Cost, cost-efficiency and cost-effectiveness of integrated family planning and HIV services

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Objective: To evaluate costs, cost-efficiency and cost-effectiveness of integration of family planning into HIV services.

Intervention: Integration of family planning services into HIV care and treatment clinics.

Design: A cluster-randomized trial.

Setting: Twelve health facilities in Nyanza, Kenya were randomized to integrate family planning into HIV care and treatment; six health facilities were randomized to (nonintegrated) standard-of-care with separately delivered family planning and HIV services.

Main outcome measures: We assessed costs, cost-efficiency (cost per additional use of more effective family planning), and cost-effectiveness (cost per pregnancy averted) associated with the first year of integration of family planning into HIV care. More effective family planning methods included oral and injectable contraceptives, subdermal implants, intrauterine device, and female and male sterilization.

Patients and participants: We collected cost data through interviews with study staff and review of financial records to determine costs of service integration.

Results: Integration of services was associated with an average marginal cost of $841 per site and $48 per female patient. Average overall and marginal costs of integration were associated with personnel costs [initial ($1003 vs. $872) and refresher ($498 vs. $330) training, mentoring ($1175 vs. $902) and supervision ($1694 vs. $1636)], with fewer resources required for other fixed ($18 vs. $0) and recurring expenses ($471 vs. $287). Integration was associated with a marginal cost of $65 for each additional use of more effective family planning and $1368 for each pregnancy averted.

Conclusion: Integration of family planning and HIV services is feasible, inexpensive to implement, and cost-efficient in the Kenyan setting, and thus supports current Kenyan integration policy.

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Introduction

Many international policy organizations have advocated for expanded access to family planning, particularly for HIV-infected women [1–7]. In addition to preventing unintended pregnancy, family planning reduces infant and maternal mortality, and improves education and economic opportunities for women and their children [8,9]. Furthermore, by preventing unintended pregnancy, contraception reduces the number of infants infected with HIV [10,11]. In fact, expansion of family planning in Kenya could avert 33 676 unintended pregnancies and HIV transmission to 5725 infants annually, at a cost of $1713,488, or $51 per pregnancy and $299 per HIV infection averted [10].

Integration of HIV and other health services has been proposed as an efficient and cost-effective way to expand access to services and improve the continuity of care for HIV-infected women [12–16]. Two quasi-experimental studies observed an increase in the uptake of both family planning and HIV services after integration [17]. However, little is known about the costs of integrated care and whether integration increases the use of family planning or reduces unintended pregnancies [16,18–20].

To address the need for more rigorous research, we conducted a cluster-randomized trial to evaluate the integration of family planning services into HIV care and treatment within health facilities in Nyanza Province, Kenya. As part of this project, we conducted micro-costing analysis related to the provision of family planning and service integration. Costs within integrated and nonintegrated sites were then combined with data on increased use of more effective family planning methods (oral and injectable contraceptives, subdermal implants, intrauterine device (IUD), and female and male sterilization), and number of pregnancies averted.

Methods

We conducted a cluster-randomized trial in which 12 health facilities were randomized to provide family planning services during routine HIV care and six health facilities were randomized to refer HIV-infected women to another clinic within the same health facility for family planning methods other than male condoms. More information on study methods is available in this issue [21] and online (http://integrationforimpact.org/wp-content/uploads/2012/05/Study-Protocol_FP_HIV-Integration_03Dec10.pdf).

Costs

We estimated marginal costs to the health system associated with the introduction and integration of family planning into HIV care and treatment services during a series of site visits conducted between March and September, 2011. We visited all sites assigned to integrate family planning and HIV services and five of six nonintegrated sites; one site could not be visited because of impassable roads. Interviews with clinical staff lasted 30 to 60 minutes and included discussion of the integration process, changes in personnel, changes in logistics and organization, cost and budgetary issues, and changes in service uptake. In addition, we toured facilities to identify changes in organization, logistics and service delivery. As health facilities did not hold comprehensive cost data, we determined additional costs (and savings) associated with integration through meetings and correspondence with study staff.

Fixed (one-time) costs

At all sites, study staff provided three days of initial training on counseling and provision of family planning services for HIV-infected patients. At integrated sites, study staff provided two additional days of training on reorganization of patient flow and logistics to facilitate integration of family planning and HIV services. During this process, trainers, staff and contract laborers physically redesigned the clinic to facilitate integration of services. Additional labor costs (as well as space savings) were recorded separately as 'one-time' costs (or savings).

Recurring costs

After initial training, clinical study staff spent an average of one day per week at all sites providing ongoing mentorship to health facility staff. Whenever a health facility experienced significant (greater than 40 percent) clinical staff turnover, clinical study staff conducted three day 'refresher trainings' to train staff on counseling and provision of family planning. Study coordinators and Ministry of Health district reproductive health coordinators also conducted supportive supervision visits at least quarterly. The cost of supplies and materials included: furniture (or improvements to existing furniture); family planning equipment; decontamination buckets for family planning equipment; color-coded stickers for patient files receiving family planning services; posters to facilitate the integration process; and other supply or material costs identified by study staff associated with integration.

For all costs, we used an exchange rate of $0.01169 to one Kenyan Shilling, based on the exchange rate on July 1, 2011 [22].

Outcomes

For this article, our primary outcomes include marginal cost per HIV-infected female patient (woman), cost per additional use of more effective family planning (cost-efficiency) and cost per pregnancy averted (cost-effectiveness). Information on the assessment of study outcomes is defined in Appendix A and in [21].

Clinic size

To determine potential economies of scale after integration in larger health facilities, we assessed costs

and cost-efficiency of integration according to the size of health facilities. The size of each health facility was determined based on the total number of HIV-infected women currently enrolled in each clinic.

Analysis

We assessed costs associated with integration of family planning and HIV services by comparing overall and category-specific costs within integrated and nonintegrated health facilities. We assessed cost-efficiency and cost-effectiveness of integration by comparing average cost per woman, marginal cost per additional woman using more effective family planning and marginal cost per pregnancy averted within integrated and nonintegrated health facilities. We reviewed cost-efficiency by clinic size to identify potential economies of scale. Additional information on these analyses is available in Appendix B.

Results

Costs

Average costs per site associated with the provision of family planning was $4859 within integrated sites and $4018 within nonintegrated sites (difference = $841). Overall and marginal costs of integration were associated with personnel costs [initial ($1003 vs. $872) and refresher ($498 vs. $330) training, mentoring ($1175 vs. $902) and supervision ($1694 vs. $1636)], with fewer resources required for other fixed ($18 vs. $0) and recurring expenses ($471 vs. $287). Information on the variability of costs by level of health facility is included in Appendix C.

Intervention cost-efficiency and cost-effectiveness

We observed a marginal cost of $48.44 per HIV-infected woman between integrated and nonintegrated sites (Table 1). We observed a 19.9% increase in use of more effective family planning (from 16.7 to 36.6%) within integrated sites and an 8.7% increase (from 21.1 to 29.8%) in use of more effective family planning within nonintegrated sites [21]. This difference is statistically significant and represents 822 additional HIV-infected women at integrated sites and 299 additional HIV-infected women at nonintegrated sites using more effective family planning at a marginal cost of $65.39 per additional HIV-infected woman using more effective family planning (Table 2).

During the study period, the rate of incident pregnancy among HIV-infected women was 5.5 per 100 woman years within integrated sites and 6.1 per 100 woman years within nonintegrated sites. This difference was not statistically significant [21] but corresponds to 227 incident pregnancies within integrated sites and 209 incident pregnancies within nonintegrated sites. If women in integrated sites had a rate of incident pregnancy that was similar to that observed in nonintervention sites, then we would have observed 252 incident pregnancies. Therefore, the intervention was associated with 25 fewer pregnancies at a marginal cost of $1368.03 per incident pregnancy averted.

Cost-efficiency by clinic size

We observed substantial economies of scale in the incremental cost per additional use of more effective family planning among HIV-infected women (Fig. 1). Cost per woman decreased more with increasing clinic size within integrated sites [$Y = 32.83(\exp(-0.002X))$] compared with nonintegrated sites [$Y = 15.83(\exp(-0.001X))$]. We observed similar relationships in cost per additional woman using more effective family planning. Cost per additional woman using more effective family planning decreased more with increasing clinic size within integrated sites [$Y = 269.27(\exp(-0.003X))$] compared with nonintegrated sites [$Y = 107.67(\exp(-0.00004X))$].

Table 1. Cost-Efficiency and cost-effectiveness by randomization arm.

	Integrated sites ($n = 12$)	Nonintegrated sites ($n = 6$)	Difference	CER[a]
Total Costs	$58 306.84	$24 105.99	$34 200.85	
Total Women	4135	3429	706	
Cost per HIV-infected female patient	$14.10	$7.03		$48.41
More effective family planning use – Baseline	691	723	(32)	
More effective family planning use – Endline	1513	1022	491	
Additional use of more effective family planning	822	299	523	
Cost per additional use of more effective family planning	$70.93	$80.62		$65.39
Pregnancy rate (per 100 woman years)	5.5	6.1	0.6	
Incident pregnancies (observed)	227	209	18	
Incident pregnancies (if as in nonintegrated)	252	209	43	
Pregnancies averted	25	0	25	
Cost per pregnancy averted	$2332.27	NA		$1368.03

[a]CER = Cost efficiency/effectiveness ratio = [(C(integrated) – (C(nonintegrated)]/[E(integrated)-(E(nonintegrated)], where C = cost and E = efficiency or effectiveness.

Table 2. Distribution of average costs by health facility level and randomization arm.

	Integrated health facility level			Nonintegrated health facility level		
	Dispensary $ (%) $n=5$	Health center $ (%) $n=5$	Hospital $ (%) $n=2$	Dispensary $ (%) $n=1$	Health center $ (%) $n=4$	Hospital $ (%) $n=1$
Average costs	4160.52	5033.76	6167.70	4341.02	3641.45	5199.18
Average fixed costs						
Initial training	791.71 (19.03)	673.74 (13.38)	1012.51 (16.42)	329.82 (7.60)	1064.03 (29.22)	645.44 (12.41)
Space	4.81 (0.12)	34.37 (0.68)	7.36 (0.12)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Average recurring costs						
Refresher training	358.36 (8.61)	487.24 (9.68)	873.55 (14.16)	187.46 (4.32)	376.24 (10.33)	285.65 (5.49)
Mentoring	878.66 (21.12)	1647.63 (32.73)	1947.23 (31.57)	2485.34 (57.25)	678.90 (18.64)	1590.78 (30.60)
Supervision	1732.86 (41.65)	1748.48 (34.74)	1587.83 (25.74)	1107.16 (25.50)	1294.35 (35.54)	2151.47 (41.38)
Supplies	366.87 (8.82)	386.43 (7.68)	434.81 (7.05)	231.25 (5.33)	151.34 (4.16)	525.83 (10.11)
Other costs	135.81 (0.65)	279.37 (1.11)	304.41 (4.94)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)

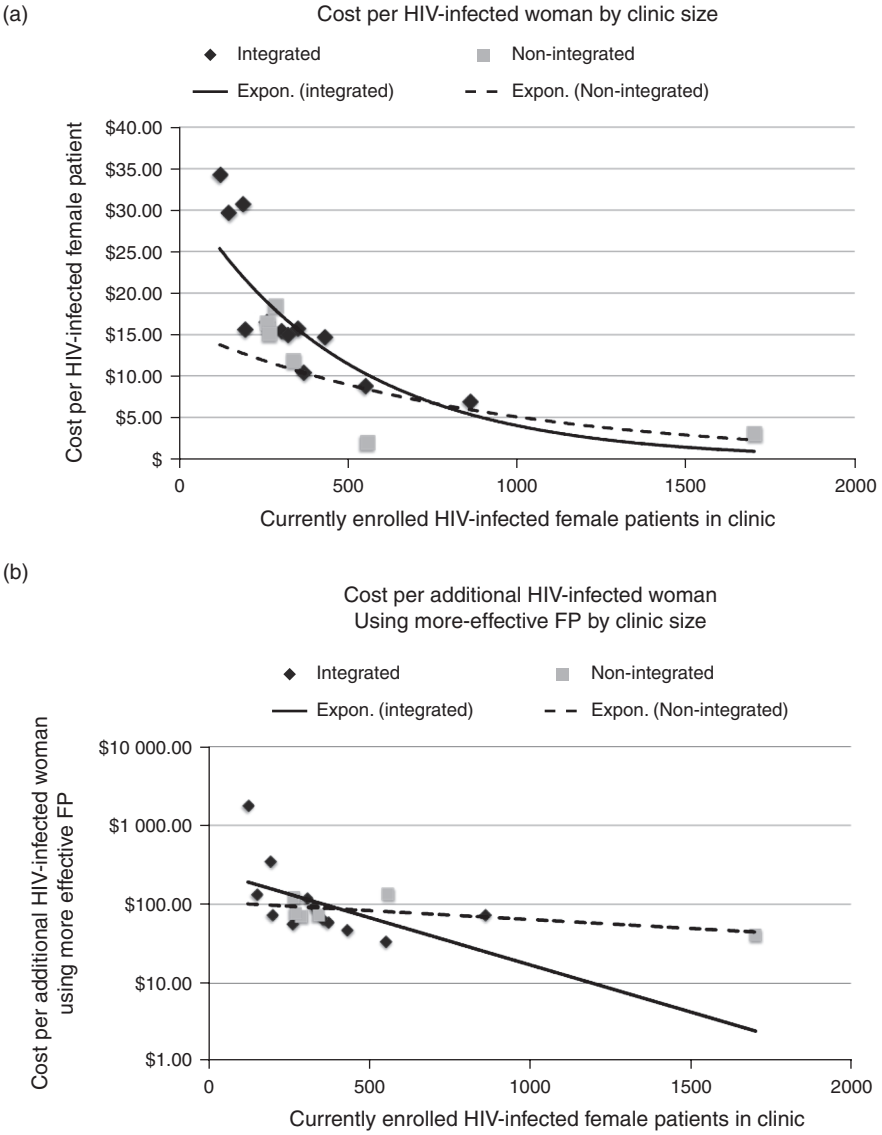

Fig. 1. Cost-efficiency by clinic size. (a) Cost per HIV-infected woman by clinic size. (b) Cost per additional HIV-infected woman using more-effective family planning by clinic size.

Discussion

Integration of family planning into HIV services is a cost-efficient way to increase the delivery of family planning services to HIV-infected women in this setting. The cost of family planning associated with integration in this study was well within the range of previously published estimates for the cost of provision of family planning services ($6–113) [23,24]. In addition, the efficacy of integration was found to be higher than estimates used in previous modeling efforts (20 vs. 10% increase in the use of family planning) [23]. These estimates of cost and efficiency result in a marginal cost of $65 per additional woman using more effective family planning.

Costs associated with integration were predominantly associated with personnel, including training, mentoring and supervision. Although costs tended to be higher within integrated and larger sites, several factors, including distance, staff turnover and infrastructure, affected the level of effort needed to facilitate service delivery and integration, and therefore costs in each category at each site. These results suggest the need for ongoing support for integration of family planning into HIV care. They also suggest the need to identify efficiencies in training, mentoring and supervision.

We observed substantial economies of scale in the integration of family planning into HIV care. For example, within smaller sites (e.g. size = 200), integration was associated with an additional cost of $9 per HIV-infected woman and an additional cost of $41 per additional use of more effective family planning. In contrast, within larger sites (e.g. size = 800), integration was associated with cost savings of $0.48 per HIV-infected woman and cost savings of $80 per additional use of more effective family planning. These results reflect the broader distribution of personnel resources over a greater patient population in larger settings.

This study has several limitations, which affect the generalizability of findings. First, the setting of the study in Nyanza Province and the relatively small sample size of the study limit broader applicability. Second, both integrated and nonintegrated sites received training and ongoing mentoring. Therefore, our findings were based solely on whether health facilities provided integrated rather than nonintegrated family planning and HIV services. Third, we were not able to measure changes in activities among clinic staff and patients. Previous reviews of the literature have suggested that integration places additional strain on health personnel [12–15]. Thus, the integration process and the provision of family planning together with HIV services may place an additional burden on healthcare providers. Fourth, this study was not powered to detect a statistically significant difference in the rate of pregnancy. Therefore, we were not able to establish whether this intervention was cost-effective with respect to averted pregnancies.

Taken together, these results reinforce the prioritization of integration of family planning and HIV services, particularly within larger health facilities [25]. Integration will depend on high quality training of all clinic personnel in patient education and provision of family planning methods, as well as sustained mentoring and supervision of clinical personnel in integrated health facilities. The allocation of resources toward a more comprehensive approach to reproductive health among HIV-infected women has the potential to not only benefit the lives of HIV-infected women and their families, but also to enhance the economic and social environment of the country as a whole.

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S.B.S. participated in study design, conducted cost data collection site visits, supervised data management and analysis of both cost and outcome data, and led writing of the manuscript. S.K. led design of cost component of the study, conducted the cost data collection site visits, conducted analysis of cost data and drafted the article. M.O. coordinated all aspects of study implementation and monitoring, contributed to data interpretation and writing. G.O. was responsible for management of all cost data in-country and participated in interpretation of costing data and writing. R.L.S. performed literature search, developed study and training materials, monitored study, contributed to writing. D.G. originated and supervised the overall trial, participated in study site training, led study design, and contributed to data interpretation and writing. S.J.N. contributed to study design, training, data interpretation and writing. C.B. led data management and analysis of outcome data and contributed to writing. E.A.B. supervised training and data collection and contributed to data interpretation and writing. C.R.C. supervised all aspects of study, including development of the study design, analysis, and writing of the manuscript.

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Conflicts of interest

The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the article.

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