

# Costs and efficiency of integrating HIV/AIDS services with other health services:

## a systematic review of evidence and experience<sup>1</sup>

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### Introduction

Integration is a growing priority in the context of the AIDS response. HIV and AIDS are intrinsically linked to many other health problems. Integration has the potential to improve the quality and continuity of care for those living with HIV or bring HIV services to those who would otherwise not have access to them (Sylla et al., 2007; World Bank, 2009). For some interventions, such as prevention of mother-to-child transmission of HIV (PMTCT) or prevention and treatment of tuberculosis (TB) co-infection, integration is clinically essential. The integration of HIV services is supported by a wide range of evidence on its clinical and public health benefits (UNAIDS, UNFPA and FHI, 2004; WHO and UNFPA, 2004; UNAIDS, 2005; African Union Commission, 2006). These highlight its benefits to patients with co-morbidities and benefits in terms of continuity of care and increased access to HIV services. It has therefore been called for in a number of global policies and high-level position papers, most recently in the 2011 UN Declaration on HIV/AIDS (United Nations, 2011).

It is also commonly assumed that integration can improve programme efficiency (World Bank, 2009; Church and Mayhew, 2009; WHO et al., 2009). This is of particular interest in the current economic climate, as many countries are seeking to rationalise their health-related expenditure. However, to date, the evidence base to support this assertion remains unclear, despite the numerous reviews that focus on HIV integration more generally (Church and Mayhew, 2009; WHO et al., 2009; Soto, Bell and Pillen, 2004; Briggs and Garner, 2006; French et al., 2006; PATH, 2007; Ickovics, 2008; Atun et al., 2010a; Kennedy et al., 2010; Tudor et al., 2011). This paper therefore summarises the current evidence on the impact of integration of HIV services on the efficiency of health services, focusing on low- and middle-income countries.

Integration has been approached differently in a wide variety of different settings, making the concept of integration difficult to tie down. Although there has been some consensus recently in the field of sexual and reproductive health (SRH) on terminology (IAWG for SRH & HIV Linkages, 2010), there remain several differing discourses on integration (Briggs and Garner, 2006; Unger, DePaepe and Green, 2003; Shigayeva et al., 2010; Atun, Bennett and Duran, 2008; Leichsenring, 2004). The most common understanding relates to horizontal integration or integration at the point of service delivery; this can range from structured referrals to physical incorporation providing a one-stop approach (Shigayeva et al., 2010). Integration can also be seen as part of a wider system of co-



*Children in Namibia get yogurt with HIV/AIDS education*

ordination at the policy and planning, human resources and financing levels, sometimes referred to as linkages (IAWG for SRH & HIV Linkages, 2010). For the purposes of this review, we use the Joint United Nations Programme on HIV/AIDS (UNAIDS) definition of programme integration: 'joining together different kinds of services or operational programmes in order to maximise outcomes, e.g. by organizing referrals from one service to another or offering one-stop comprehensive and integrated services'. This includes services from a singular provider and from separate providers (within one site) where there is a clearly functional referral system.

Economic theory suggests several potential efficiency advantages at various levels of a health system arising from the integration of HIV and other health services (Ickovics, 2008; McPake, Kumaranayake and Normand, 2002). Integration has the potential to improve both technical efficiency (providing services or producing outputs at the lowest cost) and allocative efficiency (achieving health outcomes at a low cost). Technical efficiency focuses on using the right mix of resources to produce health services and can be assessed by measuring the unit cost of HIV services. Allocative efficiency is also concerned with whether the right mix of health services is provided and is commonly assessed using measures of cost-effectiveness.

Integration has the potential to improve technical efficiency through economies of scope and scale. Economies of scope, or reductions in HIV service costs from combining services, may be found through shared use of a common infrastructure, overheads and certain 'indivisible' operational resources. Economies of scale, or reductions

in HIV service costs associated with increased scale of service provision, may be found where integration enables expansion of service coverage to clients who have not previously accessed them.

Beyond this, as stated above, HIV service integration may be clinically essential for the provision of cost-effective services for those with HIV (e.g., the integration of HIV counselling and testing (CT) into antenatal care (ANC) services is clinically required for the provision of PMTCT). Integration can thus also contribute to an overall improvement of the allocative efficiency of HIV services. Moreover, integration may enable further efficiency gains beyond the service level. Box 1 describes the potential effect of integration at each level of a health system, loosely based on the framework to describe integration developed by Atun et al. (2010b).

Economic evidence on integration from other sectors suggests that integration is likely to produce efficiency gains when '(1) goods/services are complementary, (2) there is a low marginal cost of added service, (3) consumers value all services and (4) there is a low correlation in demand for different services' (Ickovics, 2008). The integration of HIV and other health services potentially meets most of these requirements. First, HIV and TB/SRH/maternal and child health services are complementary services as they address co-infections, are provided at similar health services levels and may affect the same persons (Lush et al., 2001). Second, there is a

potentially low marginal cost of integrated services where clinic space exists and staff already have much of the essential knowledge and skills (Ickovics, 2008). Third, HIV services may be valued by clients seeking general services, and people living with HIV may have a wide range of other unmet health needs (de Bruyn, 2005; Delvaux and Nostlinger, 2007; Myer, Rebe and Morroni, 2007; Gruskin et al., 2008). Fourth, there may be a low correlation in existing demand where groups of clients seeking other health services may not seek HIV-related services independently (Ickovics, 2008).

## Study overview

Database searches, manual searches and snowballing identified 666 citations, of which 51 duplicates and 451 clearly irrelevant titles were excluded in the first round of title/abstract review. Abstracts of the remaining 164 citations were evaluated and full text for 55 was read and reviewed. A total of 46 studies were retained after this review, of which 35 were peer-reviewed and 11 were grey literature. A flow chart of the selection process is contained in the online appendix (figure W1).<sup>2</sup>

Studies included cost analyses, cost-effectiveness analyses and least-cost analyses. Most studies included all relevant costs in their analysis, though costing methods varied. Studies either evaluated an integrated intervention against a 'do-nothing' comparator (in which no treatment or intervention was offered) or compared alternative integrated intervention strategies (such as comparative evaluations of isoniazid preventive therapy (IPT) with and without TB screening). Nine studies conducted a direct comparison of integrated and stand-alone services providing the same set of interventions. Studies used a wide variety of service output and outcome measures for cost and cost-effectiveness. For example, cost-effectiveness was measured using the cost per TB case averted, HIV infection averted and disability-adjusted life year (DALY) averted. DALYs are calculated as the sum of years of life lost and years of life lived in a state of less than full health.

We divided studies into five major topic headings:

1. HIV CT integrated into other health services. This includes both voluntary and provider-initiated CT for HIV, integrated into primary health care (PHC), SRH, home-based care, MCH and TB services.
2. TB services integrated into HIV care and treatment, including IPT, intensified case finding and TB treatment. These services often used CT as an access point for TB services, although several studies also included referral from any TB unit to the CT unit, indicating two-way collaboration.
3. HIV care and treatment integrated into general health services and community-based care (including palliative care, cotrimoxazole preventive therapy, PMTCT and antiretroviral therapy (ART)).
4. Integration of family planning (FP) into services for HIV-positive individuals, including PMTCT and HIV care and treatment.
5. HIV care and treatment and preventive outreach services integrated into other health services for populations at higher risk of HIV exposure, who may have different needs/interactions with the health-care system from the general public.

### Box 1

#### Potential efficiency gains from integration

- Integration at the governance level (such as co-ordination of strategic and operation planning and performance level) may improve technical efficiency by sharing scarce resources, such as skilled planners and managers. Joint or co-ordinated planning and management, monitoring and evaluation, and reporting may also improve allocative efficiency as (or if) planners allocate their scarce resources across interventions taking into account the relative cost-effectiveness of services.
- At the financing level, integration may improve technical efficiency by merging the costs of separate financing systems. Co-ordinated financing systems may also reduce perverse incentives that may be created by competing programmes and thus impact allocative efficiency.
- At the health management systems level, integration can facilitate improvements in technical efficiency through reductions in management systems costs. This can include joint procurement, sharing of middle managers, joint training and supervision, sharing of information, education and communication materials, and joint management information systems.
- At the facility level, integration can contribute to reductions in facility costs resulting from joint utilisation of fixed factors of production.
- For patients, integration may lead to less fragmented services, higher levels of continuity of care, better referral systems and possibly reductions in patient/ community-level costs resulting from fewer visits to facilities, greater proximity of services and reduced delays in accessing treatment.

## Results

### 1. HIV CT integrated into other health services

We identified 17 studies (10 peer-reviewed and 7 grey literature) that evaluated the costs and/or cost-effectiveness of the integration of CT into other health services. Five compared the cost of integrated services with those of stand-alone services, enabling an assessment of technical efficiency gains. The remaining 12 provide cost estimates for different models of integrated CT or contribute to the evidence base on the cost-effectiveness of an integrated service package.

Of the five studies that present a non-integrated comparator, three were conducted in Kenya, one in Uganda and one in India. The three Kenyan studies examined introducing CT into FP/PHC settings. The Ugandan study compared different CT strategies including stand-alone, hospital-based and facility-based home outreach. Finally, the Indian study examined the economic consequences of merging existing SRH and HIV services. All five studies found that unit costs were consistently lower for integrated services than stand-alone services, with savings 31–79 per cent of stand-alone costs. However, they were all conducted at a relatively small scale. Generally, the studies that examined CT as part of integrated service packages (ANC/PMTCT and TB/HIV) found these services to be cost-effective compared with a 'do-nothing' alternative. In addition, one study reported significant potential future cost savings in ART and PMTCT services from integrating CT in ANC compared with a do-nothing alternative.

### 2. TB services integrated into HIV care

We found two models and seven empirically based studies (some involving limited modelling) examining the costs and/or cost-effectiveness of integrating TB and HIV services. All were peer-reviewed. Studies largely evaluated elements of the 'Three I's' strategy, an integrated approach to reduce the burden of TB on HIV-positive clients through intensified TB case finding, IPT and infection control for TB, as recommended by WHO (2008). Intervention elements included IPT (in some cases targeted with a tuberculin skin test), intensified case finding and cotrimoxazole preventive therapy, integrated with CT or HIV care and treatment services. CT was commonly used as an access point for TB services, although in some cases (e.g., ProTEST), the collaboration was bi-directional (including referral from TB to HIV and vice versa). None of the studies compared a stand-alone versus integrated option, as integration is clinically required to deliver the full range of TB/HIV services to co-infected patients. Five of the seven empirical studies focused on establishing the incremental cost-effectiveness of integrated TB/HIV services compared with 'do nothing'. All studies were set in the context of generalised epidemics in sub-Saharan Africa, with the exception of one from Cambodia.

The majority of studies found that integrated TB/HIV care was highly cost-effective. Five included the estimated TB treatment cost savings from preventive therapy; three of these found the intervention to be cost saving. None of the studies presented a before and after evaluation of changes in average costs of services as a consequence of integration or examined different models of integration, so no conclusions on technical efficiency can be drawn.

### 3. HIV care and treatment integrated into general health services

We found 18 studies (16 peer-reviewed and 2 grey literature) evaluating the costs and/or cost-effectiveness of HIV care and treatment integrated into general health services, community-based care or PHC. Only one study (Rosen, Long and Sanne, 2008) considered a non-integrated alternative. Of the remainder, 11 specified the model of integrated service delivery in use and 6 specified provision in conjunction with PHC but gave few details of service delivery organisation.

All 11 studies specifying integrated service delivery examine HIV care and treatment in a one-stop-shop setting, except Kitajima et al. (2003), which evaluated referral to different providers within the same facility. Generally, the studies were set in the context of generalised epidemics in sub-Saharan Africa, although two studies consider concentrated epidemics: one in Mexico and one in Thailand. The majority conclude that integrated HIV treatment and care services are feasible and cost-effective.

The one comparative study (Rosen, Long and Sanne, 2008) found that stand-alone sites were more expensive per patient treated than some integrated models (hospital and general practitioner based) but less expensive than an integrated PHC model. When costs per patient in care and 'responding to treatment' were compared, the results for the stand-alone and integrated PHC models were equivocal and the general practitioner model was found to be more expensive. However, as this study includes only four sites (each with differing methods, financing sources and settings), no firm conclusions can be drawn on whether integration or stand-alone provision of HIV care and treatment is more efficient.

### 4. FP for HIV-positive individuals

Four studies estimated the potential cost savings from provision of FP to HIV-positive individuals through integrating FP services within PMTCT or HIV care and treatment programmes, two of which were peer-reviewed. All studies modelled costs at the national level in the context of generalised epidemics; we found no studies that empirically evaluated models of integrating FP with ART services or comprehensive care centres, despite the widespread existence of such programmes.

All studies found the provision of FP to HIV-positive individuals to be highly cost-effective or cost saving. Most studies estimate substantial savings through prevention of the costs incurred from PMTCT interventions, maternal deaths, treatment of perinatal HIV infections and care and support for orphans and vulnerable children. No studies compared the unit costs of integrated versus stand-alone FP or HIV care and treatment services or examined the comparative costs of different models of integration.

### 5. HIV services integrated with other health services for higher risk populations

We found three studies (all peer-reviewed) evaluating the integration of HIV services into other health services for key populations at higher risk of HIV exposure. Studies examined the impact of integration on services targeted towards female sex workers, people who inject drugs and those with mental health disorders. Two studies, set in the United States, evaluated

integration of mental health and/or substance abuse services into HIV care and treatment, while one set in United Republic of Tanzania evaluated four different approaches to provision of HIV/sexually transmitted disease prevention services for sex workers at truck stops. All three studies were conducted on a small scale. Two studies report lower unit costs per patient for integrated services, although in one the difference was insignificant. The third study found that costs for integrated care were higher at the majority of sites and often not reimbursable by a third-party payer.

## Discussion

Our results show that a wide range of integrated services are cost-effective and that integration may reduce the costs of delivering some key HIV services. The best quality economic evidence focuses on the cost-effectiveness of HIV services, which require integration from a clinical perspective. This includes offering HIV CT in ANC services as part of the provision of PMTCT, providing TB services to HIV-positive clients and HIV services to those with TB and making FP services available to HIV-positive clients. There are number of studies that demonstrate the cost-effectiveness and cost savings of these service packages, strongly supporting further scale-up from an economic perspective. However, the cost-effectiveness of these integrated services has generally been demonstrated through models or at the pilot level, and in some areas there is little empirical evidence to demonstrate efficiency at scale in different contexts. Additionally, none of the studies compare the relative efficiency of different models of delivery, such as one-stop versus structured referrals, or examine whether the provision of these services may also result in reductions in the unit costs of services through economies of scale or scope. Only a few examine reductions in costs to the patient. The exclusion of these factors is likely to result in an underestimation of the cost-effectiveness of these integrated services.

The integration of both CT and HIV care and treatment into general health services is feasible, and the evidence consistently demonstrates that integrated CT services are likely to improve technical efficiency. It should be noted, however, that economic concerns may need to be weighed against issues such as stigma and confidentiality. Where reported, lower CT costs were primarily driven by the improved use of human resources. This suggests that the expansion of CT through existing services may place less of a burden on scarce human resources for health than expansion through stand-alone facilities (although any expansion may still require additional resourcing of staff).

Although there were several studies demonstrating the costs and feasibility of integrated HIV care and treatment, there were no high-quality studies comparing the costs of integrated services with those of stand-alone alternatives. The one study that compared costs across integrated and non-integrated sites was of an insufficient sample size. Due to the variety in services examined and methods used to measure costs, it was also hard to examine whether the costs of integrated HIV care and treatment are higher or lower than those found in other studies costing stand-alone services. Therefore, at present, no firm conclusions can be drawn on the economic benefits of integrating HIV care and treatment.

Broadly, we found that the evidence base is weak on assessing any technical efficiency gains from integration, assessing any efficiency

impact beyond the service delivery level and assessing any gains from the patient perspective (Box 1). Furthermore, the evidence found provides little insight into the most efficient model to employ in different contexts. None of the studies used traditional econometric methods to estimate economies of scale or scope; where other methods were used, such as before and after comparisons, study quality tended to be poor. This is likely to reflect the fact that these methods require large sample sizes, and there is a scarcity of HIV service cost data from low- and middle-income countries. The application of data envelopment analysis, a non-parametric technique for evaluating efficiency, is beginning to be used in other sectors and could provide a solution where sample sizes are small.

Even where broad analytical techniques are available, integration is complex and challenging to represent in quantitative terms. It can be best described as a continuum, progressing from linkages and service co-ordination to full integration of resources and services (Shigayeva, 2010; Atun et al., 2010b). New techniques, such as developing indices for integration, may provide a way forward. A recent study developed a scale of integration to enable cross-country comparisons of performance (Shigayeva, 2010). Likewise, work is in progress on the Integra Initiative<sup>3</sup> to develop an index of integration. However, no studies have yet explored how these scales and indices relate to cost.

This review paper has several limitations. The review only includes accessible published and grey literature and is not necessarily an accurate representation of the full range of cost data available from HIV programmes. Moreover, we were not able to account for the potential impact of political or economic context on study findings. There was also a lack of consistency in cost and efficiency measures (and description of methods) across different studies, again limiting the extent that we were able to interpret and validate study results.

Our results broadly support current recommendations in international policy for integration in HIV services. Studies evaluating the WHO's collaborative TB/HIV treatment guidelines and 'Three I's' strategy to reduce the impact of TB on those living with HIV found these interventions to be cost-effective and potentially cost saving. Studies evaluating integration of CT largely support the current WHO policy to expand provider-initiated CT for HIV in PHC settings. Finally, although there is little empirical evidence available, strong modelling evidence indicates that the steps already taken by a number of countries to integrate FP into services for HIV-positive individuals are likely to be economically beneficial.

Given the significant policy interest in scaling up integration, research on how to implement and expand integrated services is now required. In particular, there is an urgent need to assess the potential for efficiency gains from integrating HIV treatment and care into general health services, requiring large-scale costing studies. There is also almost nothing known about the impact of integration on service provision and efficiency for populations at higher risk of exposure to HIV, a key concern in concentrated epidemic settings. Moreover, for areas where cost-effectiveness is established, we recommend further operational and country-level research to support programme and facility managers. This should focus on identifying which models of integration are most appropriate in different settings, balancing efficiency with other service delivery objectives. Researchers should be challenged not

just to assess the extent of gains to be made but also to investigate the implications of different models in different settings. Research is also required on the most effective ways for programme managers to implement and promote integration at the facility level. There is currently insufficient evidence to draw any lessons on the most efficient process of integration, although there are some promising examples of research in this area. In addition, none of the studies reviewed included efficiency gains at the systems and few at the patient level. The potential in this area may be significant (Box 1); it is therefore highly recommended that future studies include these aspects in their assessment of integration.

In summary, given the existing evidence that largely supports HIV integration from a public health and clinical perspective, the findings of this review support further efforts to integrate. However, significant evidence gaps remain. Unfortunately, few of the studies found adequately address the central questions currently concerning many programme managers: not whether to integrate but when to, how to and which model is most efficient in which setting? Investment in country-based operational research and larger costing studies across a variety of settings is therefore urgently required to support future development of policy and programming in this area.

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## Endnotes

<sup>1</sup> This article is condensed by kind permission of the authors from a paper in *Sex Transm Infect*, 2012; 88: 85–99, first published online 8 December 2011 (<http://sti.bmj.com/content/88/2/85.full.pdf>). That paper was adapted from a full review report that can be found at <http://integra.wp.tincan.co.uk/wp-content/uploads/2012/01/UNAIDS-Report.pdf>

<sup>2</sup> Both the paper and the full report contain a number of tables and figures, which could not be included here due to space limitations, and the latter also has further detailed references.

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