Association Between HIV Programs and Quality of Maternal Health Inputs and Processes in Kenya

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We assessed whether quality of maternal and newborn health services is influenced by presence of HIV programs at Kenyan health facilities using data from a national facility survey. Facilities that provided services to prevent mother-to-child HIV transmission had better prenatal and postnatal care inputs, such as infrastructure and supplies, and those providing antiretroviral therapy had better quality of prenatal and postnatal care processes. HIV-related programs may have benefits for quality of care for related services in the health system. (*Am J Public Health.* 2015;105: S207–S210. doi:10.2105/AJPH.2014.302511)

In the past decade, the government of Kenya, with the support of international donors, has achieved a dramatic scale-up of HIV services, which has resulted in expanded coverage and a two thirds reduction in the number of AIDS-related deaths between 2002 and 2011.[1] However, although some studies have shown that targeted vertical HIV investments have a positive effect on other health services, others have shown a mixed effect, and few have focused on effect on quality.[2–5]

Questions about quality of care for mothers and newborns are particularly important in Kenya, a country in which the maternal mortality ratio and newborn deaths are high.[6] Reducing maternal mortality requires that all women have access to emergency obstetric care to address complications during labor and delivery.[7] These complications, ranging from postpartum hemorrhage to birth asphyxia in the newborn, frequently cannot be predicted in advance but can be successfully managed if detected by trained clinicians with access to required medicines and supplies.[8–10] Quality of these services is critical to their success in saving lives.[11] In this study, we assessed whether the quality of maternal and newborn service inputs and processes was influenced by the presence of HIV programs at health facilities.

METHODS

We used data from the Kenya Service Provision Assessment, a nationally representative survey that assesses the health facilities' capacity to provide essential health care.[12] In 2010, 695 facilities (11%) were selected for the survey. For the dependent variables, based on Donabedian's[13] quality-of-care framework, we a priori selected Kenya Service Provision Assessment variables that represented inputs (structure) of care (infrastructure, supplies, equipment, workers) and processes of care (type of care provided). Using principal-components analysis, we constructed 4 indices of maternal and newborn health inputs and processes with separate indexes created for hospitals and clinics. We used the first component, which accounted for the greatest variance in the underlying data, standardized to a mean of 0 and a standard deviation of 1.[14,15] (Details are available in the supplement to the online version of this article at http://www.ajph.org.)

The key independent variables of interest were the presence of antiretroviral therapy (ART) and prevention of mother-to-child HIV transmission (PMTCT) programs in the facility. Potential confounders included overall facility quality index in areas unrelated to HIV or maternal and child health, funding type (private–nongovernmental vs governmental), number of health workers, and number of inpatient beds.

We conducted statistical analysis using Stata version 12 (StataCorp LP, College Station, TX). We log transformed the continuous independent variables. We analyzed 12 separate multivariable ordinary least squares regression models with prenatal–postnatal (or delivery–newborn) input (or process) index score as the dependent variable and presence of HIV program along with confounders as independent variables. We used robust standard errors to account for dependence within regions of the country. For each dependent variable and facility type, we estimated 2 separate models for PMTCT and ART. Because virtually all hospitals provided PMTCT, in the hospital analysis we assessed only the effects of ART service.

RESULTS

Of the 703 Kenya Service Provision Assessment facilities, we included in this study 560 (237 hospitals, 323 clinics) that offered prenatal–postnatal services (Table 1). As shown in Table 2, in clinics, the presence of PMTCT programs was associated with a 0.56 SD increase in the prenatal–postnatal input quality score ($P<.01$; model 1). The effect was 0.57 SD ($P<.01$) when the model was adjusted for availability of ART programs (model 2).

The presence of ART programs was associated with improved prenatal–postnatal quality in clinics and hospitals. In clinics, the presence of ART programs was associated with a 0.70 SD increase ($P<.001$) in prenatal–postnatal care process quality (model 4), controlling for PMTCT. In hospitals (Table 3), the presence of ART programs was associated with a 0.47 SD increase in prenatal–postnatal processes ($P=.02$). The association between ART programs and delivery–newborn care approached but did not reach significance at a P level of less than .05.

DISCUSSION

The presence of PMTCT and ART programs was associated with higher quality prenatal and postnatal health care inputs and processes in the same clinics and hospitals. The magnitude of change observed was moderate[16]; however, it equaled or exceeded that found in other studies evaluating quality improvement interventions.[17,18] Given that the majority of PMTCT services are provided in prenatal care clinics, it is likely that investments in equipment, commodities, and human resources enhanced prenatal–postnatal care more

TABLE 1—Descriptive Characteristics of Facilities: Kenya Service Provision Assessment, 2010

Characteristic	Overall (n = 560[a]), No. (%) or Mean ±SD	Clinics (n = 323), No. (%) or Mean ±SD	Hospitals (n = 237), No. (%) or Mean ±SD
Independent variables			
Facility services			
Facilities with PMTCT program	468 (83.6)	251 (77.7)	217 (91.6)
Facilities with ART program	272 (48.6)	75 (23.2)	197 (83.1)
Public facilities	322 (57.5)	172 (53.3)	150 (63.3)
No. of qualified staff per facility	15 ±54.1	3 ±2.9	32 ±80.0
No. of beds per facility	41 ±91.2	6 ±11.2	89 ±125.3
Sample quality variables used in index of overall facility quality: infrastructure, pharmacy practices, HMIS, QA, infection control			
Record of management team meeting observed	300 (53.8)	123 (38.2)	177 (75.0)
Routinely carried out quality assurance activities[b]	252 (45.2)	94 (29.3)	158 (66.9)
Record of quality assurance activities observed	137 (24.6)	38 (11.8)	99 (41.9)
Dependent variables			
Sample quality variables used in index of inputs for prenatal and postnatal care (supplies, equipment, human resources)			
Guidelines for prenatal–postnatal care available	350 (62.6)	182 (56.3)	168 (71.2)
Teaching aids for prenatal–postnatal care available	325 (58.2)	174 (54.0)	151 (64.0)
Thermometer available	480 (85.9)	285 (88.2)	195 (82.6)
Sample quality variables used in index of processes of prenatal and postnatal care (routinely provided services, evidence-based services)			
Blood test for syphilis routinely provided	419 (75.0)	196 (60.9)	223 (94.1)
Blood group test routinely provided	405 (72.5)	184 (57.1)	221 (93.2)
Urine protein test routinely provided	392 (70.1)	181 (56.2)	211 (89.0)
Sample quality variables used in index of inputs for delivery–newborns and newborn care (supplies, equipment, human resources)			
Oxygen source observed	229 (41.0)	56 (17.3)	173 (73.3)
Injectable metronidazole (antibiotic) observed	141 (25.2)	47 (14.6)	94 (39.7)
Incubator observed	152 (27.1)	22 (6.8)	130 (54.9)
Sample quality variables used in index of processes of delivery–newborns and newborn care (routinely provided services, evidence-based services)			
Injectable antibiotics administered in past 3 mo	270 (48.5)	76 (23.6)	194 (82.6)
Neonatal resuscitation performed in past 3 mo	238 (43.0)	65 (20.3)	173 (73.9)
Maternal or newborn deaths or near misses reviewed	215 (38.4)	63 (19.5)	152 (64.1)

Note. ART = antiretroviral therapy; HMIS = health management information; PMTCT = prevention of HIV mother-to-child transmission; QA = quality assurance. These are sample variables in facility quality index. We calculated indices of quality of care using principal-components analysis. Indicators relevant to each index were selected from the Service Provision Assessment section relevant to that index. We give 3 variables that accounted for a substantial proportion of variability as examples for each index. The full list of indicators is given in Table A (available in the supplement to the online version of this article at http://www.ajph.org).

[a]Based on sample of facilities that offer prenatal–postnatal care.

[b]Quality assurance is defined as formal review system or comparison of work or system to a standard.

generally. ART investments, such as enhanced laboratories, health information systems, training, and supportive supervision, may have influenced maternal care quality.[5]

We found no associations between HIV programs and quality of delivery–newborn care at clinics. The links between ART and delivery–newborn care quality in hospitals were marginally significant and require further study given the poor quality of delivery–newborn services in many countries in the region.[19–22]

This study had several limitations, including its cross-sectional nature, which precludes assessment of causality. It is possible that clinics and hospitals with stronger prenatal–postnatal and delivery–newborn care were more likely to be selected as sites for PMTCT and ART programs, though this is unlikely to be a main driver. Finally, assessing the association between HIV programs and health outcomes would have been ideal, but the latter were not available in this data set.

In conclusion, we found several positive associations between the presence of PMTCT

and ART programs and the quality of health services for mothers and newborns in Kenya.[22,23] Additional gains may be possible if services are more closely integrated, as is currently pursued.[24–26] Prospective evaluation research is needed to elucidate how to most efficiently harness HIV investments to benefit all people seeking health care. ■

TABLE 2—Associations Between Availability of PMTCT and ART Services and Quality of Prenatal–Postnatal and Delivery–Newborn Care in Clinics: Kenya Service Provisions Assessment, 2010

	Prenatal and Postnatal Care				Delivery and Newborn Care			
Clinics	Inputs: Model 1 (n = 284; R^2 = 0.13), Coefficient (*P*)	Inputs: Model 2 (n = 284; R^2 = 0.13), Coefficient (*P*)	Processes: Model 3 (n = 294; R^2 = 0.22), Coefficient (*P*)	Processes: Model 4 (n = 294; R^2 = 0.29), Coefficient (*P*)	Inputs: Model 5 (n = 137; R^2 = 0.46), Coefficient (*P*)	Inputs: Model 6 (n = 137; R^2 = 0.46), Coefficient (*P*)	Processes: Model 7 (n = 142; R^2 = 0.18), Coefficient (*P*)	Processes: Model 8 (n = 142; R^2 = 0.18), Coefficient (*P*)
PMTCT available	0.56 (<.01)	0.57 (<.01)	0.27 (.02)	0.19 (.08)	-0.03 (.91)	-0.01 (.97)	0.07 (.79)	0.08 (.76)
ART available		-0.11 (.51)		0.70 (<.01)		-0.07 (.62)		-0.05 (.75)
Clinic quality index	0.11 (.24)	0.11 (.26)	0.20 (.03)	0.15 (.08)	0.00 (.99)	0.00 (.93)	0.17 (.06)	0.17 (.06)
Public facility	0.06 (.59)	0.08 (.44)	-0.39 (<.01)	-0.53 (<.01)	-0.61 (.01)	-0.58 (.01)	-0.33 (.12)	-0.31 (.17)
No. health workers (ln)	0.08 (.15)	0.08 (.09)	0.05 (.03)	0.03 (.06)	0.77 (<.01)	0.78 (<.01)	0.16 (.1)	0.16 (.1)
No. beds (ln)	0.01 (.32)	0.01 (.29)	0.02 (.02)	0.01 (.06)	0.02 (.14)	0.02 (.16)	0.03 (.07)	0.03 (.1)

Note. ART = antiretroviral therapy; ln = natural logarithm; PMTCT = prevention of HIV mother-to-child transmission. Ordinary least squares regression with robust standard errors clustered at region level.

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Contributors

M. E. Kruk originated the study concept, developed the analytic framework contributions of all coauthors, led the writing, and oversaw the analysis. A. Jakubowski led the analysis and contributed to writing and editing. All other authors contributed to study design, interpretation of the results, and editing the article. All authors approved the final version for publication.

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Human Participant Protection

No human participant protection was required because all data used in the analysis were secondary, de-identified data.

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TABLE 3—Associations Between Availability of ART Services and Quality of Prenatal–Postnatal and Delivery–Newborn Care in Hospitals: Kenya Service Provisions Assessment, 2010

	Prenatal and Postnatal Care		Delivery and Newborn Care	
Hospitals	Inputs: Model 9 (n = 219; R^2 = 0.10), Coefficient (*P*)	Processes: Model 10 (n = 217; R^2 = 0.17), Coefficient (*P*)	Inputs: Model 11 (n = 210; R^2 = 0.38), Coefficient (*P*)	Processes: Model 12 (n = 215; R^2 = 0.40), Coefficient (*P*)
ART available	0.05 (.86)	0.47 (.02)	0.37 (.07)	0.25 (.06)
Hospital quality index	0.26 (.14)	0.25 (.03)	0.34 (.052)	0.37 (< .01)
Public facility	-0.30 (.02)	0.15 (.3)	-0.34 (< .01)	0.28 (.06)
No. health workers (ln)	0.03 (.75)	0.05 (.42)	0.13 (.31)	0.12 (.3)
No. beds (ln)	-0.07 (.13)	0.00 (.97)	0.04 (.52)	0.10 (.13)

Note. ART = antiretroviral therapy; ln = natural logarithm. Ordinary least squares regression with robust standard errors clustered at region level.

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