 [3.7 - 6.56]	5.9 [4.9 - 7.0]	13.4 [11.5 - 15.2]	6.5 [5.3 - 7.7]
Eastern	5.9 [5.1 - 6.7]	6.2 [5.2 - 7.2]	16.3 [13.2 - 19.3]	8.6 [6.7 - 10.6]
Nairobi	7.2 [6.7 - 7.7]	6.7 [4.7 - 8.7]	12.1 [9.2 - 14.9]	9.9 [7.8 - 12.1]
North Eastern	4.4 [3.3 - 5.5]	5.7 [4.2 - 7.3]	10.7 [3.7 - 17.6]	5.9 [4.5 - 7.3]
Nyanza	6.2 [5.5 - 6.8]	8.9 [4.0 - 13.9]	14.7 [7.9 - 21.3]	9.0 [6.4 - 11.6]
Rift Valley	5.3 [3.4 - 7.2]	5.7 [3.7 - 7.7]	11.5 [6.3 - 16.7]	6.4 [4.8 - 7.9]
Western	6.1 [4.4 - 7.8]	7.4 [5.5 - 9.2]	11.2 [7.2 - 15.3]	7.4 [6.2 - 8.5]

Medical procedures include: examinations, pre-procedures counseling, lab tests, pain management, anesthesia, PAC procedure, intensive treatment, post-procedure monitoring of the patient, post-procedure counseling, family planning services and follow-up care.

Non-medical procedures include: registration, room preparation and post-procedure instrument/room cleaning.



Appendix 2 → Average costs (in Kenya Shillings) (and 95% confidence interval) of medications and medical supplies for treating a typical case of complications of unsafe abortion, per scenario of complications

	Case with mild complications	Case with moderate complications	Case with severe complications	Average cost per case
Total	1,484 [1,263 – 1,706]	2,204 [1,925 – 2,483]	4,663 [4,192 – 5,134]	2,426 [2,233 – 2,618]
Level of facility				
Level 2	1,353 [427 – 2,278]	1,737 [1,368 – 2,107]	n/a	1,549 [1,057 – 2,041]
Level 3	1,369 [1,138 – 1,600]	1,909 [1,398 – 2,420]	2,647 [1,875 – 3,419]	1,787 [1,516 – 2,058]
Level 4	1,236 [1,060 – 1,412]	2,621 [2,192 – 3,050]	4,682 [4,065 – 5,299]	3,116 [2,728 – 3,504]
Level 5	2,639 [2,146 – 3,133]	3,970 [3,178 – 4,763]	6,889 [6,165 – 7,614]	4,912 [4,366 – 5,457]
Level 6	2,153 [1,786 – 2,519]	3,067 [1,843 – 4,290]	9,796 [5,889 – 13,703]	5,305 [3,162 – 7,449]
Region				
Central	1,669 [1,068 – 2,269]	2,538 [1,482 – 3,593]	5,498 [4,278 – 6,719]	2,947 [2,246 – 3,647]
Coast	1,479 [910 – 2,049]	1,883 [1,338 – 2,428]	4,646 [3,956 – 5,336]	2,063 [1,569 – 2,558]
Eastern	1,074 [824 – 1,324]	1,749 [1,321 – 2,177]	4,949 [3,199 – 6,698]	2,297 [1,658 – 2,937]
Nairobi	1,178 [909 – 1,446]	1,751 [1,079 – 2,422]	4,821 [3,832 – 5,810]	3,502 [2,504 – 4,499]
North Eastern	1,565 [1,271 – 1,859]	1,744 [1,427 – 2,060]	2,648 [479 – 4,816]	1,879 [1,407 – 2,352]
Nyanza	1,106 [970 – 1,242]	1,696 [1,282 – 2,110]	2,307 [948 – 3,665]	1,647 [1,219 – 2,075]
Rift Valley	1,351 [912 – 1,791]	2,289 [1,881 – 2,696]	4,614 [3,659 – 5,568]	2,108 [1,646 – 2,571]
Western	1,639 [734 – 2,544]	2,606 [1,581 – 3,632]	3,048 [2,184 – 3,912]	2,269 [1,686 – 2,852]

n/a: Not applicable

Appendix 3 → Annual costs (in Kenyan shillings) of treating unsafe abortions in public health facilities in Central region, per scenario of complications^{1,2}

	Average per-case cost (Ksh)	Caseload ³	Annual cost (Ksh)	Annual costs (US\$)
Scenario of complications				
Mild [95% confidence interval]	2,897 [1,727 – 4,067]	2,237	6,447,281 [3,861,327 – 9,093,236]	76,245
Moderate [95% confidence interval]	4,265 [2,423 – 6,108]	3,801	16,213,206 [9,210,926 – 23,219,289]	191,736
Severe [95% confidence interval]	9,344 [7,181 – 11,507]	2,380	22,238,920 [17,090,933 – 27,386,906]	262,996
All procedures [95% confidence interval]	5,008 [3,806 – 6,211]	8,420	44,929,407 [30,163,187 – 59,699,430]	531,332

¹ Annual estimates for 2012

² Caseload data collection occurred in 2012; cost data collection occurred in 2014 but our costs sources range from 2012 to 2014.

³ The 2012 Kenya incidence and complications of unsafe abortion study reported conservative estimates of abortion incidence; therefore the total annual costs reported here might be an under-estimation of the actual costs of unsafe abortion to the public sector.

Ksh: Kenyan shillings; 84.56 Ksh = 1 US\$

Appendix 4 → Annual costs (in Kenyan shillings) of treating unsafe abortions in public health facilities in Coast region, per scenario of complications^{1,2}

	Average per-case cost (Ksh)	Caseload ³	Annual cost (Ksh)	Annual costs (US\$)
Scenario of complications				
Mild [95% confidence interval]	3,161 [2,153 – 4,170]	1,332	4,210,079 [2,867,542 – 5,553,948]	49,788
Moderate [95% confidence interval]	4,128 [3,079 – 5,176]	4,928	20,343,507 [15,173,851 – 25,508,235]	240,581
Severe [95% confidence interval]	11,826 [9,566 – 14,087]	1,212	14,337,725 [11,597,723 – 17,078,939]	169,557
All procedures [95% confidence interval]	4,660 [3,507 – 5,813]	7,473	38,891,311 [29,639,117 – 48,141,122]	459,926

¹ Annual estimates for 2012

² Caseload data collection occurred in 2012; cost data collection occurred in 2014 but our costs sources range from 2012 to 2014.

³ The 2012 Kenya incidence and complications of unsafe abortion study reported conservative estimates of abortion incidence; therefore, the total annual costs reported here might be an under-estimation of the actual costs of unsafe abortion to the public sector.

Ksh: Kenyan shillings; 84.56 Ksh = 1 US\$



Appendix 5 → Annual costs (in Kenyan shillings) of treating unsafe abortions in public health facilities in Eastern region, per scenario of complications^{1,2}

	Average per-case cost (Ksh)	Caseload ³	Annual cost (Ksh)	Annual costs (US\$)
Scenario of complications				
Mild [95% confidence interval]	2,890 [2,329 – 3,452]	2,643	7,633,808 [6,151,951 – 9,118,307]	90,277
Moderate [95% confidence interval]	3,715 [2,868 – 4,562]	2,179	8,093,692 [6,248,374 – 9,939,010]	95,715
Severe [95% confidence interval]	11,645 [7,765 – 15,524]	2,066	24,057,747 [16,041,941 – 32,071,487]	284,505
All procedures [95% confidence interval]	5,390 [3,932 – 6,848]	6,887	39,785,246 [28,442,266 – 51,128,803]	470,497

1 Annual estimates for 2012

2 Caseload data collection occurred in 2012; cost data collection occurred in 2014 but our costs sources range from 2012 to 2014.

3 The 2012 Kenya incidence and complications of unsafe abortion study reported conservative estimates of abortion incidence, therefore the total annual costs reported here might be an under-estimation of the actual costs of unsafe abortion to the public sector.

Ksh: Kenyan shillings; 84.56 Ksh = 1 US\$

Appendix 6 → **Annual costs (in Kenyan shillings) of treating unsafe abortions in public health facilities in Nairobi region, per scenario of complications^{1,2}**

	Average per-case cost (Ksh)	Caseload ³	Annual cost (Ksh)	Annual costs (US\$)
Scenario of complications				
Mild [95% confidence interval]	3,862 [3,370 – 4,355]	1,351	5,216,827 [4,552,229 – 5,882,777]	61,694
Moderate [95% confidence interval]	4,149 [2,959 – 5,340]	2,209	9,163,887 [6,535,537 – 11,794,446]	108,371
Severe [95% confidence interval]	10,183 [7,023 – 13,344]	2,596	26,435,154 [18,231,767 – 34,641,136]	312,620
All procedures [95% confidence interval]	7,674 [5,403 – 9,945]	6,155	40,815,869 [29,319,553 – 52,318,360]	482,685

1 Annual estimates for 2012

2 Caseload data collection occurred in 2012; cost data collection occurred in 2014 but our costs sources range from 2012 to 2014.

3 The 2012 Kenya Incidence and Complications of Unsafe Abortion study reported conservative estimates of abortion incidence, therefore the total annual costs reported here might be an under-estimation of the actual costs of unsafe abortion to the public sector.

Ksh: Kenyan shillings; 84.56 Ksh = 1 US\$



Appendix 7 → **Annual costs (in Kenyan shillings) of treating unsafe abortions in public health facilities in North Eastern region, per scenario of complications^{1,2}**

	Average per-case cost (Ksh)	Caseload ³	Annual cost (Ksh)	Annual costs (US\$)
Scenario of complications				
Mild [95% confidence interval]	3,022 [2,430 – 3,614]	1,652	4,991,121 [4,013,457 – 5,968,985]	59,025
Moderate [95% confidence interval]	3,757 [2,865 – 4,649]	1,525	5,727,551 [4,367,696 – 7,087,406]	67,734
Severe [95% confidence interval]	5,722 [851 – 10,594]	1,703	9,742,590 [1,448,959 – 18,037,924]	115,215
All procedures [95% confidence interval]	3,918 [2,843 – 4,992]	4,879	20,461,362 [9,830,112 – 31,094,314]	241,974

¹ Annual estimates for 2012

² Caseload data collection occurred in 2012; cost data collection occurred in 2014 but our costs sources range from 2012 to 2014.

³ The 2012 Kenya Incidence and Complications of Unsafe Abortion study reported conservative estimates of abortion incidence, therefore the total annual costs reported here might be an under-estimation of the actual costs of unsafe abortion to the public sector.

Ksh: Kenyan shillings; 84.56 Ksh = 1 US\$

Appendix 8 → Cost (in Kenyan shillings) of treating unsafe abortions in public health facilities in Nyanza region, per scenario of complications in 2012^{1,2}

	Average per-case cost (Ksh)	Caseload³	Annual cost (Ksh)	Annual costs (US\$)
Scenario of complications				
Mild [95% confidence interval]	3,337 [2,892 – 3,783]	2,830	9,440,523 [8,181,599 – 10,702,278]	111,643
Moderate [95% confidence interval]	4,678 [2,813 – 6,542]	4,014	18,776,256 [11,290,639 – 26,257,860]	222,047
Severe [95% confidence interval]	6,504 [2,217 – 10,792]	3,844	24,998,312 [8,521,104 – 41,479,364]	295,628
All procedures [95% confidence interval]	4,690 [3,320 – 6,059]	10,687	53,215,092 [27,993,341 – 78,439,502]	629,318

¹ Annual estimates for 2012

² Caseload data collection occurred in 2012; cost data collection occurred in 2014 but our costs sources range from 2012 to 2014.

³ The 2012 Kenya Incidence and Complications of Unsafe Abortion study reported conservative estimates of abortion incidence, therefore the total annual costs reported here might be an under-estimation of the actual costs of unsafe abortion to the public sector.

Ksh: Kenyan shillings; 84.56 Ksh = 1 US\$



Appendix 9 → **Cost (in Kenyan shillings) of treating unsafe abortions in public health facilities in Rift Valley region, per scenario of complications in 2012^{1,2}**

	Average per-case cost (Ksh)	Caseload ³	Annual cost (Ksh)	Annual costs (US\$)
Scenario of complications				
Mild [95% confidence interval]	3,335 [2,130 – 4,540]	3,537	11,790,764 [7,530,533 – 16,050,995]	139,437
Moderate [95% confidence interval]	4,527 [2,890 – 6,164]	7,567	34,255,746 [21,868,590 – 46,642,902]	405,106
Severe [95% confidence interval]	10,236 [6,180 – 14,293]	6,404	65,552,845 [39,577,626 – 91,534,468]	775,223
All procedures [95% confidence interval]	4,729 [3,566 – 5,891]	17,505	111,599,335 [68,976,749 – 154,228,366]	1,319,765

¹ Annual estimates for 2012

² Caseload data collection occurred in 2012; cost data collection occurred in 2014 but our costs sources range from 2012 to 2014.

³ The 2012 Kenya Incidence and Complications of Unsafe Abortion study reported conservative estimates of abortion incidence, therefore the total annual costs reported here might be an under-estimation of the actual costs of unsafe abortion to the public sector.

Ksh: Kenyan shillings; 84.56 Ksh = 1 US\$

Appendix 10 Annual costs (in Kenyan shillings) of treating unsafe abortions in public health facilities in Western region, per scenario of complications^{1,2}

	Average per-case cost (Ksh)	Caseload ³	Annual cost (Ksh)	Annual costs (US\$)
Scenario of complications				
Mild [95% confidence interval]	3,694 [2,301 – 5,087]	1,323	4,885,012 [3,042,884 – 6,727,141]	57,770
Moderate [95% confidence interval]	5,141 [3,910 – 6,372]	6,437	33,092,618 [25,168,671– 41,016,565]	391,351
Severe [95% confidence interval]	7,738 [4,401 – 11,075]	5,819	45,024,633 [25,607,833 – 64,441,433]	532,458
All procedures [95% confidence interval]	4,940 [4,039 – 5,841]	13,574	83,002,263 [53,819,388 – 112,185,139]	981,578

¹ Annual estimates for 2012

² Caseload data collection occurred in 2012; cost data collection occurred in 2014 but our costs sources range from 2012 to 2014.

³ The 2012 Kenya Incidence and Complications of Unsafe Abortion study reported conservative estimates of abortion incidence, therefore the total annual costs reported here might be an under-estimation of the actual costs of unsafe abortion to the public sector.

Ksh: Kenyan shillings; 84.56 Ksh = 1 US\$



Notes:



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