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WORKING PAPERS

Influence of Provider Training on Quality of Emergency Obstetric Care in Kenya

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BASED ON FURTHER ANALYSIS OF THE
2004 KENYA SERVICE PROVISION ASSESSMENT SURVEY

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No. 3

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Influence of Provider Training on Quality of Emergency Obstetric Care in Kenya

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Based on further analysis of the
2004 Kenya Service Provision Assessment Survey



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ABSTRACT

In addition to infectious diseases, maternal and neonatal conditions account for a substantial part of the health gap between rich and poor countries. For example, more than 99 percent of maternal deaths occur in the developing world. The majority of the deaths are caused by direct obstetric complications, including haemorrhage, sepsis, eclampsia, obstructed labour, and unsafe abortion practices. In Kenya, complications related to pregnancy and childbirth are leading causes of morbidity and mortality, translating to 414 maternal deaths per 100,000 live births. Although 88 percent of Kenyan women attend antenatal care, only 40 percent deliver in the health facilities, and only 42 percent of all deliveries have skilled attendance at delivery. In the Kenyan context, access to and use of quality emergency obstetric care (EmOC) are essential to efforts aimed at reducing maternal morbidity and mortality.

We examine data from the 2004 Kenya Service Provision Assessment (KSPA) to assess the availability of EmOC services in Kenya, and to demonstrate the importance of health worker training in the delivery of these life-saving services. We find that less than 20 percent of maternal health workers interviewed had received training in focused antenatal or postnatal care in the last three years. Among caregivers providing delivery services, only 18 percent had received training in lifesaving skills, and only 37 percent had received training in the prevention of mother-to-child transmission of HIV during the last three years. Our analysis also demonstrates that training is a critical element in the detection and management of complications. Recent training in relevant subject matter was found to be significantly and positively associated with the ability to provide quality care in the event of unsafe abortion and postpartum haemorrhage. Training was also positively associated with the ability to provide appropriate care in the event of a retained placenta.

The obvious recommendation is to ensure that up-to-date, quality training is provided to a broad base of health workers at all types of facilities, particularly at the local facilities that are the first point of contact for women experiencing an obstetric emergency. It is recognized that there are logistical obstacles to increasing the number of health workers who receive training. Further, although we isolated the element of training for this analysis, it is clear from these findings that for optimal service outcome, quality-of-care training has to be undertaken within the context of improved infrastructure and as a support to service delivery.

INTRODUCTION

Along with infectious diseases, maternal and neonatal conditions account for a substantial part of the health gap between rich and poor countries; for example, more than 99 percent of maternal deaths occur in the developing world. Overall, the average lifetime risk of maternal death is 1 in 4,000 in high-income countries, 1 in 61 in middle-income countries and 1 in 17 in the lowest-income countries (World Bank, 2006). Worldwide, 514,000 women die from pregnancy and childbirth each year, half of whom are from Africa (Pearson and Shoo, 2005). The majority of the deaths are caused by direct obstetric complications including haemorrhage, sepsis, eclampsia, obstructed labour, and unsafe abortion practices.

Studies show that most women who develop complications do not have any known risk factors, and there is no way of knowing whether any will develop (Maine, 1993). Therefore, quality emergency obstetric care (EmOC) services need to be available to every pregnant woman over and above health worker responsiveness to life-threatening complications. The United Nations recommends that for every 500,000 inhabitants, there should be at least four facilities offering basic EmOC¹ and one facility offering comprehensive EmOC,² appropriately distributed.³ The United Nations further recommends that 15 percent of all births take place in EmOC facilities, 100 percent of all complications should be treated, the caesarean section rate should be between 5 and 15 percent of all births, and the case fatality rate of obstetric complications should be less than 1 percent (UNICEF, WHO, and UNFPA, 1997).

¹The United Nations recommends six signal functions for basic emergency obstetric care. This care can be given in a health centre without the need for an operating table. The six signal functions include the provision of parental antibiotics, parental oxytocics, parental anticonvulsants, manual removal of the placenta, removal of retained products, and assisted vaginal delivery.

²The United Nations recommends eight comprehensive emergency obstetric care functions. This includes all the six basic emergency obstetric care functions described earlier as well as caesarean sections and blood transfusions.

³UNFPA Emergency Obstetric Care. checklist for planners, http://www.unfpa.org/upload/lib_pub_file/150_filename_checklist_MMU.pdf

In Kenya, the ratio of basic and comprehensive EmOC facilities to 500,000 people is 2.7 and 1.7, respectively (NCAPD, 2004). In terms of basic services, it would seem that Kenya is fairing poorly, as it has a lower-than-recommended ratio for basic EmOC services, but it seems to be doing much better in terms of comprehensive services, having more than the recommended number of facilities. However, it is important to be aware that the comprehensive service facilities may not be evenly distributed across all regions. Only 4 percent of births are delivered by caesarean section (CBS, 2004), and the case fatality rate of obstetric complications is very high. Complications related to pregnancy and childbirth are leading causes of morbidity and mortality in Kenya, translating to 414 maternal deaths per 100,000 live births. Although 88 percent of Kenyan women studied attended antenatal care, only 40 percent delivered in the health facilities, and only 42 percent of all deliveries have skilled attendants present at the time of delivery (CBS, 2004). In the Kenyan context, access to and use of quality EmOC are essential to the efforts aimed at reducing maternal morbidity and mortality (Mavalankar and Rosenfield, 2005).

In addition to demonstrating that many facilities offering obstetric services lack the equipment and basic supplies necessary to support the provision of quality antenatal care (ANC), delivery, and postnatal care (PNC) services, the 2004 KSPA further showed that the health providers' level of knowledge, competency, and skills are not up to date with the recommended practices. Although training of service providers is an important element in the provision of quality maternity care (NCAPD, 2005), less than 20 percent of health workers interviewed had received training in focused ANC or PNC in the last 3 years. Among caregivers providing delivery services, only 18 percent had received training in lifesaving skills, and only 37 percent

had received training in the prevention of mother-to-child transmission of HIV during the last 3 years.

Empirical investigations of health worker training in Kenya have been limited to mappings of health service providers in terms of cadre and distribution (Ministry of Health, 2004) and assessments of the training needs for various skills (Department for International Development/JHpiego, 2005). However, there has not been a comprehensive study of the influence of training on the provision of quality EmOC. We seek to fill this gap by assessing the link between health provider training and practice with regard to the provision of EmOC (NCAPD, 2005). To demonstrate the importance of training to the provision of quality emergency obstetric services, we use data from the 2004 KSPA to explore the association between provider training and the quality of service provision in selected components of EmOC (retained placenta, unsafe/incomplete abortion, and postpartum haemorrhage).

EmOC

EmOC can be discussed in terms of basic and comprehensive care available within a facility that is provided to a woman with obstetric complications. Basic and comprehensive services are distinguished through the signal functions as shown in Table 1.

Table 1. Elements of care

The elements of basic and comprehensive emergency obstetric care.

Basic emergency obstetric care	Comprehensive emergency obstetric care
Administer parenteral antibiotics	All functions included in basic care plus
Administer parenteral oxytocic drugs	Perform surgery (e.g., caesarean section)
Administer parenteral anticonvulsants for preeclampsia and eclampsia	Perform blood transfusion
Perform manual removal of placenta	
Perform manual removal of retained products (e.g., manual vacuum aspiration)	
Perform assisted vaginal delivery	

Quality of care in EmOC involves institutional and staff preparedness in the provision of appropriate emergency services while responding to the needs and rights of the clients. These include having staff with relevant skills available, having functional equipment and supplies, and having adequate infrastructure, all of which are prerequisites for the provision of prompt and appropriate care when emergencies arise. Health worker preparedness to provide EmOC is the most critical element in the provision of quality care, in that they must have the knowledge and skills to recognize an obstetric emergency and then respond appropriately (NCAPD, 2005).

Importance of Appropriate Training to Provision of Quality Maternity Care

Research demonstrates that appropriate training of health care providers is critical to the provision of quality maternity care. A literature review conducted by Penny and Murray (2000) to assess experiences in training initiatives for essential obstetric care in developing countries highlighted the fact that the evaluation of training programmes requires more than an account of the numbers of midwives trained, and should also measure outputs such as improved provider knowledge, improved competence, behavioral change, and improved service performance. The safe motherhood demonstration projects in Ghana and Vietnam provide a good example. These projects evaluated the use of lifesaving skills training using the American College of Nurse Midwives modules, along with the introduction of new equipment. Three key findings were established: first, the detection of life-threatening obstetric conditions improved at the primary and secondary health facility level, but management of such conditions improved only at secondary level (Sloan et al., 1998). Second, direct comparisons between the training initiatives and the differing educational approaches were difficult to make because of the diversity of context. Finally, EmOC training in poor resource settings is not a straightforward matter.

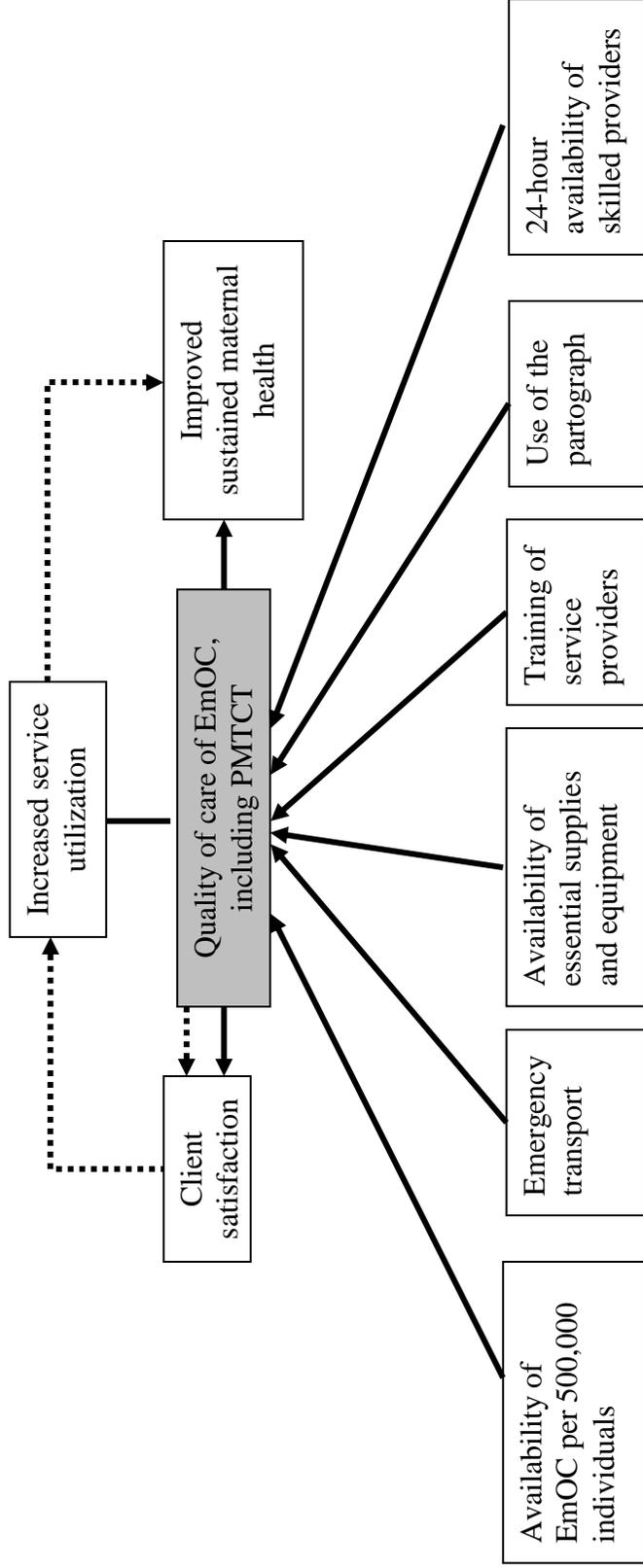
Shortcomings such as poor pre-service training, lack of good equipment, and lack of obstetric protocols in the workplace can substantially hinder the positive learning process.

A study carried out to determine whether the introduction of obstetric emergency training in line with the recommendations of the Clinical Negligence Scheme for Trusts found a significant reduction in the incidence of infants born with a 5-minute Apgar score of 6 or less and hypoxic ischemic encephalopathy following the introduction of the obstetric emergency training course. This improvement was sustained over time and led to the conclusion that specific multi-professional training in obstetric emergencies using local in-house courses are practical and may improve neonatal outcomes (Draycott et al., 2006).

Conceptual Framework

Our conceptual framework, as presented in Figure 1, demonstrates that there are key inputs that are essential and that interact synergistically to produce improved quality of care, which engenders high client satisfaction and hence greater demand for and use of services. These key inputs include availability of EmOC services per 500,000 people, emergency transport, availability of essential supplies and equipment, 24-hour availability of health personnel, use of partographs, and trained health workers (service providers). In this paper, we focus on the element of training. We test the hypothesis that there is a positive relationship between service provider training and provision of quality EmOC services.

Figure 1. Conceptual framework



Note: EmOC = emergency obstetric care; PMTCT = prevention of mother-to-child transmission of HIV.

DATA AND METHOD

Data

Subsequent to the 2003 KDHS, Kenya implemented a nationally representative survey of health care facilities, the 2004 KSPA. This survey focused on basic-level health services, particularly those important for women and children. Four high-priority health services, all interrelated to some extent, were assessed: child health, family planning, maternal health, and specific infectious diseases (sexually transmitted infections, HIV/AIDS, and tuberculosis). For this analysis, we focus on the maternal health component, which assessed counselling and screening during ANC visits, the environment available during labour and delivery, and postnatal care. Data used in this analysis were collected through the use of two survey instruments: the Health Worker Interview questionnaire and the Maternal Health Provider Knowledge questionnaire.

In the Health Worker Interview, interviewers asked providers about their qualifications (training, experience, and continued in-service training), the supervision they had received, and their perceptions of the service delivery environment. The Maternal Health Provider Knowledge questionnaire assessed the health worker's knowledge of various symptoms that pregnant women experience and what actions need to be taken in response to those symptoms.

For the purposes of the KSPA, a health service provider/worker is defined as one who actually provides professional services to clients, such as ANC, PNC, delivery care, and EmOC. For example, health workers were not eligible for observation or interview if they only completed registers and never provided any type of professional client services. The sample of health service providers was selected from providers who were present in the facility on the day of the survey and who provided services that were assessed by the KSPA. The objective was to interview an average of eight providers in a facility. In facilities with fewer than eight health

providers, all of the providers present on the day of the survey were interviewed. In facilities with more than eight providers, an average of eight providers was interviewed, including all providers whose work was observed. If interviewers observed fewer than eight providers, they also interviewed a random selection of the remaining health providers to obtain an average of eight provider interviews.

Data were weighted during univariate and bivariate analyses to account for the differentials caused by over- or under-sampling of providers with a particular qualification in a facility type and province. It should be pointed out that in a few cases, the staff present on the day of the survey may not be representative of the staff that normally provides the services being assessed.

A total of 276 maternal health worker providers were interviewed. To identify predictors of quality provision of EmOC, we selected for analysis the subset of 185 of the health care providers to whom both the Health Worker Interview questionnaire and Maternal Health Provider Knowledge questionnaire were administered.

Definitions

Dependent Variable. Our definition of quality care was based on the recommended actions that are required to be taken in case of particular obstetric complications. Each correct action was given a value of one point. Providers who mentioned four or fewer actions were classified in the poor-quality category, whereas those who mentioned five or more were classified in the good-quality category. Level of quality care was therefore classified as either poor or good. This binary classification was adopted for multivariate analysis because of the small sample size.

Table 2 provides the list of recommended actions for handling the selected obstetric complications: retained placenta, post abortion complications, and postpartum haemorrhage. These three complications were selected for analysis because they contribute highly to maternal mortality in sub-Saharan Africa and Kenya. Retained placenta is a major cause of postpartum bleeding. Haemorrhage is one of the leading direct causes of maternal deaths in the African region, accounting for 25 percent of all maternal deaths, whereas complications resulting from unsafe abortion accounts for 13 percent of these deaths (Doyin, 2004). A systematic review to determine the distribution of causes of maternal deaths carried out on 160 databases between 1997 and 2002 found that the leading cause of maternal mortality in Africa is haemorrhage, accounting for 34 percent (Khan et al., 2006).

Table 2. Actions taken

Actions taken in response to selected obstetric emergencies, for which health workers' knowledge was assessed.

Type of obstetric emergency	Recommended actions that should be reported by health worker
Retained placenta	<ul style="list-style-type: none"> Empty urinary bladder Repeat oxytocics Manually remove placenta Give intravenous fluids Monitor vital signs Check contraction of uterus Take blood for grouping and cross-matching Prepare for surgical theater if blood does not stop Refer to doctor or hospital
Incomplete or unsafe abortion	<ul style="list-style-type: none"> Assess vaginal bleeding Assess vital signs Start intravenous fluids Start on antibiotics Perform manual vacuum aspiration Do conventional evacuation (dilation and curettage) Provide counseling Do bimanual pelvic examination Pap smear/visual inspection with acetic acid/visual inspection with Lugol's iodine Give information about: sexually transmitted infections/HIV/AIDS, family planning, infertility, personal care, risks of abortion

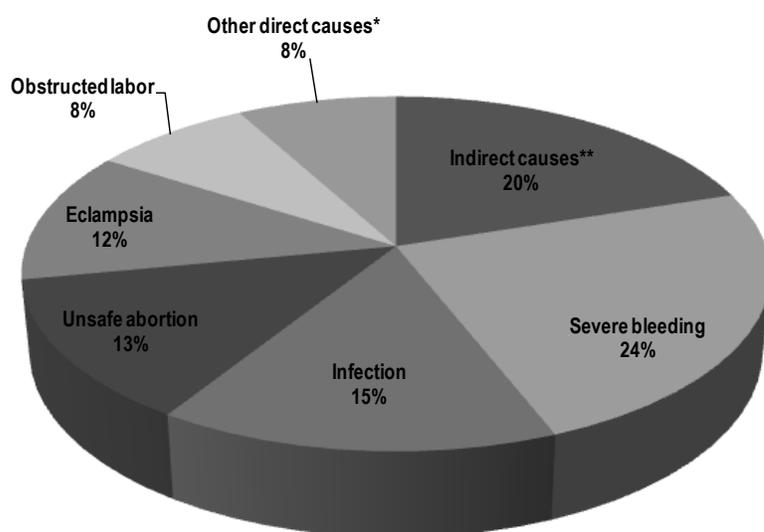
(Cont'd)

Table 2 – cont'd

Type of obstetric emergency	Recommended actions that should be reported by health worker
Heavy bleeding postpartum from an atonic/uncontracted uterus	Massage the fundus Empty urinary bladder Give oxytocics Start intravenous fluids Take blood to test for hemoglobin levels, grouping, and cross-matching Wait for spontaneous responses then refer to doctor or hospital Raise the foot of the bed

In Kenya, the KDHS 2003 indicates that between 6,000 and 10,000 women die annually from pregnancy- and childbirth-related complications. Of these deaths, two thirds are the result of postpartum haemorrhage, and one third is as a result of bleeding because of post-abortion complications (CBS, 2004). A national assessment of the magnitude and consequences of unsafe abortion in Kenya found that almost 300,000 abortions are performed in Kenya each year and that 48 percent of these abortions occur among women aged 14-24 years (IPAS, 2003).

Figure 2. Causes of maternal mortality in the African region



*Other direct causes include: ectopic pregnancy, embolism, anesthesia-related

**Indirect causes include: anemia, malaria, heart disease

Source: WHO and World Bank, 1997.

Independent Variables. Data were collected from health workers providing maternal health services by province, facility type, operating authority, provider category, years of service, and gender. The description/characteristics of each of these independent variables and the responses are detailed below.

1. Province. Kenya is organized administratively into eight provinces, each operating independently in terms of resource allocation. They include Nairobi, Central, Coast, Eastern, North Eastern, Nyanza, Rift Valley, and Western provinces. Services were assessed per province, which was used as the unit of sampling.
2. Facility Type. Facilities were assessed according to the available services they were mandated to provide. This included hospitals, which provide a wide range of comprehensive and specialized services; health centres and maternities, which mainly provide a limited range of reproductive health services; clinics; and dispensaries, which provide outpatient services.
3. Managing Authority. Health facilities were assessed depending on the major source of funding in terms of the provision of the infrastructure, staff, and supplies. These facilities were placed in two categories, governmental and nongovernmental.
4. Health Provider Category. Health providers from the facilities were assessed depending on the level of training they had, and hence the services they were able to provide. Categories include the following: consultant, medical doctor, clinical officer, registered nurse, registered midwife, enrolled nurse, enrolled midwife, and nurse aide.
5. Health Provider Years of Experience. Health provider years of experience were assessed to determine the influence of years of experience on the knowledge and actions in the

management of obstetric complications. Years of experience were categorized as 0-4 years, 5-9 years, 10-14 years, and more than 15 years.

6. Provider Gender and Training. Health provider gender was assessed to determine the influence of gender on the provision of quality EmOC. Training in lifesaving skills and post-abortion care was assessed.

Statistical Analysis

The unit of analysis for this study was the health care providers to whom both the health worker interview and maternal health provider knowledge questionnaires were administered. Because a sample of available providers was selected for interview, the provider's weight was used in this analysis. The weights were recorded as eight-digit numeric values, which were divided by 1,000,000 when used in the analysis. Our response (dependent or outcome) variable was quality care, which is a dichotomous variable, being either poor- or good-quality care. Bivariate analyses were conducted using chi-square tests of independence. Logistic regression was used to assess the association between in-service training and the provision of quality care, adjusting for the described independent variables.

RESULTS

Description of the Sample

The study sample consisted of 185 maternal health providers to whom both the health worker interview and maternal health worker knowledge questionnaires were administered. These providers were from 185 facilities in all eight provinces in Kenya. All health workers interviewed indicated that they provide delivery services and most provided ANC/postpartum care (99 percent). The majority of providers interviewed were male (87 percent). The description of the selected sample is summarized in Table 3.

Table 3. Distribution of providers: Characteristics

The number and percentage distribution of providers by characteristics.

Characteristic	Weighted (%)
Province	
Nairobi	7.2
Central	21.1
Coast	5.2
Eastern	12.1
North Eastern	1.0
Nyanza	19.1
Rift Valley	28.1
Western	6.1
Facility type	
Hospital	26.1
Health centre	50.2
Clinic	0.4
Dispensary	16.4
Maternity	6.8
Operating authority	
Government	51.4
Nongovernment	48.6

(Cont'd)

Table 3 – cont'd

Characteristic	Weighted (%)
Provider category	
Consultant	0.2
Medical doctor	0.1
Clinical officer	2.4
Registered nurse	6.8
Registered midwife	11.9
Enrolled nurse	21.1
Enrolled midwife	44.6
Nurse aide	12.2
Training	
Trained in lifesaving	15.8
Trained in postabortion care	10.4
Good-quality care	
Retained placenta	21.5
Unsafe abortion	13.7
Haemorrhage	24.2
Years of experience	
0-4	34.9
5-9	28.8
10-14	12.1
15+	24.2
Sex of provider (Male)	87.4
Provides antenatal/postpartum care	98.8
Provides delivery services	100.0
Total	100.0
Total <i>N</i>	185

Univariate Results. Most of the interviewed service providers were from Rift Valley, Central, Nyanza, and Eastern provinces. Very few providers interviewed were from North Eastern Province. Half of the respondents were from health centres, and about two thirds of the interviewed providers were enrolled nurses and enrolled midwives. Categories of some characteristics with an unweighted number of less than 25 cases were merged with other categories or dropped. Merging of provinces would not yield interpretable results; therefore, the province variable was dropped from subsequent analyses. For the facility type, health centre was

merged with maternity, and clinic was merged with dispensary. Doctors, clinical officers, or consultants (n = 15) were dropped from the analysis, as they could not be merged with nurses or midwives. Provider category remained with two categories: registered nurse/midwife and enrolled nurse/midwife/nurse aide. The total number of unweighted cases for the bivariate and multivariate analyses was 170.

Bivariate Results. Table 4, the first panel, shows the percentage distribution of providers according to their knowledge-based ability to provide care in the event of a retained placenta, according to selected characteristics. This table shows that overall, comprehensive knowledge of the actions to take in the event of a retained placenta is low among relevant service providers: less than one quarter of obstetric caregivers have the knowledge-based ability to provide good-quality care under these circumstances. Training in lifesaving skills seems to be associated with quality care provision ($P = .029$). However, service providers trained in lifesaving skills in the past 1 or 2 years were more likely to have the knowledge required to provide good-quality care in the event of a retained placenta as compared with those who had not received recent training (37 percent versus 19 percent, respectively). Although the association between training in postabortion care and knowledge to provide good-quality care in the event of a retained placenta was not statistically significant, there was nevertheless an improvement in knowledge over those who did not receive recent training: 35 percent of those trained in postabortion care had good knowledge about what to do in case of a retained placenta, as compared with 20 percent among those who had not received such training. Health providers from government-managed facilities seemed to have better knowledge of how to provide good-quality services for complications resulting from retained placenta compared with those providers from nongovernmental facilities

(25 percent versus 17 percent, respectively), though the association was not significant. Health provider category was significantly associated with quality care provision: registered nurses/midwives were more likely to have the knowledge to provide good-quality care for women with retained placenta than were enrolled nurses/midwives (37 percent versus 17 percent, respectively).

With regard to facility type, ability to provide good-quality service was below 50 percent for all categories, with hospital-based providers faring the best, with 40 percent having good levels of knowledge, and clinic/dispensary-based providers faring the worst, with only 6 percent of providers having good levels of knowledge about how to act in the event of a retained placenta. Years of experience was found to be associated with quality care provision for both retained placenta and postpartum haemorrhage complications ($P = .000$ and $P = .006$, respectively).

Table 4, the second panel, shows the percentage distribution of providers according to their knowledge-based ability to provide care in the event of unsafe abortion, according to selected characteristics. This table shows that knowledge of how to provide quality post-abortion care is very low among Kenyan caregivers, with only 14 percent being able to cite comprehensive knowledge of treatment protocols. Among service providers trained in post-abortion care in the past 1 or 2 years, 30 percent demonstrated that they could provide good-quality care to a woman presenting with symptoms consequent to unsafe abortion; however, very few providers received this training ($n = 19$). Similarly, about one quarter (23.3 percent) of providers who received lifesaving skills training had the knowledge to provide good-quality post-abortion care, compared with 12 percent among those who did not receive such training. It is important to note that failure to receive training is associated with a poor base of knowledge

on which to provide post-abortion care: More than a half of providers who received no training fall into the poor-quality care category. Less than one third (26.5 percent) of health providers in hospitals have the capacity to give good-quality service with regard to managing a woman presenting with complications arising from an unsafe abortion, whereas only 7.4 percent of maternity-based providers have the knowledge to provide good-quality care.

Table 4, the third panel, shows the percentage distribution of providers according to their knowledge-based ability to provide care in the event of postpartum haemorrhage, according to selected characteristics. Among the selected characteristics, operating authority was not significantly associated with quality care provision based on postpartum haemorrhage complications. The effect of post-abortion training had a borderline *P* value of .05. Again, we note here that the number of providers who received post-abortion training was small ($n = 19$). Among providers who received training in lifesaving skills in the past 1 or 2 years, 46.7 percent spontaneously mentioned knowledge of caregiving actions in the event of postpartum haemorrhage that is consistent with our definition of ability to provide good-quality services. In turn, 42 percent of health providers from hospitals and 21.3 percent of health providers at health centres would give good-quality service, whereas only 6.3 percent of the providers at the clinic/dispensary would give good-quality service.

Table 4. Distribution of providers: Ability

Percentage distribution of providers according to their ability to provide quality care based on knowledge of actions to perform for clients with selected obstetric complications (retained placenta, unsafe abortion, and postpartum haemorrhage), according to selected characteristics (NCAPD, 2004).

	Retained placenta (%)			Unsafe abortion (%)			Postpartum haemorrhage (%)			Total (n)
	Poor	Good	P	Poor	Good	P	Poor	Good	P	
Facility type										
Hospital	60.0	40.0	.000	73.5	26.5	.005	58.0	42.0	.001	50
Health centre/maternity	82.4	17.6		92.6	7.4		78.7	21.3		108
Clinic/dispensary	93.8	6.3		84.4	15.6		93.8	6.3		32
Operating authority			.216			.274			.515	
Government	75.3	24.7		83.7	16.3		74.2	25.8		97
Nongovernment	82.6	17.4		89.1	10.9		78.3	21.7		92
Provider category			.008			.082			.003	
Registered nurse, midwife	63.4	36.6		78.0	22.0		57.5	42.5		35
Enrolled nurse/midwife	82.6	17.4		88.6	11.4		80.5	19.5		147
Received training in lifesaving skills/ emergency complications			.029			.094			.001	
No	81.3	18.8		88.1	11.9		80.5	19.5		160
Yes, past 1 or 2 years	63.3	36.7		76.7	23.3		53.3	46.7		29
Received training in postabortion care			.123			.025			.050	
No	80.0	20.0		88.2	11.8		78.1	21.9		171
Yes, past 1 or 2 years	65.0	35.0		70.0	30.0		57.9	42.1		19
Number of years of experience			.000			.247			.006	
0-4	79.1	20.9		82.1	17.9		72.7	27.3		66
5-9	85.2	14.8		90.7	9.3		79.6	20.4		55
10-14	43.5	56.5		95.7	4.3		52.2	47.8		23
15+	87.0	13.0		82.6	17.4		89.13	10.87		46
Total	78.5	21.5		86.3	13.7		75.8	24.2		190

Multivariate Results

Retained Placenta. In the bivariate analysis, a provider's ability to name actions for management of retained placenta was significantly associated with training in lifesaving skills. Table 5, the first panel, shows that after adjusting for facility type, the years of providing delivery services, and operating authority, the health providers who received in-service training in lifesaving skills were 2.5 times more likely to provide quality service as determined on the basis actions named for clients with retained placenta complications ($P = .084$). The provider's ability to name the appropriate actions for clients with complications of retained placenta was also found to be associated with the facility type and the number of years the provider had been providing delivery or ANC services. Compared with those from clinics/dispensaries, providers from hospitals were 4.2 times as likely to name appropriate actions ($P = .064$). The more years a health provider provided delivery services, the more likely they were able to name appropriate actions for handling clients with complications of retained placenta; this relationship attained significance only for those who had been in practice for 10 or more years.

Unsafe Abortion. Considering appropriate actions for clients with complications resulting from unsafe abortion, training in post-abortion care was found to be significantly associated ($P = .046$) with the naming of appropriate actions in handling women presenting with complications resulting from unsafe abortion (Table 5, the second panel). After adjusting for other characteristics, providers who trained in post-abortion care were 3.8 times more likely to name the appropriate actions as compared with those who did not receive the training. Training is the only variable in the model that is significantly ($P < .05$) associated with appropriate knowledge of post-abortion care.

Postpartum Haemorrhage. Table 5, the third panel, shows that after adjusting for facility type, managing authority, and the cadre of the provider, providers who had in-service training in lifesaving skills were over than three times more likely than those who did not have recent training to name several actions for managing clients with postpartum haemorrhage complications. In addition, health care providers from the hospitals were three times more likely to provide good care for women with postpartum haemorrhage complications as compared with providers from clinic/dispensary facilities, and those in practice for the greatest number of years were over six times as likely as those in practice for the fewest number of years to cite appropriate interventions.

Table 5. Results
 Result of logistic regression, Kenya Service Provision Assessment, 2004

	Retained placenta			Unsafe abortion			Postpartum haemorrhage					
	Coefficient	Standard error	P	Odds ratio	Coefficient	Standard error	P	Odds ratio	Coefficient	Standard error	P	Odds ratio
Facility type (ref: clinic/dispensary)			.030				.007					.054
Hospital	1.432	0.772	.064	4.186	0.764	0.665	.251	2.146	1.704	0.786	.030	5.495
Health centre/maternity	0.384	0.761	.614	1.468	-1.074	0.674	.111	0.342	1.014	0.769	.187	2.757
Operating authority (ref: nongovernment)	0.345	0.434	.426	1.412	0.717	0.504	.154	2.049	0.330	0.410	.420	1.391
Provider category (ref: enrolled nurse)	0.575	0.495	.245	1.777	0.129	0.596	.828	1.138	0.495	0.469	.291	1.641
Received training in lifesaving skills (ref: no)	0.906	0.524	.084	2.475					1.161	0.496	.019	3.194
Received training in postabortion care (ref: no)					1.347	0.674	.046	3.844				
Years providing delivery services (ref: 15+)			.003				.253					.031
0-4	-0.078	0.644	.903	0.925	-0.884	0.649	.173	0.413	0.589	0.635	.354	1.803
5-9	0.254	0.640	.692	1.289	-0.816	0.683	.232	0.442	0.847	0.627	.177	2.333
10-14	2.023	0.643	.002	7.561	-2.007	1.125	.074	0.134	1.866	0.650	.004	6.460

LIMITATIONS OF THE STUDY

One weakness of the analysis is that the selection of trainees is left to the discretion of facility managers based on the need of the facility and the health provider. We cannot know whether there was a selection bias in terms of which staff were selected to attend training. It could be that the best/most capable staff—those who already have strong knowledge about treating complications—are also the ones selected for additional training. This would imply that what we see in the models as effects of training might also include effects of individual personality, temperament, or drive to excel, for example. In other words, we might not be getting a pure effect of training, although the majority of the effect is likely to be training.

Another limitation is that health workers were not observed during the course of an obstetric emergency to see how they actually provided care. Rather, only knowledge of what should be done was reported, and this knowledge is only a proxy for actual provision of quality care. It is possible that even health workers with good knowledge of what to do during an obstetric emergency could still provide poor-quality care in the face of such an emergency, either because of personal deficiencies or, more probably, because of deficiencies in requisite supplies and infrastructure.

The analysis would have been strengthened by the inclusion of more cases. However, during the design of the 2004 KSPA survey instrument, there was not an explicit focus on administering the two questionnaires (Health Provider Interview and Maternal Health Worker Knowledge questionnaire) to the same health providers. As a result, our analysis used about 67% of the total health workers interviewed in survey. We recommend that future implementations of the KSPA integrated the two questionnaires when collecting data from maternal health workers.

DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

Evidence from a variety of studies isolates training as one of the key elements necessary for the provision of quality care. Appropriately trained personnel and the provision of necessary supplies and equipment are critical to the development and implementation of EmOC services (Mavalankar and Rosenfield, 2005). In a study conducted in four countries in the east African region, it is reiterated that the shortage of trained staff—especially midlevel providers, poor infrastructure, and management—is an obstacle for providing quality EmOC services (Pearson and Shoo, 2005).

Our analysis has demonstrated that training is a critical element in the detection and management of complications. Recent training in relevant subject matter was found to be significantly ($P < .05$) and positively associated with the ability to provide quality care in the event of unsafe abortion and postpartum haemorrhage; training was also positively associated with the ability to provide appropriate care in the event of a retained placenta ($P < .10$). The obvious recommendation is to ensure that up-to-date, quality training is provided to a broad base of health workers at all types of facilities, particularly at the local facilities that are the first point of contact for women experiencing an obstetric emergency. A discussion of details on how to implement training programs more broadly, especially in the face of staff shortages, is beyond the scope of this paper; however, it is recognized that there are logistical obstacles to increasing the number of health workers who receive training. Further, although we isolated the element of training for this analysis, it is clear from these findings that for optimal service outcome, quality-of-care training has to be undertaken within the context of improved infrastructure and as a support to service delivery.

The more years a health provider provided delivery services, the more likely he or she was able to name appropriate actions for handling clients with complications of retained placenta and haemorrhage. This finding suggests that a successful approach to training younger health workers might be to pair them with more senior staff in a mentor/apprentice relationship. Given the shortage of staff in many facilities, however, this may not be a practical solution in many facilities providing delivery care, some of which may have no senior staff at all. The one area in which more experienced health care providers do not have an advantage over younger staff is in knowledge of post abortion care provision. This is an indication that insufficient knowledge of post abortion care exists throughout the Kenyan health care system and requires immediate upgrading, given the association between unsafe abortion and maternal mortality.

Compared with health clinics and dispensaries, only health providers in hospitals were significantly more likely to have good knowledge about postpartum haemorrhage and retained placenta. The majority of Kenyan women do not have access to hospitals—or any health care facility—at the time of delivery (the 2003 KDHS found that only 40 percent of births took place in any type of health facility). Given that facilities like health centres are level 2 facilities, which are critical to service provision and clearly the first level of contact for emergency services, training health workers at these facilities to deal with obstetric emergencies should be prioritized.

Achievement of Millennium Development Goal 5, which would require a reduction of three quarters of the maternal mortality ratio by 2015, is one of the national visions of Kenya's Ministry of Health and is viewed as a way of realizing the provision of accessible, affordable, and quality health care for all women. The need for EmOC as an avenue to address high maternal morbidity and mortality is well recognized and is articulated in various national policy documents. The political will to safeguard maternal health must be channeled toward the

implementation of evidence-based recommendations—in this case, evidence for increased provision of training—that will make a real difference in the chances for survival of a woman presenting to a health facility with life-threatening obstetric complications.

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