

Health Systems' Preparedness to Provide Post-abortion Care: Assessment of Health Facilities in Burkina Faso, Kenya and Nigeria

Kenneth Okoth Juma (✉ kjuma@aphrc.org)

APHRC: African Population and Health Research Center <https://orcid.org/0000-0001-7742-9954>

Ramatou Ouedraogo

African Population and Health Research Center

Joshua-Amo Adjei

University of Cape Coast

Ali Sie

Centre de Recherche en Sante de Nouna

Mamadou Ouattara

Centre de Recherche en Sante de Nouna

Nkechi Emma-Echiegu

Ebonyi State University

Joseph Eton

Ebonyi State University

Michael Mutua

African Population and Health Research Center

Martin Bangha

African Population and Health Research Center

Research

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Abstract

Background: In many parts of sub-Saharan Africa (SSA), access to abortion is legally restricted, which partly contributes to high incidence of unsafe abortion. This may result in unsafe abortion-related complications that demand long hospital stays, treatment and attendance by skilled health providers. There is however, limited evidence on the capacity of public health facilities to deliver post-abortion care (PAC) in these settings. We describe and discuss the preparedness and capacity of public health facilities to deliver complete and quality PAC services in Burkina Faso, Kenya and Nigeria.

Methods: A cross-sectional survey of primary, secondary and tertiary-level public health facilities was conducted between November 2018 and February 2019 in the three countries. Data on signal functions for measuring the ability of health facilities to provide post-abortion services were collected and analyzed. These data included information on essential PAC equipment and supplies, PAC staffing and training among others.

Results: Across the three countries, fewer primary health facilities (ranging from 4.3%–12.2% in Kenya and Burkina Faso) had the capacity to deliver on all components of basic PAC services. Only one in three (30–33%) of referral facilities across Burkina Faso, Kenya and Nigeria could provide comprehensive PAC services. Lack of trained staff, absence of necessary equipment and lack of PAC commodities and supplies were a main reason for inability to deliver specific PAC services (such as surgical procedures for abortion complications, blood transfusion and post-PAC contraceptive counselling). Further, the lack of capacity to refer acute PAC cases to higher-level facilities was identified as a key weakness in provision of post-abortion care services.

Conclusions: Our findings reveal considerable gaps and weaknesses in the delivery of basic and comprehensive PAC within the three countries. There is need for increased investments by governments to strengthen capacity of primary, secondary and tertiary public health facilities to deliver quality PAC services.

Background

Currently, about 90% of women of childbearing age in Africa live in contexts with restrictive abortion laws [1], and the risk of dying from an unsafe abortion is highest in Africa [2]. Every year, between 4.7% – 13.2% of maternal deaths can be linked to unsafe abortion [3]. Recognizing this, at the 1994 International Conference on Population and Development (ICPD) in Cairo, 179 governments pledged to guarantee quality Post-Abortion Care (PAC) services. PAC is an integrated service delivery model that includes a set of maternal health and family planning interventions that are both curative and preventative [4]. In 2015, countries further adopted the sustainable development goals (SDGs), aiming to reduce the global maternal mortality ratio (MMR) to less than 70 for every 100,000 live births [5]. Consequently, countries have developed national policies to improve provision of PAC as a public health necessity.

This paper uses a multi-country approach to assess the extent to which the health system is prepared to deliver PAC in three sub-Saharan countries (Burkina Faso, Kenya, and Nigeria). These countries possess varying national laws and policies on abortion and PAC [6], but show overall similarities in general state of health infrastructure [7]. Across the three countries, abortion is largely restricted. In Burkina Faso, abortion is legally permitted to save the life and protect the health of a pregnant woman, as well as in cases of rape, incest or severe fetal impairment [8]. In Kenya, abortion is not permitted unless, in the opinion of a trained health professional, there is need for emergency treatment, or the life or health of the mother is in danger, or if permitted by any other written law [9]. While in Nigeria, abortion is illegal unless done to save the life of the mother, and specific states have extended conditions under which women can obtain abortion to include rape and incest [10]. As such, women of diverse social and demographic backgrounds within these countries, in need of safe termination of pregnancy resort to unsafe abortion methods and procedures, resulting in fatalities and a range of complications that require treatment, long hospital admissions, intensive care, and attendance by highly skilled, yet scarce healthcare personnel [12].

In Burkina Faso, about 105,000 abortions were induced in 2012 (an induced abortion rate of 25/1000 women aged 15–49), with a considerable proportion being unsafe [13]. In Kenya, about 500,000 induced abortions occurred in 2012 (rate of 48/1000 women), 75% of which presented with moderate to severe complications [14], while in Nigeria, about 1.25 million induced abortions occurred in 2012 (rate of 33 abortions/1,000 women), and about 212,000 women were treated for complications of unsafe abortion. A more recent study in 2018 showed that abortions are much more common in Nigeria (45.8 abortions per 1000 women) [15]. Despite post-abortion care being a public health imperative, a considerable proportion of women are able to access quality PAC services in much of SSA [11, 12]. In 2012, almost 285,000 women who had induced abortions in Nigeria experienced complications serious enough to require treatment, but could not receive the medical care they needed [18]. Similarly, 30% of women in Kenya and 40% in Burkina Faso did not receive the appropriate medical care following abortion-related complications [10, 14]. Several barriers impede timely access to PAC services including legal restrictions on abortion [16], low capacity of health facilities to provide quality PAC services [12, 15] and stigma [21].

There is broad consensus that maximizing access and utilization of PAC could reduce poor outcomes associated with abortion, even though expanding PAC alone is insufficient to avert abortion-related complications and deaths [4]. A complex interplay exists between quality care, PAC patient experiences and health outcomes. Even so, ensuring access to effective clinical and non-clinical PAC interventions, strengthening the health infrastructure (including for PAC signal functions), and having trained staff with optimum skills and a positive attitude could treat abortion complications and prevent future unintended pregnancies. In Kenya for instance, the high incidence of repeat abortions among PAC clients raises questions about quality of post-abortion care available for women, especially PAC contraceptive counseling [18, 19]. Quality of health care is increasingly recognized as a core pillar of health systems reforms globally [4], with significant commitments toward strengthening health systems preparedness to address users' needs and expectations. So far, quality of PAC has been documented using a tripod framework for assessing healthcare quality that includes structural (facility infrastructure, management and staffing), process (technical/technical quality and patient experience) and outcome (patient satisfaction, return visits and health outcomes) indicators [20, 21]. Specifically, some studies have actualized structural and process quality assessments using the signal functions approach to measure PAC. Signal function indicators were initially designed by the United Nations in 1997 to monitor and improve provision of eight emergency obstetric care indicators [20].

In this study, we examine the state of preparedness of public health facilities to deliver basic and comprehensive PAC in in Burkina Faso, Kenya and Nigeria. We utilize signal function indicators (i.e. the availability of staff, staff training, key equipment and supplies, and ability to perform various reproductive health services)[13, 20], to describe PAC capacity. In a recent review, Onikepe and colleagues applied the signal functions approach to conduct a multicountry analysis of data from Service Provision Assessment surveys to examine capacity of primary and referral-level health facilities to delivery PAC services [17]. This paper however directly measures all the key indicators of basic and comprehensive PAC capability rather drawing from secondary datasets as previously done. There are no recent studies in the region using nationally representative data specifically on quality of post-abortion care.

Methods

Study Contexts

This was a multi-country study to assess the preparedness of public health facilities to deliver PAC services in Burkina Faso, Kenya and Nigeria. The three countries offer both similar and dissimilar contexts for investigating quality of PAC. For instance, abortion is legally restricted in all three countries and permitted only to save life or preserve health of a woman [8, 23]. All three countries report high incidences of unsafe abortion [10, 11, 14]. Burkina Faso (French-speaking country in West Africa) was among the first countries in SSA that changed its law in the post-ICPD period from total prohibition to allowing abortion to preserve a woman's health [28]. Nigeria presents a peculiar case where abortion laws vary by jurisdiction with about three legal systems applicable to abortion: the penal code applicable in the northern states, the criminal code in the southern states and across the other states; while Sharia penal legislation is applicable in twelve Northern states [25, 26]. None of the three legal codes permits abortion except to save the life or health of the woman. Under the penal code, an offending health provider and woman may be imprisoned for fourteen and seven years respectively. Kenya's 2010 constitution opened-up the grounds for access to safe abortion services as an emergency treatment to preserve the life or health of the mother, a provision that did not exist before [9]. Any other reasons inconsistent with the law are criminalized under the penal code, leading to widespread stigma and fear [30]. More recently in 2019, the Kenyan high court outlawed action by the Ministry of Health to withdraw the *standards and guidelines for reducing maternal mortality due to abortion* [31]. These contexts therefore offer worthy contexts to examine the preparedness of their health facilities to provide PAC services.

Study design and population

A cross-sectional survey was conducted among a representative sample of primary, secondary and tertiary health facilities in the aforementioned countries. Health system across the three countries is organized according to hierarchical levels. Health facility levels are generally categorized as primary, secondary and tertiary-levels. Primary health facilities are the first point of contact for the majority of community members' health needs, and include community facilities, dispensaries and clinics. In Kenya, primary-level facilities handle the Kenya Essential Package for Health (KEPH), which encompass activities related to health promotion, preventive care, and curative services. Secondary facilities are referral facilities for primary-level hospitals and are mainly sub-regional and regional facilities. They undertake curative and rehabilitative care and address a limited extent of preventive care and health promotion. Tertiary facilities are mainly national referral and teaching hospitals. All health facilities capable of conducting normal deliveries were included in our sample frame. Data was collected in facilities over a 30-day period between November 2018 and February 2019.

Sampling and recruitment

A two stage stratified sampling procedure was used in each country, that is, a) the highest sub-national administrative units (i.e. counties in Kenya, states in Nigeria and regions in Burkina Faso), and b) the levels of health facilities. At the first stage, in each country, a random sample of six regions, counties or states was drawn, and excluding the administrative unit hosting the national capital regions/cities – i.e. Centre in Burkina, Nairobi in Kenya, and Abuja – Federal Capital Territory (FCT) in Nigeria. Thereafter, the capital regions/cities were added to the regions purposely to make seven regions/counties/states in each country.

The selected administrative units included, Burkina Faso (seven regions from the 13: Boucle du Mouhoun, Cascades, Centre, Centre-Ouest, Centre-sud, Haut-Bassins, and Nord); Kenya (seven counties from 47: Garissa, Kajiado, Kiambu, Laikipia, Mandera, Migori, and Nairobi); Nigeria (six states plus the federal capital territory (FCT) from 36: Anambra, Bauchi, Cross-River, Edo, Kogi, Kano and FCT (Abuja).

At the second stage, an updated master list of all public health facilities in the different sub-national units was obtained from government records. Burkina Faso and Nigeria's list were updated up to July 2018 while Kenya was updated in February 2018. A requisite sample of facilities in each country was determined using a formula for known populations and known proportion estimates by: $\Delta = z\sqrt{(p(1-p))/n}$.

To solve for n we made it the subject: $(n = \left(\frac{z}{\Delta}\right)^2 p(1 - p))$, and assumed a confidence interval of 95%, with z as 1.96, and Δ as 0.05. In all cases, the known estimate p represented the proportion of facilities capable of providing PAC contraceptive counselling, which was the lowest measure for quality of PAC in Kenya (19.4%) and Nigeria (16%) [16, 30]. Because we did not find any recent estimate in Burkina Faso, we used the 50% proxy in order to generate the maximum sample size possible. These calculations yielded the number of facilities required for each country, and upon accounting for a response rate of approximately 93%, the estimated sample size of facilities was determined as follows: 414 in Burkina Faso, 259 in Kenya, and 223 in Nigeria.

The sample of health facilities was allocated to each of the seven administrative units in each country depending on the population of eligible facilities in a specific region/county or state. Eligible facilities were those that could provide normal delivery services, were publicly owned (government owned) and operational at the time of survey. As such, we excluded some specialized facilities including mental and spinal hospitals as well as military and prison hospitals known not to offer services to the public. Our focus on public health facilities is because government investments in health services primarily go to these facilities. During the survey, some facilities were dropped and replaced with similar facilities within the same locality, due to insecurity and travel inaccessibility. In addition, sampled facilities that declined to participate in the study were replaced with similar facilities from the sampling frame, which had been identified a priori.

Data collection

Trained field workers visited each eligible facility and administered the signal functions questionnaire which had been adopted from previous versions [22, 31]. The questionnaire were further refined to the contexts following extensive discussions with experienced obstetricians and gynecologists in each country. Questionnaires included details on availability of key equipment, supplies and commodities, staffing and staff training, facility operation hours and ability to perform various sexual and reproductive health services. Uniform tools were used across all countries. However, some aspects were adapted to fit in national standards (e.g. facilities categorizations). The tools were pre-tested to enhance conceptual clarity and logical flow. At large referral hospitals, respondents were the head of the obstetrics and gynecology department, or a key obstetrician gynecologist working in the facility. However, at lower level facilities, a nurse, a midwife or another health worker who was knowledgeable on PAC services provided in the facility was interviewed. The quantitative data were collected using tablets and hosted on the SurveyCTO platform. Completed and verified data were uploaded onto the APHRC cloud server for safe storage. Spot-checks were performed on 5% of the sample by the lead for each country.

Data analysis

Quantitative data was analyzed using Stata Software, version 15. Exploratory analysis was done to summarize response rates of health facilities by levels and administrative units. To describe the capacity of health facilities to deliver PAC services, we constructed composite or aggregate indicators of signal functions to provide basic and comprehensive PAC using a signal functions approach. By calculating the availability of specific health interventions that are key to PAC—i.e., the signal functions—we measure the capacity for, and quality of, PAC from a health systems perspective. We do this by summing or combining sets of indicators that constitutes the two delineated levels of care - basic and comprehensive PAC, that roughly correspond to care that should be provided at both the primary level and at the referral level hospitals respectively (**Box 1**). We also explored another level of analysis, which included developing case scenarios by excluding some PAC signal functions to have a less restrictive criterion at various stages. At first, we analyzed with all PAC signal functions for each facility levels. Secondly, we excluded the availability of staff capable of conducting normal deliveries, thirdly, we excluded - staff with delivery capabilities; having a referral capacity; availability of short and long-acting, or permanent family planning methods. At the fourth stage. We examined PAC

Loading [MathJax]/jax/output/CommonHTML/jax.js by to conduct referrals (through having a vehicle fueled). "Capacity" or "preparedness" was

conceptualized as ability of health facilities to deliver services based on signal function indicators [34]. Proportions of facilities capable of delivering basic and comprehensive PAC were generated.

Results

A total of 414 (Burkina Faso), 253 (Kenya) and 227 (Nigeria) health facilities participated in the survey. Health facilities included both primary, secondary and tertiary-level hospitals as illustrated in the Table 1.

Table 1
Distribution of sampled health facilities by Country

	Primary-level facilities	Secondary-level facilities	Tertiary-level facilities	Total (Overall facility response rate)
Burkina Faso	354 (85.5%)	56 (13.5%)	4 (1.0%)	414 (100%)
Kenya	211 (83.4%)	39 (15.4%)	3 (1.2%)	253 (97.6%)
Nigeria	92 (40.5)	124 (54.6%)	11 (4.8%)	227 (100%)

Typical services offered by the various levels of facilities

Primary-level facilities; offer health promotion and preventive care, and various curative services including prenatal, delivery and antenatal services; Secondary facilities: undertake curative and rehabilitative activities, to a limited extent preventive/ health promotion, and are a referral point for primary facilities; Tertiary facilities: referral point for primary/secondary facilities, and offer wide range of specialized services including major surgeries

Capacity of health facilities to deliver post-abortion care services

Capacity of primary health facilities to deliver basic PAC services

Less than one in ten primary-level facilities in Kenya (4.3%) and Nigeria (6.5%) had capacity to deliver all elements of basic PAC services, which include-treatment of complications, family planning counselling and contraceptive services, ability to refer patients needing referral (through presence of vehicle with fuel), and staff capable of conducting normal deliveries. When we excluded staff with capabilities to conduct normal deliveries, proportion of primary facilities capable of basic PAC remained constant in Nigeria, and changed by less than two-percent in Burkina Faso and Kenya (Table 2). Similarly, upon excluding - staff with delivery capabilities, referral capacity, and availability of various family planning methods, basic PAC capacity improved by 4.3% in Burkina Faso, while no real change was seen in the other countries. However, the greatest change in basic PAC was seen when we excluded the ability to conduct referral of patients needing emergency care at a higher-level facility.

Table 2
Primary-level facilities capable of providing basic PAC services

	Burkina F; N = 354	Kenya; N = 211	Nigeria; N = 92
	n (%)	n (%)	n (%)
Basic PAC (all indicators)	43 (12.2)	9 (4.3)	6 (6.5)
Basic PAC (excluding staff with delivery capabilities)	49 (13.8)	13 (6.2)	6 (6.5)
Basic PAC (excluding - staff with delivery capabilities; referral capacity; availability of short and long-acting, or permanent family planning methods)	64 (18.1)	13 (6.2)	7 (7.6)
Basic PAC (excluding referral capabilities, i.e. no vehicle with fuel)	230 (65.0)	78 (37.0)	19 (20.7)

While no primary facility across Burkina Faso, Kenya and Nigeria had the capacity to offer all the basic PAC signal functions PAC services, the majority of them could offer most of the signal functions. It is, however, worth noting that their capability to offer specific PAC services varied across countries. For instance, a majority of primary level facilities in Burkina Faso and Kenya ($\geq 90\%$) could administering parenteral antibiotics and intravenous fluids compared to Nigeria (88%) (Table 3). The least capability score is noted on availability of transport for referral to higher level facility; less than one in ten (8.5%) of primary facilities in Kenya and Nigeria have vehicles/ambulance and approximately one-fifth of facilities in Burkina Faso (19.2%). One service for which the primary facilities in Kenya fared rather poorly (below 50%) compared to Burkina Faso and Nigeria is the availability of staff to perform normal deliveries on normal duties or on call 24h daily.

Table 3
Capability to provide basic post-abortion care signal functions among primary-level facilities

	Burkina Faso N = 135 (%)	Kenya N = 211 (%)	Nigeria N = 92 (%)
Remove retained products of conception*	96.9	78.7	83.7
Administer parenteral antibiotics*	99.4	96.2	88.0
Administer parenteral uterotonics*	98.6	76.3	83.7
Administer intravenous fluids [†]	98.9	96.2	91.3
Has vehicle with fuel to transport patients needing referral [†]	19.2	8.5	8.7
Has staff capable of undertaking normal deliveries on duty or who are on call for 24h everyday	93.8	33.7	73.9
Provide at least one modern, short-acting family planning method at time of survey [†]	72.9	91.5	69.6
*Assessed on the basis of facility reporting if they had ever provided the service; [†] assessed on the basis of the availability and validity or functionality of a given item (drug or equipment) at the time of survey			

Capacity of referral health facilities to deliver comprehensive PAC services

Across the three countries, just one-third of referral-level health facilities (30% in Burkina Faso, 33% in Nigeria, and 29.6% in Kenya) could deliver the entire package of comprehensive PAC services. These services included - treatment of complications, family planning counselling and contraceptive services, ability to conduct blood transfusion, major abdominal surgery, and having a vehicle with fuel for possible referral. After applying a less restrictive criterion to assess capacity of referral facilities to deliver comprehensive PAC, only Nigeria had improvements in the proportion of facilities capable of comprehensive PAC (Table 4).

Table 4
Referral-level facilities capable of providing comprehensive PAC services

	Burkina F; N = 60	Kenya; N = 42	Nigeria; N = 135
	n (%)	n (%)	n (%)
Comprehensive PAC (all indicators)	18 (30.0)	14 (33.3)	40 (29.6)
Comprehensive PAC (excluding staff with caesarean section ability working daily)	18 (30.0)	14 (33.3)	45 (33.3)
Comprehensive PAC (excluding - staff with caesarean abilities, availability of short and long-acting, or permanent family planning methods)	20 (33.3)	14 (33.3)	47 (34.8)
Comprehensive PAC (excluding referral capabilities, i.e. no vehicle with fuel)	20 (33.3)	14 (33.3)	62 (46)

All tertiary level facilities across the three countries reported high capacity for comprehensive PAC. There were modest differences in availability of vehicles with fuel to convey PAC patients in critical conditions. Ordinarily, this will not be expected of tertiary facilities, however we know that in many developing countries, some health facilities designated as tertiary can lack certain expected resources/infrastructure (e.g. ICU). While all tertiary facilities in Kenya had this capacity, only three in four (75%) tertiary facilities in Burkina Faso and 72% in Nigeria had the same. About 25% of tertiary facilities in Nigeria are unable to undertake a major abdominal surgery such as a laparotomy (Table 5). There were some differences between secondary and tertiary facilities. For instance, very few secondary level facilities in Kenya (35.9%), Burkina Faso (37.5%) and Nigeria (50%) had capacity to undertake a major abdominal surgery, such as laparotomy or hysterectomy. Notably, 84% of secondary facilities in Burkina Faso administer blood transfusion, compared to about half (56%) in Kenya and 48% in Nigeria. About 75% of secondary facilities Kenya and Burkina Faso have vehicles for referral purposes, compared to less than half in Nigeria (46%).

Table 5
Capability to provide comprehensive PAC signal functions among secondary and tertiary facilities

	Burkina F (%)		Kenya (%)		Nigeria (%)	
	Secondary (N = 56)	Tertiary (N = 4)	Secondary (N = 39)	Tertiary (N = 3)	Secondary (N = 124)	Tertiary (N = 11)
Remove retained products of conception*	100.0	100.0	100.0	100.0	91.9	100.0
Administer parenteral antibiotics*	100.0	100.0	100.0	100.0	95.2	100.0
Administer parenteral uterotonics*	100.0	100.0	97.4	100.0	90.3	100.0
Administer intravenous fluid†	100.0	100.0	100.0	100.0	97.6	100.0
Has vehicle with fuel to transport patients needing referral ^{†‡}	75.0	75.0	74.4	100.0	46.0	72.7
Provide modern, short and long acting family planning method [†]	83.9	100.0	97.4	100.0	81.5	100.0
Administer a blood transfusion*	48.2	100.0	56.4	100.0	84.7	100.0
Undertake major abdominal surgery i.e., laparotomy and hysterectomy *	37.5	75.0	35.9	100.0	50.0	100.0
Has staff capable of doing caesarean sections available daily	96.4	100.0	97.4	100.0	79.8	90.9

Key: *Assessed on the basis of facility reporting if they had ever provided the service; †assessed on the basis of the availability and/or functionality of a given item (drug/equipment) at time of survey; ‡we assumed that staff who were capable of doing caesarean sections were also capable of doing normal deliveries, and therefore did not need to include this factors in comprehensive capability for PAC

Facility operation hours

Majority of facilities in Burkina Faso (98.3%) and in Nigeria (82.8%) operated every day for 24hrs, while less than 40% of health facilities in Kenya did so. There were stark contrasts on the days in which facilities deliver contraceptives, for instance; only about 6% of facilities in Kenya offered contraceptive services 24 hours daily, while over 94% in Burkina Faso do so, and 54% in Nigeria. Majority of facilities in Kenya (84.2%) nevertheless operate for 5 days for less than 24 hours as seen in Table 6.

Table 6
Facility operation periods and products offered

	Burkina Faso (%)	Kenya (%)	Nigeria (%)
Operational days and time			
7 days for 24hrs/per day	98.3	35.6	82.8
5days and less than 24hrs/per day	0	51.8	7.5
Others	1.7	12.7	9.7
Days and time when Contraceptive services are provided			
7 days for 24hrs/per day	94.9	5.9	54.2
5days and less than 24hrs/per day	0	84.2	12.8
Others	5.1	9.9	33

Reasons why some facilities could not deliver basic or comprehensive PAC services

Respondents from Burkina Faso, Kenya and Nigeria, cited a number of reasons for the limited capacity to deliver basic and or comprehensive post-abortion care services. Lack of skills and specific training on PAC services, lack of equipment, and unavailability of certain commodities and supplies for PAC, were commonplace across Burkina Faso (Fig. 2), Kenya (Fig. 3) and Nigeria (Fig. 4). In Burkina Faso and Kenya, the greatest impediment to delivery of surgical procedures that manage abortion complications including surgical PAC for pregnancies below 12

weeks of gestations was the lack of trained staff and absence of the necessary equipment. While medical evacuation procedures were largely hampered by the lack of trained providers in Burkina Faso and Nigeria, in Kenya the stock-outs of supplies and commodities were main factors. Inability to deliver blood transfusions was mainly attributed to the lack of supplies and commodities in Kenya, as opposed to the lack of equipment in Burkina Faso and Nigeria.

Discussion

Of all maternal deaths, those related to unsafe abortion are the most severely underestimated [2, 3], yet they remain most preventable. Nearly two and half decades after the ICPD, availability, access and quality of post abortion care (PAC) is limited in most SSA countries, resulting in several deaths from unsafe abortion [16]. Within Burkina Faso, Kenya and Nigeria, long standing political commitments to address maternal mortality and morbidity, have not necessarily translated into improved access to PAC, and particularly in primary level facilities, accessed by the majority of women. Using signal function data from nationally representative survey of facilities in the three countries, this study provides new evidence on the preparedness of public health facilities to deliver quality PAC in resource-constrained settings.

Across the three countries, data on availability and distribution of PAC services showed the poor state of health care for women who present at public health facilities with abortion-related complications. Overall, very few primary health facilities in the three countries (i.e. Kenya-4.3%, Nigeria-6.5%, and Burkina Faso-12.2%) had capacity to deliver on all basic PAC services. These findings are consistent with other studies reporting low capacity of health systems for PAC services. For instance, in Zambia, only 2.6% of facilities could deliver basic PAC services [26]. In addition, other studies have also reported lower figures for basic PAC in Tanzania, Uganda, Rwanda and Namibia [33–35]. On the contrary, other recent studies in countries such as Malawi (29%) and Senegal (16%) had significantly higher proportions of facilities able to deliver basic PAC services [13, 36]. These differences may be mainly driven by the national government's prioritization and investments in general maternal health services across levels of health facilities, specifically, quality post-abortion care services.

Only one in three (30–33%) referral facilities in the focus countries were capable of providing comprehensive PAC services. These proportions are higher compared to the proportion of facilities in a Zambian study (0.3%). This disparity could be due to the higher threshold (12 indicators) used in Zambian work, which did not create categorization for the clusters of services potentially available in primary facilities, but rather examined all facilities as similar. Nevertheless, results from surveys on comprehensive PAC services in Uganda, Senegal, Rwanda, Namibia and Kenya were largely similar to our findings (Vlassoff et al., 2015). Regardless, the existing capacities for referral facilities for the services covered can be described as low and needing urgent prioritization. Referral facilities are intended to provide critical and specialized care to patients and in the case of PAC, such services can be urgent without which women may experience permanent disabilities and death eventually. This is more concerning, given that even when applying a less-strict measure of comprehensive PAC (excluding staff availability and post-abortion family planning services to at least one long-acting or short-acting method), there was no marginal change in overall capacity of referral-level health facilities to provide comprehensive PAC. Among healthcare providers in the three SSA countries, there was consensus that capacity to deliver post abortion interventions must entail a combination of personal skills of health staff and health facility resources including blood for transfusion and drugs such as Misoprostol, as such, gaps in either results in poor health outcomes. Health providers training is therefore as important, allowing them to assess the clinical condition of PAC patients, diagnose, and prescribe appropriate treatment for the patient. There are opportunities to enhance such training through pre-service and periodic in-service training. The absence of training means providers mostly act as a relaying belt by referring all patients that come their way – further increasing delays to care and cost of care.

By using signal functions indicators to examine preparedness of facilities to deliver specific basic PAC services, this study was able to highlight critical strengths and challenges in delivering basic PAC at the primary level, and also offer an opportunity to compare across countries. In general, no country had all primary level facilities capable of providing all basic PAC services, with specific gaps in the availability of vehicles with fuel (preferably ambulance) to facilitate seamless transfer of patients to the proximate higher facility. Even though lower level referral facilities (especially secondary facilities) were able to deliver many of the PAC signal functions, they were unable to provide two of the most essential interventions to manage life threatening abortion complications, blood transfusions and abdominal surgeries. These interventions are the cornerstone of comprehensive PAC clinically and in their absence then it is almost not worth sending women to these facilities. We know that primary facilities are more prevalent in these contexts, which implies that they are often the first point of contact for medical emergencies including those arising from unsafe abortions [16]. Improved preparedness of these facilities to provide PAC services is fundamental to saving the lives of women and girls.

In context, our findings suggest that;

- Many women may not be able to receive appropriate PAC at the nearest health facilities in these countries.

- Even for women who can access referral-level facilities, either via referral from primary care or through bypassing primary care altogether, they may not be guaranteed appropriate management of the complications they present.
- Limitations in access to quality and complete PAC by women may result in several poor outcomes in health. The weak referral capacities at primary facilities means that women may have to facilitate their own transfer when they require critical care. In a region of poor public and private transportation systems, women and their caregivers may be subjected to tortuous journeys moving from one facility to the other.
- Relative variability exists between countries in the provision of specific services, probably reflective of the distinct structure of the health system and tasks expected at each level of facility within it, regardless of our broad classification into primary and referral levels for analysis.

Strengths and limitation

Among the key strengths of this study are that we collected primary data on the health system indicators of PAC from a cross-section of health facilities in Burkina Faso, Kenya and Nigeria, and complemented this survey data with in-depth interviews from key providers of PAC and related services. This is an improvement from previous studies that utilized service provision assessment data, which are often not collected to measure PAC services but maternal health generally. Further, we attempt to measure the quality of PAC at different levels of health service delivery across the three countries and report on critical gaps in the provision of PAC at all facilities that offer delivery services. Nonetheless, there are certainly some limitations to the study findings. First, while the study assesses the structural and process indicators (to be published elsewhere) of health care quality framework, it does not examine the patient health outcomes in assessing the quality of post-abortion care. Considering the five essential components of comprehensive PAC, this study address three, including treatment of incomplete and unsafe abortion complications, contraceptive and family planning services, and the provision of reproductive and other health services. This survey however did not assess counselling to identify and respond to women's emotional and physical health needs and concerns as well as community and service provider partnerships for prevention, mobilization of resources and ensuring that health services reflect and meet community expectations and needs.

Conclusions

This study found low capacity of primary and referral facilities to provide basic and comprehensive PAC. While PAC is a critical emergency service, results from this study point to severe gaps and weaknesses in delivery of PAC in Kenya, Nigeria and Burkina Faso. To achieve improved maternal mortality targets, there is need for increased investments by governments to strengthen capacity of health facilities to deliver quality PAC services including training of health providers, supplies and commodities, and referral to higher-level facilities.

Abbreviations

APHRC: African Population and Health Research Center

FCT: Federal Capital Territory

ICPD: International Conference on Population and Development

KEPH: Kenya Essential Package for Health

KNH: Kenyatta National Hospital

MMR: Maternal Mortality Ratio

NACOSTI: National Commission for Science, Technology & Innovation

PAC: Post-Abortion Care

SDGs: Sustainable Development Goals

Declarations

Ethical Considerations

The study protocol was reviewed and approved by the AMREF Ethics and Scientific Research Committee (ESRC) (protocol ID: AMREF-ESCR
 Kenyatta National Hospital Ethics and Research Committee (protocol ID: KNH-ERC/A/384) in

Kenya. Permits to conduct the study were also obtained from the Kenyan National Commission for Science, Technology and Innovation (NACOSTI) and from each participating health facility. The study protocol was also approved in Nigeria by the National Health Research Ethics Committee of Nigeria (NHREC) (protocol ID: NHREC/01/012007-20/08/2018), and in Burkina Faso by the health research ethics committee (CERS) (Protocol ID: 2018-10-124), as well as authorization letters from the ministries of Health in all the countries. Individual written consent was obtained from each participant included in the study.

Consent for publication

Not applicable.

Conflict of interest:

The authors declare that they have no competing interests

Availability of data and materials:

Data are available from the authors

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Authors' contributions

KJ, RO, JAA, MM, MB - contributed to the design of the study. KJ, RO, MB - analyzed and interpreted the data and drafted the manuscript. All authors (KJ, RO, JAA, MM, MB, MO, NEE, and JE) contributed to the final manuscript by providing input into the interpretation of the data, reviewing, and editing the manuscript. All authors read and approved the final manuscript.

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Figures

Overlapping signal functions required in order to meet basic and comprehensive PAC services	
Expected Functions for all facilities (Signal Functions)	
<ol style="list-style-type: none"> 1. Remove retained products of conception* 2. Administer parenteral antibiotics* 3. Administer parenteral uterotonics* 4. Administer intravenous fluids[†] 5. Provide at least one modern, short acting family planning method at time of survey[‡] 	
Capability to provide basic PAC	Capability to provide comprehensive PAC
Functions expected of primary facilities (Signal Functions)	Functions expected of referral facilities (Signal Functions)
<ol style="list-style-type: none"> 6. Has vehicle with Fuel to transport patients needing referral [†] 7. Has staff capable of undertaking normal deliveries on duty or who are on call for 24h per day, 7 days per week 	<ol style="list-style-type: none"> 6. Administer blood transfusion* 7. Undertaking major abdominal surgery (similar to provision of caesarean section)* 8. Provided at least one long-acting, reversible[†] or permanent family planning method 9. Has staff capable of doing caesarean sections on duty or who are on call for 24h per day, 7 days per week[‡]
Adapted from [17]	
*Assessed on the basis of facility reporting if they had ever provided the service	
[†] Assessed on the basis of the availability and validity or functionality of a given item (drug or equipment) at the time of survey	
[‡] We assumed that staff who were capable of doing caesarean sections were also capable of doing normal deliveries, and therefore did not need to include this factors in comprehensive capability for PAC	

Figure 1

Description of basic and comprehensive PAC services (signal functions)

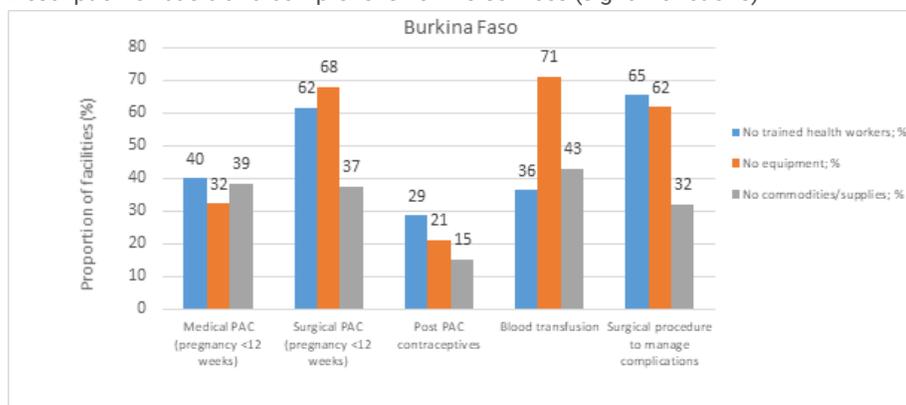


Figure 2

Reasons for not delivering PAC services in Burkina Faso

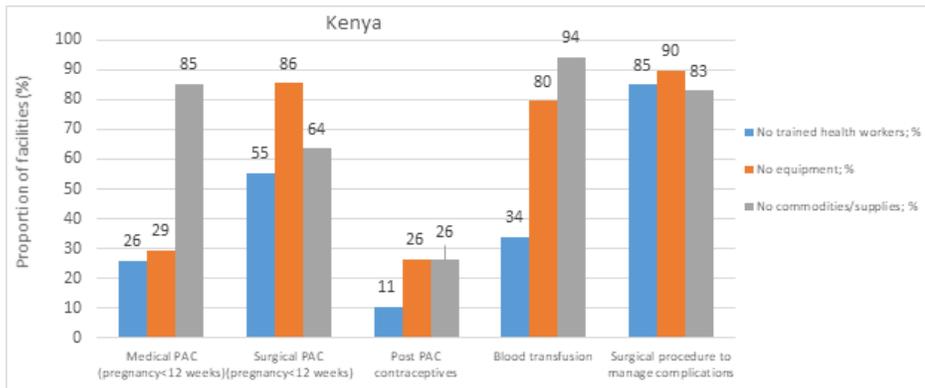


Figure 3

Reasons for not delivering PAC services in Kenya

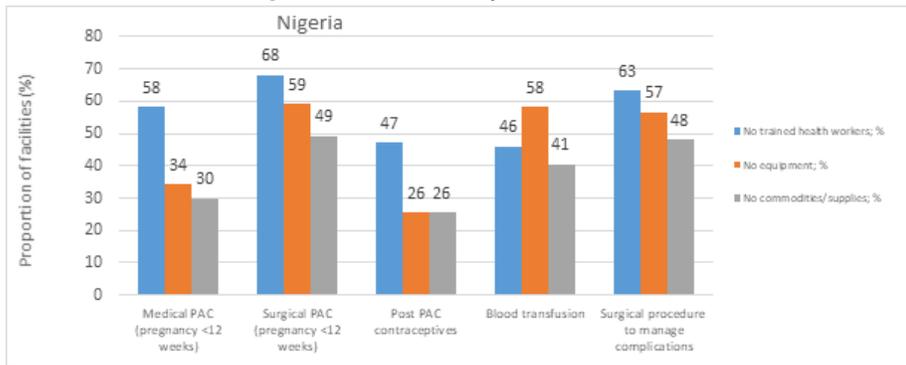


Figure 4

Reasons for not delivering PAC services in Nigeria