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Review of costing methods in national HIV strategic planning documents

An Equitable Financing report

Contents

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Abbreviations

AIDS	acquired immunodeficiency syndrome
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
HIV	human immunodeficiency virus
IBC	ingredients-based costing
NSP	national strategic plan
PEP	post-exposure prophylaxis
PEPFAR	United States President's Emergency Plan for AIDS Relief
PMTCT	prevention of mother-to-child transmission
PrEP	pre-exposure prophylaxis
SPD	strategic planning document
TB	tuberculosis
UNAIDS	Joint United Nations Programme on HIV/AIDS

Executive summary

Stagnating HIV funding means efficient resource allocation is increasingly vital for an effective HIV response. Strategic planning documents (SPDs), including investment cases, national strategic plans (NSPs), and their respective resource-needs estimates, are central to this aim. This study reviewed SPD costing methods to identify common methodological strengths, weaknesses and gaps, with a view to improving national planning and budgeting and promoting transparency.

Latest costed SPDs from nine countries were reviewed using purposive sampling, including six costed NSPs and four investment cases. Cost estimates were extracted and evaluated for transparency and validity using the Global Health Cost Consortium checklist. SPD narratives, and their respective costings and primary data sources, were compared to evaluate alignment in the scope of interventions and for appropriate adaptation to settings and programmatic contexts.

Across all SPDs, a total of 426 cost estimates were extracted, categorized and compared with SPD narratives and source data. Costs were adapted from existing unit cost estimates in the literature (*n* = 101, 24%), estimated using ingredients-based costing (IBC) (*n* = 279, 65%) or unstated (*n* = 46, 11%).

When literature sources were publicly accessible (*n* = 50, 50%), two-thirds of the corresponding estimates were found, of which half matched in activity scope. When examining peer-reviewed literature sources, primary cost literature was found to be robust for prevention interventions and testing and treatment, but sparse for the remaining four service areas.

Of the 279 IBC estimates, 38% presented itemized inputs. Within the NSP subsample of SPD, a tenth (11%) included some interventions that were not included in their costings. Among the 256 costed interventions in NSPs (Figure 1), 63% of estimates defined specific activities, of which 91% matched with NSP intervention details and 72% had sufficient detail to assess.

Within the NSP subsample of SPDs, a 44% information gap was found between NSPs and their respective costings. A tenth (11%) of interventions specified in NSPs were not included in their costings. Among the 256 costed interventions (Figure 1), 8% did not match in scope with NSP intervention details and 25% of cost estimates had insufficient details to assess scope alignment.

This review identifies methodological strengths and weaknesses in SPD costings and identifies opportunities to improve future costings of national HIV planning documents. Although analysts make very good use of existing data sources, lack of empirical cost data and adaptation to specific settings often make IBC necessary to generate appropriate setting- and time-specific cost estimates. As formal guidance on how to do this does not exist, the approaches taken differ.

Overall, there are no formalized templates or standards for reporting the full set of adaptations and assumptions for unit costs, rendering the estimates hard to interpret, and missing the opportunity to build on these unit costs to adapt them for future iterations and other settings. This review recommends that bespoke guidance on generating cost estimates for SPDs be developed, including a reporting checklist to institutionalize transparent reporting of methods. This reporting checklist and the resulting cost estimates could be submitted to a live public database that can be scrutinized, adapted and used for costings elsewhere.

Introduction

For many years, countries have used strategic planning documents (SPDs) to outline, detail and guide their national HIV responses. SPDs include national strategic plans (NSPs), which define a country's national targets and outline the full spectrum of interventions for mid-term planning in three- to five-year increments, and investment cases, which propose a package of mid- to long-term strategies for effective allocation of resources.

In some cases, SPDs are costed, providing an estimate of the resources required to implement designated interventions and achieve set targets. It has become clear, however, that the quality of many documents could be improved to strengthen their role in resource mobilization. The Joint United Nations Programme on HIV/AIDS (UNAIDS) has initiated four reviews to identify the strengths and weaknesses of the strategic planning processes: epidemiology and priority setting; costing and resource needs projections; linkages and alignments between planning documents; and how the process supports implementation *(1)*.

This report presents findings on the second review. Based on the results, UNAIDS reviews will develop guidance to improve the elaboration of SPDs and strengthen the quality of each output, to better support country planning and optimize country implementation.

To date, the literature has focused chiefly on the outputs and value of SPDs, their costings, and various modelling methods. Several papers describe different cost and effectiveness modelling approaches, each attuned and designed under various epidemiological and economic parameters, and each seeking to better reflect complex real-world dynamics, including behaviour change, diminishing returns and programmatic synergies *(2–6)*.

From the Resource Needs Model, to the Goals Model, to Optima, each custom-made model has been used and adapted for NSP costing and investment cases to assist country stakeholders in making evidence-based resource allocations. Indeed, for the AIDS2031 Financing Working Group, examples were chronicled where well-costed NSPs resulted in improved country resource allocation, increased donor funding, and successful advocacy for government investment in national HIV programmes *(7)*.

Few studies have investigated the inputs used to inform model parameters, including unit costs. Only one study presents a detailed review of the methodologies, sources and assumptions used to estimate unit costs for the South African HIV investment case *(8)*. Typically, for other SPD costings, model input details are briefly summarized in report annexes and otherwise dispersed across draft documents and spreadsheets, resulting in a "black box" situation where costing methodology, assumptions and approaches are familiar to analyst teams but uncharted for other stakeholders.

The operational reality of national costings, including their often very short timelines and teeming numbers of multilateral stakeholders, can generate a rushed costing process. Moreover, the elaboration of NSPs and their costings will often occur concurrently, with technical teams, economists, epidemiologists and modellers working in parallel with infrequent exchanges. Costing teams may be provided with a wish list of interventions, often with insufficient information on their design, activities, resources and target populations. As a result, final costing reports may comprehensively present model outputs while only sparsely providing details to describe and justify their methods, approaches and costing inputs.

This study aims to review costing methods applied across SPDs to better understand the variation in approaches, identify common methodological strengths and weaknesses, and propose tools that can support improvements in the form of a guideline and a reporting checklist.

Specifically, the objectives are to:

- Evaluate whether estimated unit costs align with the interventions and programme package detailed in NSPs.
- Collate the range of methods used to estimate costs.
- Synergize key strengths and weaknesses in costing approaches and provide practical recommendations on how costs should be addressed across SPDs.
- Assess the type and appropriateness of cost input data used in SPDs, and identify where appropriate existing data are not used and gaps in availability of suitable cost inputs.

The quality of SPD costings is dependent on several inputs, including the level of detail provided to the costing analyst, and the availability in the literature of the costs of different interventions. Moreover, these costings are only one of many components used towards implementing an effective and efficient national HIV programme. Although the use of SPD costings by the overall health system falls outside the scope of this review, it is critical to recognize that costings do not happen in isolation. After several years of NSP and investment case development through UNAIDS, this is the first review of the details of costing methods *(9)*.

Methods

Country sampling

Ten costing documents and their associated SPDs from nine countries were selected for review using a purposive sampling approach based on availability and access to country SPD costings (Table 1). The review team prioritized countries from different geographical regions, income levels, types of HIV epidemic, level of HIV funding and country investment.

Table 1.
Overview of sample countries, SPDs and country characteristics

	Ethiopia	Myanmar	Namibia	South Africa	Suriname	Togo	United Republic of Tanzania	Zambia	Zimbabwe	Ref.
Region	Eastern and southern Africa	Asia and Pacific	Eastern and southern Africa	Eastern and southern Africa	Latin American and Caribbean	Western and central Africa	Eastern and southern Africa	Eastern and southern Africa	Eastern and southern Africa	–
NSP period	2021–2025	2021–2025	2020–2022	2017–2022	2021–2027	2021–2025	2018–2023	2020–2023	2021–2025	*(10–19)*
Costing document	NSP costing 2020 *(10)*	NSP costing 2020 *(11)*	Investment case 2020 *(12)*	Investment case 2016 *(13)*						
NSP costing 2017 *(14)*	Investment case 2021 *(15)*	NSP costing 2020 *(16)*	Investment case 2019 *(17)*	NSP costing 2020 *(18)*	NSP costing 2020 *(19)*					
Income level	Low-income country	Lower-middle-income country	Upper-middle-income country	Upper-middle-income country	Upper-middle-income country	Low-income country	Lower-middle-income country	Lower-middle-income country	Lower-middle-income country	*(20)*
Gross domestic product spent on health	3.3%	4.8%	7.9%	8.3%	7.9%	6.2%	3.6%	4.9%	4.7%	*(21)*
Country expenditure on HIV	28%	19%	55%	80%	68%	31%	9%	14%	12%	*(10–19, 21, 22)*
Type of HIV epidemic	Mixed	Concentrated	General	General	Concentrated	General	General	General	General	*(10–19)*
HIV prevalence in population aged ≥15 years in 2020	1.0%	0.6%	12.6%	17.7%	1.2%	2.1%	5.0%	11.7%	12.6%	*(23)*
Total expenditure on HIV from all funding sources (millions)	US$ $188.7 (2019)	US$ 106.5 (2017)	US$ 282.8 (2017)	US$ 2501.6 (2018)	US$ 4.7 (2011)	US$ 20.5 (2019)	US$ 156.1 (2019)	US$ 249.2 (2020)	US$ 263.7 (2019)	*(22, 23)*

Reviewed documents

National costing data were extracted from NSP costings and investment cases, including reports, supporting spreadsheets and models. Costings and investment cases use similar methodologies, combining country demographic, epidemiological and programmatic data with estimated unit costs of services to project mid- to long-term costs. NSP costings calculate total programmatic costs, but investment cases take this analysis one step further to compare the costs and impact of each intervention and suggest an optimal package of services to country policy-makers *(24)*. Annually costed operational plans were not included in this analysis.

This analysis only reviews the input unit costs used to inform resource needs projections. Although important, this review does not evaluate final cost estimates or how the programmes were ultimately implemented, or validate the appropriateness of the resource needs projections with actual expenditure.

When possible, peer-reviewed and grey literature articles cited as sources in costings and investment cases were reviewed and extracted. Source unit costs, along with their activity scope, ingredients, setting, target population, inflation adjustments and any weighted averages, were compared with the final unit costs used in SPDs to evaluate appropriateness and identify methodological strengths and weaknesses.

Details of national programmes and activities were extracted from latest NSPs. Information on intervention areas, operational procedures, target populations and providers were compared with cost estimates to ensure alignment of activity scope.

Data extraction and analysis

Dimensions of quality were informed by the Global Health Cost Consortium reference case, which presents 17 principles for high-quality costing *(25)*. The data extraction form allowed extraction of cost estimates and their key characteristics, functions and variables, including details on source type (document name and type, year of publication, country); activity (service and programme area, country of costing, target population, activity scope); costing (currency, year of reported cost, inflation adjustments, full or incremental costing, financial or economic costing, adaptation from literature methodology or ingredients-based costing (IBC), empirical or modelled); ingredients (including capital and recurrent costs); setting (facility or community-based, type of provider, scale of intervention); and other (annualization, shadow prices, cost function).

See Annex 2 for a complete outline of the data extraction template.

Analysis was conducted by outlining key review questions and inputting a simple code (1 = yes, 2 = no, 99 = not applicable or unknown), representing whether it fulfilled evaluation criteria or whether there were insufficient data to evaluate. The analysis template allowed for a methodical review and synopsis of the costing method and the possible strengths, weaknesses and gaps, by asking the following questions:

- How do cost estimates align with interventions listed in NSPs?
- What methodologies were used to estimate costs?
- What strengths, weaknesses and gaps were found in costing approaches?
- What peer-reviewed studies were used in SPD costings?

Results

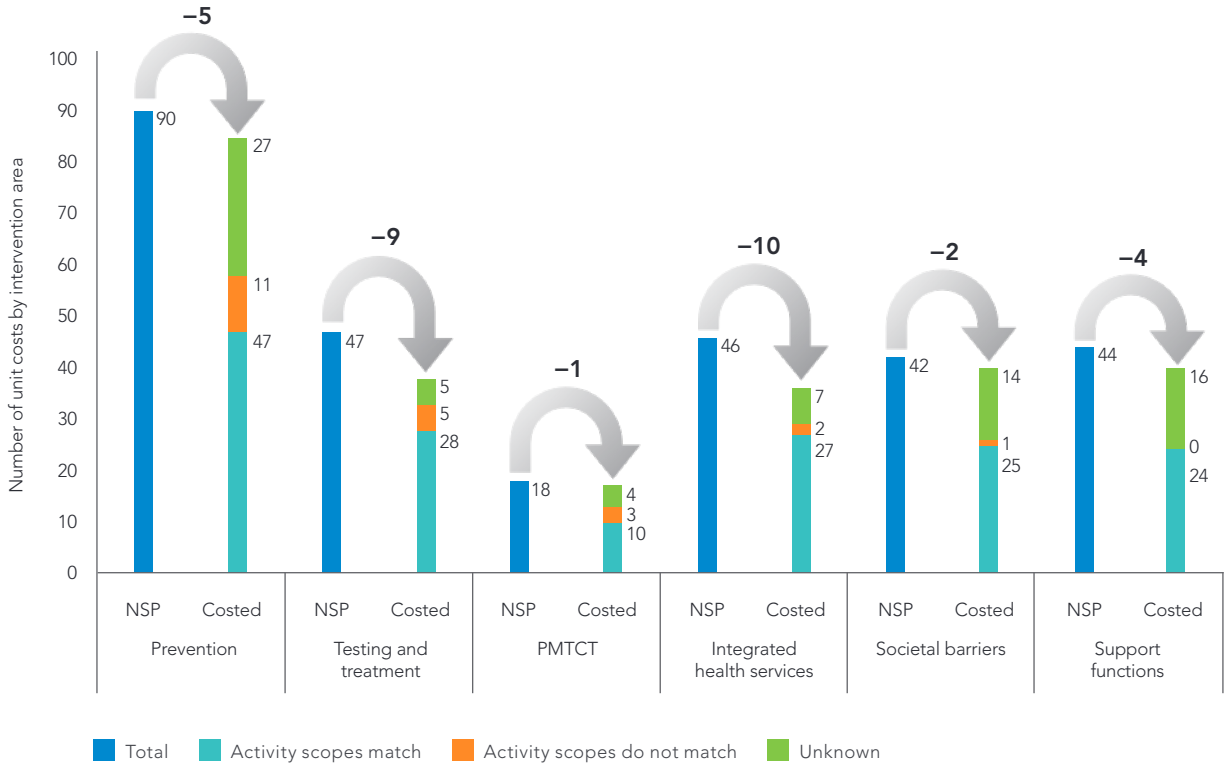
Sample description

Extraction yielded 821 data points, of which 314 (38%) were from intervention details listed in narrative NSPs, 426 (52%) were from costing data collected from NSP costings and investment cases, and 81 (10%) were cited from primary or secondary data sources (Table 2).

Table 2.
Data points extracted per country and per source, service area and target population

	Ethiopia	Myanmar	Namibia	South Africa	Suriname	Togo	United Republic of Tanzania	Zambia	Zimbabwe	Total
Total extracted data points	85	59	46	301	24	47	38	111	110	821 (100%)
Sources of data points										
Narrative NSP documents	32	18	18	109	13	18	14	51	41	314 (38%)
NSP costings	46	41	–	117	–	24	–	42	58	328 (40%)
Investment case costings	–	–	26	54	11	–	13	–	–	104 (12%)
Cited from primary or secondary sources	7	–	2	27	–	5	11	18	11	81 (10%)
Services										
Prevention	32	21	15	84	8	21	18	35	31	265 (32%)
Testing and treatment	23	13	7	64	8	13	12	34	10	184 (22%)
PMTCT	10	3	8	16	2	4	2	5	7	57 (7%)
Integrated health services	5	6	4	41	1	3	-	15	37	112 (14%)
Societal barriers	15	6	6	52	1	4	1	10	8	103 (13%)
Support functions	–	10	6	44	4	2	5	12	17	100 (12%)
Target populations										
General	17	1	13	42	4	9	13	23	10	132 (16%)
Key and vulnerable populations	39	38	13	119	6	17	12	29	46	319 (39%)
People living with HIV	27	5	14	75	9	18	5	28	33	214 (26%)
Other	2	1	–	19	–	3	1	–	1	27 (3%)
Not applicable or not specified	–	14	6	46	5	–	7	31	20	129 (16%)

Figure 1.
Costed NSP interventions and activity scope alignment



Prevention (32% of the data) and testing and treatment (22% of the data) were the service areas with the greatest focus. The remainder of the data focused on integrated health services (14%), which included services for HIV-associated comorbidities such as other sexually transmitted infections, tuberculosis (TB) and other opportunistic infections, programme support functions (12%), which refers to cross-cutting research and management activities related to the national HIV response, interventions addressing societal barriers (13%), and prevention of vertical transmission (also known as prevention of mother-to-child transmission, PMTCT) (7%).

In terms of population categories, 39% of the data were related to prevention services targeting people from key and vulnerable populations, and 26% of the data were related to HIV testing and treatment services.

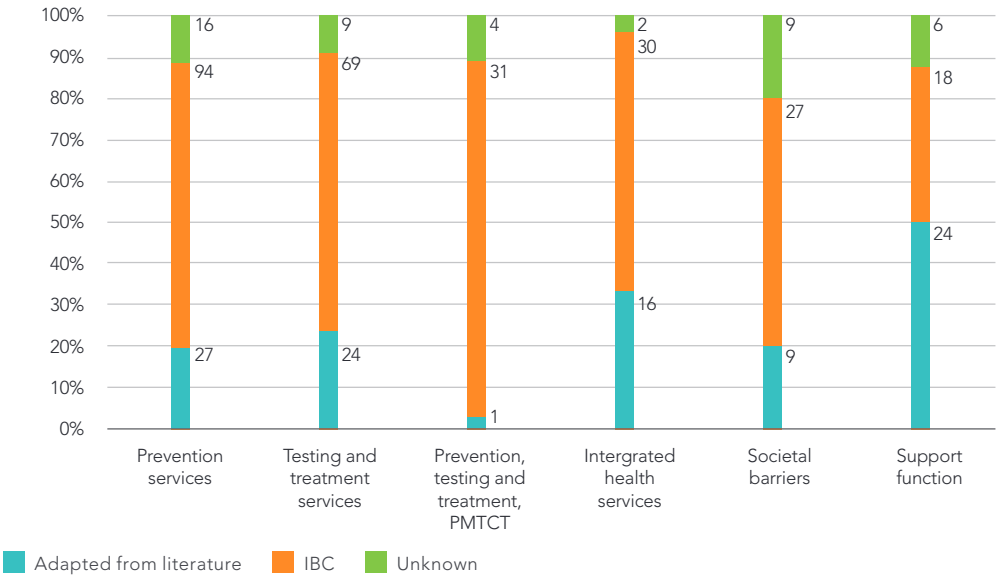
See Annex 1 for definitions of service areas and population categories.

Activity alignment between NSPs and costings

To evaluate the alignment between descriptive and costed SPDs, this review first examined the interventions listed and described in NSPs and compared them with costed interventions.

Investment cases were excluded from this part of the analysis. Investment case reports do not typically contain descriptive information on interventions and their activities. Moreover, investment case costings prioritize a predefined set of high-impact interventions and do not exhaustively cost every intervention listed in NSPs.

Figure 2.
Costing methodology used per intervention area



The breakdown of the alignment and activity scope matching by intervention area is presented in Figure 1. Of the 287 interventions listed in NSPs, 31 (11%) were not captured in costings, presenting the difference (indicated with blue arrows) between the number of interventions in the NSPs and the number of interventions captured in the costing.

For the remaining 256 costed interventions, 161 (63%) estimates matched in activity scope to NSPs, 22 (9%) did not, and 73 (28%) had insufficient detail to assess activity scope alignment.

Costing methodologies

To understand the different methods used to estimate costs, each intervention costed across SPDs was extracted and categorized as one of three methodological approaches. Methods include adapting costs from the literature (costs are derived from the literature and adaptations are applied to the full unit cost source estimated) and IBC (adaptations are made within the unit cost inputs based on multiple sources of data or modelled from scratch based on input quantities and prices).

Inputs into IBC include budget or expenditure reports, commodity price lists, and health-care worker salary scales. Some interventions are costed as lump sums or based on a percentage of direct costs rather than multiplying a unit cost by the scale of the service provided, but they are still based on existing literature or developed using IBC.

Although there is some fluidity between these methods, best judgement has been used to categorize cost estimates between the two categories. When insufficient information is provided, it is categorized as unknown.

See Annex 1 for the definitions used to categorize the methods.

Table 3.
Evaluation of approaches used in adapting costs from the literature

	Total	Source cited	Source accessed	Cost matches	Activity scope matches	Assumptions cited	Historical cost-years adjusted	Weighted average used
Prevention	27	27	15	8/15	4/8	6	1/8	2/2
Testing and treatment	24	23	21	17/21	7/17	7	11/16	0/2
PMTCT	1	1	0	0	–	1	–	–
Integrated health services	16	16	10	8/10	5/8	5	1/7	–
Societal barriers	9	9	4	0/4	–	1	–	–
Support functions	24	23	0	0	–	2	–	–
Total	*101*	*99/101 (98%)*	*50/100 (50%)*	*33/50 (66%)*	*16/33 (48%)*	*22/50 (44%)*	*15/31 (48%)*	*2/4 (50%)*

Across the 426 cost estimates extracted from NSP costings and investment cases, the majority (279, 65%) were modelled using IBC, nearly a quarter (101, 24%) were based on grey and peer-reviewed literature, and the remaining 46 (11%) could not be categorized as the methodology was either not clear or not stated.

Figure 2 presents methods by intervention area. PMTCT and interventions addressing societal barriers presented the fewest cost estimates based on literature (Table 3). More specifically, from looking at methodology across interventions, it can be noted that no literature was used for estimating costs of early infant diagnosis, paediatric treatment, nutrition support, or interventions regarding policy advocacy and stigma and discrimination (see Annex 3).

Review of adapting cost estimates from the literature approach

To evaluate the strengths, weaknesses and gaps specific to the literature approach, the review extracted and assessed the sources and then compared cost estimates, activity scopes and assumptions. The specific biomedical, behavioural and other activities that constitute an intervention were listed as described in sources and compared with the details and ingredients attached to unit costs. Inflation adjustments and calculations, if any, were also reviewed.

Among the 101 cost estimates derived and adapted from the literature, 53% originated from grey literature sources, 45% from peer-reviewed sources, and 2% from unknown sources (see Annex 4). Grey literature sources included unpublished studies, programme expenditure records and budgets, which, other than annually published United States President's Emergency Plan for AIDS Relief (PEPFAR) Country Operational Plans , were seldom available for review.

Within the sources available for review (*n* = 50), only 33 (66%) matched the estimate presented in the NSP or investment case costing. The remaining 34% referenced a source that did not report the cited unit cost even when accounting for inflation adjustments. Reasons for discrepancies include incorrect citations, and isolated and unreported exchanges between source authors and SPD costing teams to adapt the unit cost estimates.

Where corresponding estimates were found in the cited source and sufficient detail was provided in both to understand assumptions, 16 estimates (48%) captured the same scope of activities. Where inflation adjustments were needed (*n* = 31), 15 estimates (48%) were indeed adjusted for inflation.

Body of peer-reviewed literature

To evaluate the appropriateness of peer-reviewed sources used for SPD costing, and the potential gaps in the body of costing literature, this review examined every peer-reviewed primary source used and evaluated appropriateness based on study age, study setting, target population and activity scope.

At the time of costing, peer-reviewed sources were on average four years old, while the data reported in the study were on average six years old. We note, however, a frequent use of studies with data that were over 10 years old (Figure 3), particularly in integrated health services (see Annex 5).

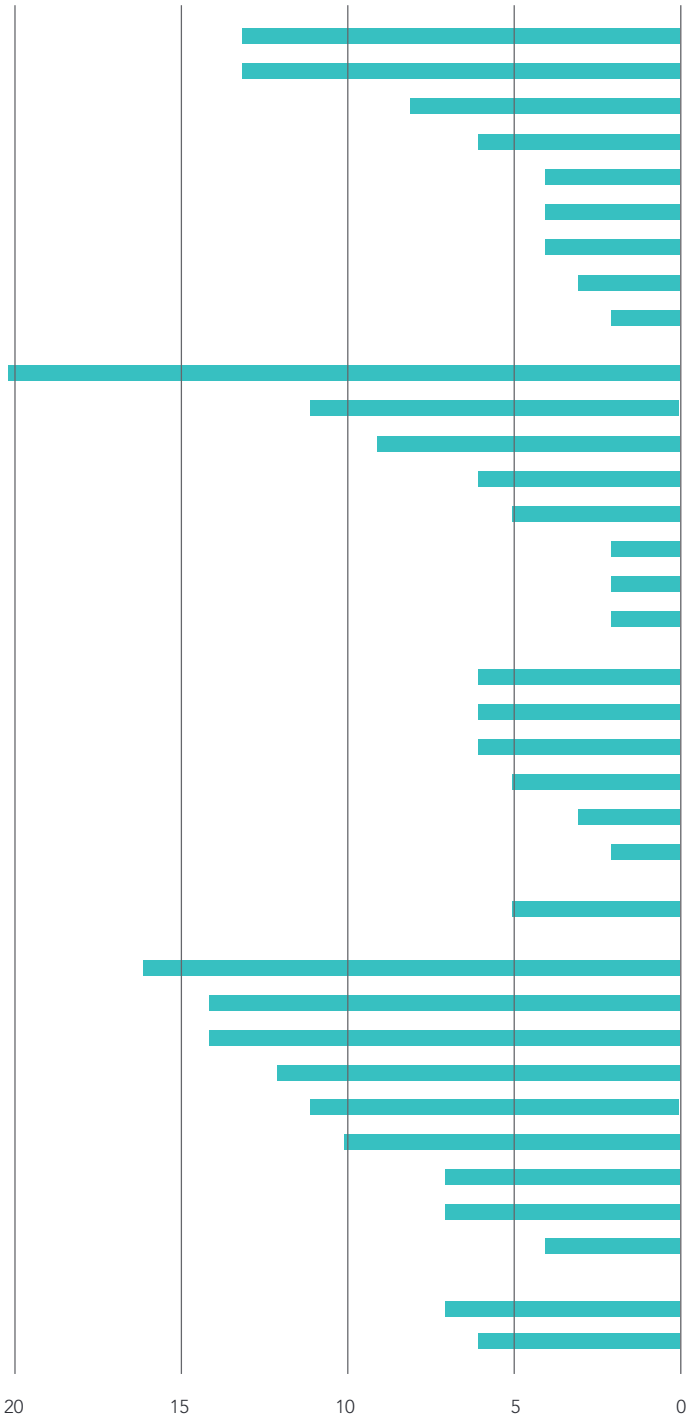
The most represented region in the primary source literature was eastern and southern Africa (*n* = 28), followed by the Asia and Pacific region (*n* = 3), North America (*n* = 2), and western and central Africa (*n* = 1). Sources from South Africa (*n* = 11), Zambia (*n* = 6), Kenya (*n* = 5) and the United Republic of Tanzania (*n* = 4) were most frequently cited.

Overall, less than half (43%) of the studies matched the country in which the national costing was conducted, although 42% shared some similarities (same region or same country income level). The remaining 15% shared no country similarities (neither same region nor same income level)—an example of this is using cervical cancer screening and treatment costs originating from China or hepatitis B and C diagnostic costs from the Medicare plan from the United States of America for Zimbabwe's 2020 NSP.

Costed interventions cited from peer-reviewed literature frequently related to prevention (*n* = 11), testing (*n* = 9), integrated health services (*n* = 9) or HIV treatment (*n* = 7). Only two peer-reviewed studies were used for interventions addressing societal barriers, and one study was used for PMTCT services. No studies were used to estimate support function costs such as programme management, research, or monitoring and evaluation, likely due to the very country-specific nature of these programmes.

When comparing scopes, national costings matched with their primary source in 29% of cases. For 25% of unit cost estimates, scopes were appropriately adjusted for IBC. In 35% of cases, it was not possible to evaluate alignment as the national costing did not provide sufficient details. For 10% of unit cost estimates, scopes in primary sources and national costing were misaligned.

Figure 3.
Age of primary source data at the time of use in SPD costing



Cash transfers	**Prevention**
Opioid substitution therapy	
Voluntary medical male circumcision	
Voluntary medical male circumcision	
Voluntary medical male circumcision	
Mobile sexual and reproductive health services	
Cash transfers	
Pre-exposure prophylaxis	
Key population outreach	
Voluntary counselling and testing	**Testing**
Provider-intiated testing	
Provider-intiated testing	
Index testing	
Community-based testing	
Home-based testing	
Provider-intiated testing	
HIV self-testing	
Adherence support	**Treatment**
Antiretroviral therapy	
CD4 testing	
Adherence support	
Antriretroviral therapy services	
Viral load testing	
Prevention of mother-to-child transmission	**PMTCT**
Mental health screening	**Integrated health services**
Treatment of sexually transmitted infections	
Tuberculosis isoniazid preventive therapy	
Hepatitis B screening	
Cervical cancer testing with visual inspection with acetic acid	
Laboratory quality assurance	
Testing for sexually transmitted infections	
Hepatitis B treatment	
HPV vaccination	
School support	**Societal barriers**
Lifeskills	

Years between data collection and costing

Review of IBC approach

To evaluate the strengths, weaknesses and gaps specific to the IBC approach, the review extracted and assessed the sources, cost functions, activity scopes, costing ingredients, inflation adjustments and calculations used.

Regarding the sources cited for IBC (Table 4), 61 (22%) of cost estimates were derived from other costing models developed and used in the same country, such as national antiretroviral therapy cost models, TB modelling or former investment cases. Other source types included programme expenditure reports (18%), programme budgets (7%), country commodity price lists (6%) and key informant interviews (4%).

Among the 279 IBC estimates, 110 (39%) were accompanied by costing details and calculations (Table 5). Of the 279 estimates, 147 (53%) had defined activity scopes, and 105 (38%) had clearly identified ingredients. In cases where historical costs required an adjustment for inflation to bring them to a consistent year with the costing (n = 20), four cost estimates (20%) were not adjusted or accompanied with a justification for that decision. All future costs were kept constant, and no estimated inflation was used for projected years.

In 23 cases where a weighted average needed to be calculated, two resorted to using unweighted averages—calculating the non-weighted average between the cost of positive and negative tests or calculating the cost of PMTCT interventions in rural and urban health centres.

Approach to costing interventions addressing societal barriers and programme support costs

Not all cost estimates used in NSP and investment case costings were estimated using unit costs multiplied by the quantity of projected outputs or health outcomes. Of the 426 cost estimates extracted, 103 (24%) pertaining specifically to interventions addressing societal barriers and programme support activities used a combination of approaches, expressing estimates as unit costs multiplied by quantities, national-level fixed costs, and as a percentage of national direct costs (Table 6).

Among these two programme areas, 41 costs (40%) were expressed as fixed costs (i.e. a lump sum) only. These were typically found and estimated from programmatic budgets (n = 12) or expenditure reports (n = 28) of various implementers, such as PEPFAR Country Operational Plans and Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) grants, and estimated using a weighted average.

Indirect programme support costs were also expressed as a percentage of direct costs (n = 19, 18%), with the average portion of total costs across the SPDs being 22% of direct costs. When broken down to intervention level, individual support activities, such as research and surveillance, human resource capacity-building and multisectoral coordination, were estimated at an average of 2% of direct costs.

Table 4.
Peer-reviewed and grey literature sources used for IBC

	Other cost models	Commodity price lists	Programme budget	Expenditure records	Key informant interviews	Peer-reviewed studies	Multiple sources	Unknown	Total
Prevention	17	5	11	21	3	5	18	14	94
Testing and treatment	15	8	2	8	1	6	7	22	69
PMTCT	12	4	1	3	0	1	4	6	31
Integrated health services	11	1	1	5	4	3	4	1	30
Societal barriers	5	0	4	12	2	1	8	5	37
Support functions	1	0	0	1	1	0	9	6	18
Total	*61 (22%)*	*18 (6%)*	*19 (7%)*	*50 (18%)*	*11 (4%)*	*16 (6%)*	*50 (18%)*	*54 (19%)*	*279 (100%)*

Table 5.
Evaluation of approaches used in IBC

	IBC shown	Scope clear	Ingredients clear	Historical cost-years adjusted where needed	Weighted average used where needed	Total
Prevention	46	37	29	6/7	7/8	94
Testing and treatment	19	42	28	6/6	8/8	69
PMTCT	8	16	9	1/1	1/2	31
Integrated health services	10	21	8	0/2	4/4	30
Societal barriers	16	23	16	3/4	0/0	37
Support functions	11	8	15	0/0	1/1	18
Total	*110/279 (39%)*	*147/279 (53%)*	*105/279 (38%)*	*16/20 (80%)*	*21/23 (91%)*	*279 (100%)*

Table 6.
Approaches to costing interventions addressing societal barriers and support function activities

	Total	Unit costs	Fixed costs	% direct costs
Societal barriers	55	41	10	4
Support functions	48	2	31	15
Total	*103 (100%)*	*43 (42%)*	*41 (40%)*	*19 (18%)*

Discussion

Lessons learned

This report has reviewed the costings undertaken for 10 SPDs across nine countries between 2016 and 2021. It extracted the cost estimates and the methods used to estimate them and reviewed the source data and methods for adapting cost data sources to the specific setting and programmatic context presented in each SPD. A summary of the aims, findings and key messages is listed in Annex 6.

Stakeholder feedback has highlighted how analysts develop SPD costings, often in very short timeframes; where the programmes needing costing are being developed in parallel rather than in sequence, often without the full specification of the programme to cost; or where the availability of observed programmatic cost data is sparce. Under these constraints, analysts are faced with making multiple analytical choices and assumptions. This review aims to identify areas where specific guidance can support this process.

We extracted and scrutinized 426 cost data points and their sources. Around two-thirds addressed prevention and treatment. Far fewer detailed costs were available for other programme areas, including interventions addressing societal barriers and support function activities. Of all interventions presented in the NSP, the vast majority (89%) were represented in the costings, and nearly two-thirds of the specified intervention activities were represented in the costings. Unit cost estimates are more frequently developed using IBC (n = 279, 65%), building up the unit cost from a diversity of data sources to create new or adapt existing estimates to the specific setting. Around a quarter of the studies (n = 101, 24%) were adaptations of existing unit costs, of which less than half (45%) were from peer-reviewed literature.

This emphasizes the lack of observed data generally, but also the lack of grey literature making its way into the peer-reviewed literature. The process of publishing cost data is slow, but the peer review process would make estimates more valid, more robust and more widely available for use.

The quality of the costings is generally high. By taking an overview across the costings, methodological strengths can be drawn on from different documents to develop a gold standard and identify key areas for improvement. The first issue this review identified was a 44% information gap between NSPs and their costings, consisting of interventions costed with insufficient detail on activity scope (25%), interventions that were not captured (11%), and interventions where activity details did not match with the description in NSPs (8%). This relates to two issues—process and perspective.

The process of NSP costings is typically rushed. From the outset, costing teams are provided with insufficient details on interventions and their approach, service delivery level, operationalization, and primary and complementary activities. Costing teams are obliged to make critical assumptions and estimate an approximate value for each intervention, thus engendering the discrepancies and gaps highlighted above.

Alternatively, different NSP costings seem to have been costed from different perspectives. These perspectives and assumptions were rarely stated, but some seem to use the perspective of the national AIDS programme alone, precluding costs of other national government branches, while others seem to adopt the perspective of the entire ministry of health, integrating costs from other sectors, such as social services or TB.

Different costing perspectives suggest different costing goals. This transpired further when collecting feedback from different NSP costing teams during the review of this study. Costing teams affirmed that the NSP costing had to be comprehensive, with a multisectoral perspective, to present the government with a total estimate to which ministries and partners can use for budgeting purposes. Other costing teams suggested NSP costings had to be aware of the country funding landscape and focus on prioritized interventions to present the ministry of health with a practical cost estimate.

The objective of the NSP costing should guide which of these costs are included. Perspective, costed interventions, activity scopes and above-service costs are contingent on whether the goal is to inform resource allocation or budgeting.

It is the perspective of this review that NSP costing goals should be deliberated among in-country stakeholders and stated clearly in reporting documents. Ideally, costings should be embedded from the beginning of the process so to help inform priority setting, but ultimately, analysts must be provided with a clearly defined list of interventions along with details on their scope, activities, target populations, level of implementation, and scale. Costing teams would then use these details to conduct a comprehensive and, if appropriate, multisectoral cost analysis of the NSP. Funding landscape analyses, investment cases and budgeting serve to further inform SPDs, helping to define effective financing and purchasing strategies. This approach would require the process for NSP development to be revised and initiated far earlier than is currently done.

Lack of transparency and details on methodologies, assumptions and sources was a common issue across most costings. Overall, 11% of unit costs had no literature or IBC referenced, 15% had no cited sources, 61% had unclear activity scopes (possibly because of the vague description of interventions in main narrative SPDs), and 62% had undefined costing ingredients (relevant mainly for IBC cost estimates).

In some cases, annexes provided far greater detail, but other documents were missing an annex with full costing details or a spreadsheet with adaptations. A comprehensive reporting checklist would be an important report that the national AIDS council could request.

Additionally, 34% of cited peer-reviewed sources did not contain a matching or comparable unit cost, indicating cost adaptations were made but not reported. As a result, future costing teams looking to adapt the data, tools and sources would not be able to build on each other's work and would have to rely on institutional memory.

Over the course of NSP implementation, however, activities and approaches often adapt, so unit costs may need to be adjusted to reflect higher or lower indirect costs, decreased commodity prices, increased community-led approaches, and so on. As they stand, costing details are limited to an NSP chapter and contain insufficient details to permit reviews or adaptations. A standardized methodological report for SPD costings ideally could become a living document that countries learn to adapt over time to compare with programme expenses. In its simplest form, the report would need to

include a statement on the costing's goal and perspective, intervention and activity descriptions, target population, and ingredients with input prices and quantities, each fully referenced with their own source noted. A more sophisticated version could link to a costing model where they are automatically updated.

Some specific methodological issues or incongruencies were found. Due to the lack of clarity on costing ingredients, the assumptions or inclusion around indirect costs could not always be tracked within specific or across unit costs within a national costing exercise. This is important as there are different ways to include indirect costs, either within each unit cost, or as a lump sum (fixed cost), or as a percentage markup on total direct costs.

This raised concerns over whether indirect costs were being sufficiently accounted for or possibly double-counted. Again, the application of indirect costs is further informed by the costing's perspective and overall goal. With insufficient information, it was not possible to make a judgement on the treatment and application of indirect costs. Stating costing goals and perspective and systematically defining ingredients ought to improve transparency and support country costing teams to track their indirect costs across the hundreds of datapoints, methodologies and sources used.

Costing teams face huge challenges in having to use limited, often outdated sources, rarely suited for the exact programmatic context of country costings. A summary of the peer-reviewed sources used across costings revealed potential gaps in the literature—only one peer-reviewed source was cited for interventions to prevent vertical transmission (PMTCT) and two for interventions addressing societal barriers. PMTCT costing studies are often unadaptable as they may pertain to an intervention specific to a population, such as all women, or only pregnant women living with HIV, or all children, or only children living with HIV.

Interventions addressing societal barriers are more challenging to translate across settings. Each country has its own specific barriers and approaches to addressing societal factors. Nevertheless, there is a clear need to generate an evidence base around societal barriers and the community response, to start understanding the composition and drivers of these costs. With this growing evidence, it is imperative that these intervention areas and their respective costings become more prominent in NSPs, thus helping to secure future investments in these vital response areas. Peer-reviewed sources used for costing integrated health services were often over 10 years old and not always geographically pertinent to the country costing. This may be more reflective of both the top-down and siloed approach used over the past decade in the HIV response, and the increasing interest in integrating community responses and systems, including community-generated data and analysis, and other health and social services. Updating the cost evidence in these programme areas will help facilitate their inclusion in costed NSPs. Moreover, integrated services are also an opportunity to improve access to and ensure more person- and community-centred services, and to reduce overall costs by leveraging shared costs and economies of scope.

It is outside the scope of this review to assess whether the limited use of peer-reviewed literature is due to a lack of observed cost data or an inability to identify these data for SPD costings. There are many synergies, however, across national costings in identifying existing costing literature, and this could be monopolized more effectively. Former attempts at keeping unit-cost repositories up to date have proved to be challenging due to time-limited funding and commitment. As such, this review suggests establishing a live repository of SPD costings using a standardized methodological report, including a list of referenced peer-reviewed sources along with relevant assumptions and adaptations. The report would need to be submitted with the NSP in a standard format that can be uploaded without additional editing. Such a

database could provide a starting point, which costing teams would then update with more recent literature. Country-specific activity-based costings and management are crucial to this repository, as this will help generate consistent data across interventions, and pertinent evidence on interventions addressing societal barriers, integrated care and above-service-level costs.

Limitations

This study has not reviewed whether critical building blocks were in place for SPD costings to succeed, such as an appropriately timed and sequenced SPD process, a well-specified description of interventions in SPD narratives, or a later, effective use of costings for funding applications or programming. Other guidance is under development at UNAIDS to support more robust strategic planning processes, which is outside the scope of this report.

The analysis identified a number of strengths, and some specific information gaps and methodological challenges to help build the opportunity to improve the process and reporting standards for costing national HIV SPDs.

It was beyond the scope of this study to conduct its own systematic review across intervention areas and identify whether pertinent and up-to-date costing literature was available to costing teams. The study does highlight potential gaps in the literature (such as PMTCT and interventions addressing societal barriers), and some potential aged-out costing studies (particularly in integrated health services) or geographically discrepant studies, but it is unable to evaluate whether other, more relevant studies may have been available to costing teams.

Recommendations and next steps

We recommend that a transparency checklist be developed to make goals, perspectives and assumptions explicit at the outset; identify all components that need to be considered for each unit cost; and document the nature and source of each unit cost and the overall resource needs estimate. This checklist would be part of a broader UNAIDS guideline on costing national HIV strategic plans that would include specific guidance on best practice for estimating the costs of planning documents, including advice on how to:

- Critically appraise and choose between multiple or limited available data sources.
- Adapt unit costs from other settings and time periods to the specific SPD context.
- Adjust unit costs for the inclusion or exclusion of specific intervention approaches and activities.
- Adjust costs and input prices for changes over time (this could be for inflation or price drops, e.g. for some diagnostics and pharmaceuticals).
- Document assumptions and adaptations applied using a transparency checklist in a methodological report.
- Present cost analyses for different purposes, including budgeting and resource allocation.

This guidance will feed into broader NSP guidance for multisectoral (led by UNAIDS) and health-sector (led by WHO) planning. This will include a reporting checklist based on review findings that will support more transparent and high-quality cost estimates.

Annexes

Annex 1. Glossary

Services	
Prevention	Programmes that use biomedical, behavioural and structural approaches to reduce a person's risk of contracting HIV Include provision of pre-exposure prophylaxis (PrEP), post-exposure prophylaxis (PEP), condoms, lubricants and other commodities, voluntary medical male circumcision (VMMC), services for people who inject drugs, opioid substitution therapy, needle–syringe programmes, comprehensive sexuality education, economic empowerment of adolescent girls and young people, and other tailored services for adolescent girls and young people, sex workers, gay men and other men who have sex with men, transgender women, transgender men, and people in prisons *(26)*
Testing and treatment	Voluntary HIV testing and antiretroviral therapy services after diagnosis, irrespective of CD4 cell count or WHO clinical stage *(27)* Include viral load testing, other laboratory testing for treatment monitoring, and retention support for people on treatment *(26)*
Prevention of vertical transmission	All activities aiming to prevent or eliminate vertical transmission or mother-to-child transmission (PMTCT) Include HIV testing and treatment of pregnant women, early infant diagnosis and paediatric treatment *(26)*
Integrated health services	Health services that seek to prevent, test for and treat HIV-associated comorbidities Include diagnosis, treatment and prevention of sexually transmitted infections, TB and other opportunistic infections in people living with HIV *(26)*
Interventions addressing societal barriers	Support basic programme activities by helping to "overcome major barriers to service uptake" *(27)* Include programmes that seek to reduce stigma and discrimination, remove legal and social barriers, address gender inequality, defend human rights, and promote civil society and community engagement *(26)*
Support functions	Include activities used to manage and track the national HIV response, such as collecting and reporting strategic information on the HIV epidemic and strengthening health systems *(26)*
Population categories	
General population	Refers to a countrywide population, typically HIV-negative or with an unknown HIV status, reached by prevention or testing programmes through wide, non-targeted approaches
Key populations	Include gay men and other men who have sex with men, sex workers and their clients, transgender men, transgender women, people who inject drugs, and people in prisons and other closed settings *(27)*
People living with HIV	Adults and children with a known HIV-positive diagnosis who may or may not be receiving routine HIV treatment
Other	Category including health-care workers, parents and caregivers, teachers and traditional leaders
Vulnerable populations	Defined by each country's unique social and epidemiological contexts, but may include adolescent girls and young women, adolescent boys and young men, pregnant and breastfeeding women, children or infants exposed to HIV, partners of people living with HIV, partners of women attending antenatal care, survivors of sexual violence, people with disabilities, orphans and vulnerable children, and uncircumcised men living in high-prevalence areas

Costing	
Activity scope	Multiple activity components that may fall within a single intervention, such as promotional campaigns, monitoring and evaluation, and capacity-building
Costing ingredients	Cost inputs of an intervention, including capital and recurrent costs, and direct and indirect costs Input categories include startup activities, demand-generation, training, vehicles, equipment, buildings, personnel, supplies, vehicle maintenance, building maintenance, service-level indirect costs, and above-service-level costs
Ingredients-based costing	Unit cost was estimated by evaluating the type and number of resources used for each intervention and input costs, using expenditure reports, budgets, price lists, and other government programme costings
Adapting costs from literature	Unit cost collected from a published or unpublished source and applied to a costing model or budget with minimal adjustment to the full unit cost, such as using an average between two pertinent estimates, or adjusting historical costs for inflation If adjustments were made within unit costs to ingredients, input quantities or prices, this was categorized as IBC and not as adapting costs from the literature

Annex 2. Data extraction and analysis template

	Heading	Inputs/details
Data point	Data source type	Resource needs model Cited source Primary data source Investment case NSP costing NSP document
	Region	Asia and Pacific Eastern and southern Africa Latin America and the Caribbean Western and central Africa Middle East and North Africa
	Sample country	[specify country name]
	Services	Prevention Testing and treatment PMTCT Integrated health services Societal barriers Support functions
	Programmes	Condoms, lubricants and other Economic empowerment PEP PrEP Sexual education and health services Tailored services VMMC HIV testing Antiretroviral therapy Laboratory Retention support Testing and treatment of pregnant women Early infant diagnosis Paediatric treatment Retention support TB Sexually transmitted infections Cervical cancer Hepatitis B Hepatitis C Syphilis Mental health Community mobilization Gender inequality Human rights Support for orphans and vulnerable children Parenting support Policy advocacy Stigma and discrimination Health systems strengthening Monitoring and research

Data point	NSP data point	[specify cost name]
	Variable details	[specify intervention description]
	Data source name	[specify document title]
	Year of publication	[specify year of publication]
	Data source link	[specify URL]
	Source type	Peer-reviewed study Report Excel worksheet
Data point characteristics	Reported cost name	[specify cost per unit of output]
	Country of unit cost	[specify country origin of unit cost (may differ from country sample)]
	Population categories	General population Key populations Vulnerable populations People living with HIV Other
	Populations	General population Adult men Female sex workers Gay men and other men who have sex with men Transgender women and transgender men People in prisons People who inject drugs People from key populations (not specified) Partners of people living with HIV Partners of women attending for antenatal care People with disabilities Serodiscordant couples Survivors of sexual violence Orphans and vulnerable children Clients of sex workers Adolescent boys and young men Adolescent girls and young women Children Infants Adults living with HIV Children living with HIV Pregnant and breastfeeding women living with HIV People living with TB/HIV coinfection Health-care workers Parents, guardians and caregivers Teachers Traditional leaders
	Scope	[specify activities included in cost]
	Cost type	Unit Total Percentage
	Reported unit cost	[specify cost]

Data point characteristics	Currency	[specify currency]
	Duration of intervention	[specify whether cost is per event, year or treatment period]
	Duration details	[specify duration]
	Year of reported unit cost	[specify year of unit cost]
	Reported/assumed	[specify whether year of unit cost is reported or assumed; if assumed, one year less than year of publication]
	US$ (costed year)	[convert unit cost to US$ if needed, at year of reported unit cost]
	US$ 2020	[convert US$ unit cost from reported year to 2020]
	Inflation adjustment	[specify whether unit cost was inflated to reporting year]
	Full/incremental/other	[specify whether cost is incremental or full]
	Ingredients included	[specify ingredients included in cost, e.g. staff salary, equipment, supplies]
	Financial/economic/ other	[specify whether unit cost is financial or economic estimate]
	IBC/adapted cost from literature	[specify method used to estimate unit cost—adapted cost from literature or IBC]
	Empirical/modelled	[if IBC, specify whether empirical or modelled]
Other reported unit costs	Reported cost name	[if other estimate is provided for same unit cost, provide
	Country of unit cost	
	Reported unit cost	
	Reported currency	
	Time horizon	
	Time horizon details	
	Year of reported unit cost	
	Year reported/assumed (if assumed, use end of data collection period)	
	Full/incremental/other	
	Financial/economic/ other	
	IBC/adapted cost from literature	

Other reported unit costs	Empirical/modelled	[if other estimate is provided for same unit cost, provide further details]
	Reported cost name	
	Country of unit cost	
	Reported unit cost	
	Reported currency	
	Time horizon	
	Time horizon details	
	Year of reported unit cost	
	Year reported/assumed (if assumed, use end of data collection period)	
	Full/incremental/other	
	Financial/economic/ other	
	IBC/adapted cost from literature	
	Empirical/modelled	
Ingredients	Startup	[yes if ingredient included in unit cost estimate; no if not included; NS if not specified]
	Training	[yes if ingredient included in unit cost estimate; no if not included; NS if not specified]
	Demand creation	[yes if ingredient included in unit cost estimate; no if not included; NS if not specified]
	Adherence support	[yes if ingredient included in unit cost estimate; no if not included; NS if not specified]
	Staff time	[yes if ingredient included in unit cost estimate; no if not included; NS if not specified]
	Waste management	[yes if ingredient included in unit cost estimate; no if not included; NS if not specified]
	Equipment	[yes if ingredient included in unit cost estimate; no if not included; NS if not specified]
	Vehicles	[yes if ingredient included in unit cost estimate; no if not included; NS if not specified]
	Vehicle operation, maintenance and transport	[yes if ingredient included in unit cost estimate; no if not included; NS if not specified]
	Building and storage	[yes if ingredient included in unit cost estimate; no if not included; NS if not specified]
	Building operation/ maintenance	[yes if ingredient included in unit cost estimate; no if not included; NS if not specified]
	Supplies beyond medicine costs	[yes if ingredient included in unit cost estimate; no if not included; NS if not specified]
	Service-level indirect costs	[yes if ingredient included in unit cost estimate; no if not included; NS if not specified]
	Above-service-level direct costs	[yes if ingredient included in unit cost estimate; no if not included; NS if not specified]

Setting	Facility-based	[specify whether intervention site/cost is incurred at health-facility level]
	Facility level	[if yes, specify level of health facility]
	Community-based	[specify whether intervention site/cost is incurred at community level]
	Community-led	[specify whether intervention is led by community actors or groups]
	Provider	[specify type of provider delivering service]
	Integrated with other services	[specify whether service is standalone or integrated with other services]
	Number of sites in unit cost	[specify number of sites used or covered in unit cost estimate]
	Scale of intervention unit cost	[specify number of people reached with intervention in unit cost estimate]
Other details	Duration of observed implementation (months)	[specify number of months observed for unit cost estimate]
	Annualized capital costs (or deannualized for first budget year)	[specify whether capital costs are annualized]
	Shadow prices (good and opportunity costs of time)	[specify whether shadow prices included in unit cost estimate]
	Human resources availability constraints	[specify whether human resources constraints observed or reported during period of unit cost estimate]
	Supply/logistics constraints	[specify whether logistics or supply issues observed or reported during period of unit cost estimate]
	Suboptimal demand	[specify whether demand issues observed or reported during period of unit cost estimate]
	Human- or person-centred approach	[specify whether human- or person-centred design included in intervention/activity]
	Cost function used	[specify cost function used for unit cost estimate]
Method	Quick extraction notes/ observations per unit cost	[brief qualitative notes from extraction]
	Quick extraction notes/ observations per intervention area	[brief qualitative notes from extraction]
	Quick extraction notes/ observations per country	[brief qualitative notes from extraction]
	Adapted cost from literature or IBC	[specify unit estimate measurement method—adapted cost from literature, IBC, unknown]

Unit estimate adapted from the literature	Peer-reviewed/grey	[if adapted cost from literature, indicate whether source is government report, grey (other) or peer-reviewed research]
	Source name/what	[if adapted cost from literature, indicate name/type of source]
	Unit estimate source cited	[1 = unit estimate source reported or cited; 0 = unit estimate source not reported or cited]
	Unit estimate source found	[1 = source found or accessed; 0 = source not found or accessed]
	Unit estimate and unit estimate source match/ correct	[1 = unit estimate used matches source unit estimate; 0 = unit estimate used does not match source unit estimate; 99 = not applicable] [comments, e.g. found source but could not find reported unit estimate]
	Unit estimate source appropriate (year, country, setting, intervention)	[1 = source is appropriate; 0 = source is not appropriate; 99 = not applicable; 100 = assess appropriateness later] [if 0, indicate what is not appropriate—country, intervention setting, year, source type]
	Assumptions cited/ justified	[1 = assumptions made for unit estimate reported; 0 = assumptions made for unit estimate not reported; 99 = N/A] [e.g. did not report what scope or ingredients assumed to be included in cost, or did specify that HIV programme would only cover costs of cash transfer, or specified study used to assume population reactivity rate]
	Assumption correct/ appropriate	[1 = assumptions made correct; 0 = assumptions made are erroneous or incorrect; 99 = not applicable] [e.g. assumption that differentiated services delivery costs are 30% lesser than facility incorrect based on study used for unit estimate cost]
	Unit estimate scope match	[1 = scope of unit estimate matches source; 0 =scope does not match source; 99 = not applicable] [e.g. source includes prevention activities while unit estimate covers only treatment]
	Past cost years adjusted	[1 = unit estimate inflated from source year; 0 = unit estimate not inflated from source year; 99 = not applicable] [if 0, indicate source year and report year]
	Projected cost years adjusted	[1 = unit estimate inflated for projected or future years; 0 = unit estimate not inflated for projected or future years; 99 = not applicable] [e.g. NSP authors specify they do not include projected inflation]
	Weighted average used	[1 = unit estimate measured from weighted average of relevant unit estimate costs; 0 = unit estimate not correctly weighted; 99 = not applicable] [e.g. source provides cost per reactive and cost per negative; author did not use weighted average]

Unit estimate from IBC	Type of IBC	[empirical, modelled, unknown; 99 = not applicable]
	Source name/what	[type or name of source used for IBC—expenditure report, budget peer-reviewed study]
	IBC shown or demonstrated	[1 = IBC details provided; 0 = IBC details not available; 99 = not applicable]
	IBC ingredients clear and justified	[1 = ingredients included in unit estimate specified; 0 = ingredients not clear or justified; 99 = not applicable]
	Projected cost years adjusted	[1 = unit estimate inflated for projected or future years; 0 = unit estimate not inflated for projected or future years; 99 = not applicable] [e.g. NSP authors specify they do not include projected inflation]
	Weighted average used	[1 = unit estimate correctly measured from weighted average; 0 = unit estimate not correctly weighted; 99 = not applicable]
Societal barriers/programme management costs	Percentage of subtotal	[1 = if critical enablers/programme management cost is a percentage; 0 = if critical enablers/programme management cost is not a percentage; 99 = not a critical enablers/programme management cost]
	Assumptions for percentage explained	[assumptions for percentage used justified]
	Unit cost estimate	[1 = if societal barriers/programme support cost is a unit cost; 0 = if societal barriers/programme support cost is not a unit cost; 99 = not a societal barriers/programme support cost]
	Total cost	[1 = if societal barriers/programme support cost is a total cost; 0 = if societal barriers/programme support cost is not a total cost; 99 = not a societal barriers/programme support cost]
Intervention costs	Intervention area	[specify unit estimate intervention area]
	NSP unit estimate	[specify name of unit estimate]
	Full/incremental	[specify whether cost is full/incremental/unknown]
	Scope	[specify scope included in unit estimate]
	If full cost, are all pertinent ingredients included?	[1 = yes; 0 = no; 99 = not applicable]
	If incremental cost, are other unit estimate provided to capture full costs?	[1 = yes; 0 = no; 99 = not applicable]
	Unknown	[1 = yes; 0 = no; 99 =not applicable]

Annex 3. Costing methodologies per service and intervention

Service	Adapted cost from literature *(n)*	IBC *(n)*	Unknown *(n)*	Total *(n)*
Prevention	**27 (20%)**	**94 (69%)**	**16 (12%)**	**137 (100%)**
Condoms and lubricants	0	11	2	13
Economic empowerment	5	6	0	11
PEP	2	8	0	10
PrEP	4	24	0	28
Sexual and reproductive health and rights and education	4	10	3	17
Tailored services	8	29	10	47
VMMC	4	6	1	11
Testing and treatment	**24 (24%)**	**69 (68%)**	**9 (9%)**	**102 (100%)**
HIV testing	8	31	5	44
Antiretroviral therapy	11	26	1	38
Laboratory	1	6	3	10
Nutrition support	2	0	0	2
Retention support	2	6	0	8
PMTCT (all)	**1 (3%)**	**31 (86%)**	**4 (11%)**	**36 (100%)**
Antenatal HIV services	1	13	1	15
Early infant diagnosis	0	6	1	7
Paediatric treatment	0	11	2	13
Nutrition infant support	0	1	0	1

Integrated health services	**16 (33%)**	**30 (63%)**	**2 (4%)**	**48 (100%)**
TB	5	12	0	17
Sexually transmitted infections	1	4	1	6
Cervical cancer	3	4	0	7
Hepatitis B	2	1	0	3
Hepatitis C	1	1	1	3
Syphilis	1	7	0	8
Mental health	3	1	0	4
Societal barriers	**9 (16%)**	**37 (67%)**	**9 (16%)**	**55 (100%)**
Community mobilization	2	12	5	19
Gender inequality	3	7	1	11
Human rights	1	1	1	3
Support for orphans and vulnerable children	1	5	0	6
Parenting support	2	3	1	6
Policy advocacy	0	3	0	3
Stigma and discrimination	0	6	1	7
Support functions	**24 (50%)**	**18 (38%)**	**6 (13%)**	**48 (100%)**
Health systems strengthening	14	11	5	30
Monitoring and evaluation	10	7	1	18

Annex 4. Source types used for adapting cost from literature

	Peer-reviewed studies *(n)*	Grey literature *(n)*	Unknown *(n)*	Total *(n)*
Condoms and lubricants	0	11	2	13
Prevention	12	15	0	27
Testing and treatment	22	1	1	24
PMTCT	0	1	0	1
Integrated health services	11	5	0	16
Societal barriers	0	9	0	9
Support functions	0	23	1	24
Total	**45 (45%)**	**54 (53%)**	**2 (2%)**	**101**

Annex 5. Review of peer-reviewed primary sources

Reference	Intervention	Details	Years since publication	Study country	Costing country	Geographical match [a]	Population match	Scope match
Prevention services								
(28)	Opioid substitution therapy	–	10	Indonesia	Togo	None	Match	Match
(29)	Cash transfers	–	3	South Africa	South Africa	Match	Match	Unknown
(30)	Cash transfers	–	6	Kenya	Togo	Low	Match	Unknown
(31)	VMMC	–	4	Zambia	Zambia	Match	Match	Match
(32)	PrEP	–	1	Zimbabwe	Namibia	Low	Similar	Unknown
(33)	VMMC	–	5	United Republic of Tanzania	United Republic of Tanzania	Match	Match	Match
(8)	Outreach, key populations	Sex workers	1	South Africa	Zambia	Low	Match	None
(8)	Outreach, key populations	Gay men and other men who have sex with men	1	South Africa	Zambia	Low	Match	None
(8)	Outreach, key populations	People who inject drugs	1	South Africa	Zambia	Low	Match	None
(8)	PrEP	People from key populations	1	South Africa	Zambia	Low	Not a match	Match
(8)	PrEP	Adolescent girls and young women	1	South Africa	Zambia	Low	Match	Match
(34)	Sexual and reproductive health and rights services	Mobile	2	South Africa	South Africa	Match	None	Unknown
(35)	VMMC	VMMC	2	South Africa	Namibia	Low	Match	Unknown
(36)	Provider-initiated counselling and testing	Negative	9	South Africa	South Africa	Match	Match	Match

a Geographical match: match, same countries; similar, countries are different but from a similar region and country income level; not a match, countries are neither from same region nor from same income level.

(36)	Provider-initiated counselling and testing	Positive	9	South Africa	South Africa	Match	Match	Match
(37)	Provider-initiated counselling and testing	All	6	South Africa	Zambia	Low	Match	Match
(37)	Mobile HIV counselling and testing	Negative	2	South Africa	South Africa	Match	Match	Unknown
(37)	Mobile HIV counselling and testing	Positive	2	South Africa	South Africa	Match	Match	Unknown
(38)	Community-based HIV counselling and testing	All	3	Kenya, Uganda	United Republic of Tanzania	High	Match	Unknown
(39)	Index texting	All	2	Kenya	Zambia	High	Match	Match
(40)	Voluntary counselling and testing	All	17	Kenya	United Republic of Tanzania	High	Similar	Unknown
(41)	HIV self-testing	All	2	Zimbabwe	United Republic of Tanzania	High	None	Unknown
(42)	Provider-initiated counselling and testing	All	2	Malawi, Zambia, Zimbabwe	United Republic of Tanzania	High	Match	Match
(43)	Home-based HIV counselling and testing	Negative	1	South Africa	South Africa	Match	Match	Unknown
(43)	Home-based HIV counselling and testing	Positive	1	South Africa	South Africa	Match	Match	Unknown
(43)	Adherence support	–	0	South Africa	South Africa	Match	Match	Unknown
(45)	Adherence support	–	0	South Africa	South Africa	Match	Match	Unknown
(46)	Adherence support	–	1	United Republic of Tanzania	Zambia	High	Match	Match
(47)	CD4 testing	–	4	South Africa	South Africa	Match	Match	Unknown
(48)	In-patient antiretroviral therapy	Pre-antiretroviral therapy, <200 cells	2	South Africa	South Africa	Match	Match	Match
(48)	In-patient antiretroviral therapy	Pre-antiretroviral therapy, 200–349 cells	2	South Africa	South Africa	Match	Match	Match
(48)	In-patient antiretroviral therapy	Pre-antiretroviral therapy, 350–500 cells	2	South Africa	South Africa	Match	Match	Match

(48)	In-patient antiretroviral therapy	Antiretroviral therapy, <200 cells	2	South Africa	South Africa	Match	Match	Match
(48)	In-patient antiretroviral therapy	Antiretroviral therapy, 200–349 cells	2	South Africa	South Africa	Match	Match	Match
(48)	In-patient antiretroviral therapy	Antiretroviral therapy, 350–500 cells	2	South Africa	South Africa	Match	Match	Match
(49)	Viral load testing	–	1	Zambia	Zambia	Match	Match	Unknown
(50)	Antiretroviral therapy	Service	0	Zambia	Zambia	Match	Match	Unknown
(51)	Antiretroviral therapy	Service	0	Zambia	Zambia	Match	Match	Unknown
(52)	HIV/mental health	Screening	16	United States	Zimbabwe	None	Similar	None
(52)	HIV/hepatitis B	Screening	9	United States	Zimbabwe	None	Match	Match
(53)	HIV/hepatitis B	Treatment	4	Gambia	Zimbabwe	None	Match	Match
(54)	Human papillomavirus vaccination	–	2	Zambia	South Africa	Low	Match	Unknown
(55)	HIV/cancer	Screening	8	China	Zimbabwe	None	Match	Match
(55)	HIV/cancer	Diagnosis	8	China	Zimbabwe	None	Match	Match
(55)	HIV/cancer	Treatment	8	China	Zimbabwe	None	Match	Unknown
(56)	HIV/TB	IPT	11	Cambodia	Zambia	Low	Match	Match
(57)	HIV/syphilis	QA	6	United Republic of Tanzania	Zimbabwe	High	Match	Unknown
(57)	HIV/syphilis	Treatment	6	United Republic of Tanzania	Zimbabwe	Low	Match	Unknown
(58)	HIV/sexually transmitted infections	Prevention, treatment	14	Multiple	Zambia	Low	Similar	None
(59)	HIV/sexually transmitted infections	Testing	2	Peru, United Republic of Tanzania, Zambia	South Africa	None [b]	Similar	Match
(60)	PMTCT	–	1	Ethiopia	Ethiopia	Match	Match	Unknown
(61)	Life skills and vocational training	–	4	Uganda	South Africa	Low	Match	Unknown
(62)	School support	–	5	Kenya	South Africa	Low	Match	Unknown

b Costing used estimate from Peru rather than United Republic of Tanzania or Zambia.

Annex 6. Summary of study findings and key messages

Aims	Research questions	Results	Messages
Evaluate whether estimated unit costs align with interventions and programme package detailed in NSPs	How do cost estimates align with interventions listed in NSPs?	54% data extracted relevant to prevention and testing and treatment Sparse data related to integrated care, societal barriers and support functions in Suriname, Togo and United Republic of Tanzania	This may reflect potential gaps in NSPs.
		11% interventions listed in NSPs not captured in costings Among costed interventions, 63% matched in scope, 9% did not, 28% had insufficient detail	Not all interventions listed in NSPs are systematically costed: assumptions should be clearly stated if and when interventions are excluded in costings Insufficient reporting of activity scopes: assumptions should be clearly stated if and when specific activities are excluded in costing
Collate range of methods used to model costs	What methodologies are used to model costs?	65% IBC 24% adapted from literature 11% unknown Use of literature (grey and peer-reviewed) sparse for PMTCT, especially early infant diagnosis, paediatric antiretroviral therapy and nutrition Use of literature (grey and peer-reviewed) sparse for societal barriers, particularly policy and stigma and discrimination	Methodology not systematically reported or clear 11% unit costs derived from unknown origins, meaning future costing teams would have no means to adapt or adjust costing Modelled IBC costing used over twice as often as use of literature
Synergize key strengths and weaknesses in these approaches	What are the strengths, weaknesses and gaps found in IBC?	22% IBC based on national costing models 18% IBC based on expenditure; 7% IBC based on budgets 53% of activity scopes clear 38% ingredients clear 20% historical costs not adjusted (4/20) 9% of weighted averages incorrectly calculated	National costing models should use robust data sources appropriate to the country and epidemiological context Expenditure records potentially limited by operational, procurement and human resources constraints Budgets are least favourable form of data source, as they are aspirational in both cost and number outcomes and cannot address real-life constraints to achieving these targets

		Insufficient reporting of activity scopes—assumptions should be clearly stated if and when specific activities are excluded in costing; without details on activity scope, unclear whether costings match full intervention package or approach described in NSPs Insufficient reporting of included and excluded ingredients; without details on ingredients, unclear when and how indirect costs are accounted for Historical costs not systematically adjusted for inflation Best to use weighted averages for specificity
What are the strengths, weaknesses and gaps found in adapting costs from the literature?	53% of sources grey, >45% peer-reviewed 66% of costs found in cited sources (33/50) 48% of activity scopes clear and match (16/33) 52% of historical costs not adjusted for inflation (15/31) 50% of weighted averages incorrectly calculated (2/4)	Large reliance on grey literature sources, including expenditure reports and budgets—suggests priority given to country and programme-specific data, but does not necessarily allow for intervention adaptations (e.g. including new demand-generation activities or progressing to more community-led approach) Poor reporting and citing of actual sources used for costs, rendering it very difficult for future teams to pick up and adapt the work Insufficient reporting of activity scopes Insufficient review and alignment of activity scopes; frequent oversight of additional components included in peer-reviewed interventions Historical costs not systematically adjusted for inflation Best to use weighted averages for specificity

Collate range of methods used to model costs	How are costs estimated for interventions addressing societal barriers and programme support costs?	Interventions addressing societal barriers more often expressed as unit costs, followed by fixed costs and as percentage Support functions more often expressed as fixed costs, followed by percentage, followed by unit costs Percentage average: 22% overall, estimated from PEPFAR, USAID, government and Global Fund expenditure records	
	How are indirect costs modelled?	Within unit cost, or separately, or excluded—assumptions for exclusion not always cited Methods varied not only by country and costing, but by unit cost Very difficult to track, because of lack of reporting of costing ingredients Number of occasions where oversight and double-counting may be occurring, but insufficient information to make clear judgement	Insufficient reporting of costing ingredients; assumptions should be stated if and when specific ingredients are excluded in costing, included within unit cost, or separately as percentage
Assess appropriateness of type of cost input data used in SPDs	Which peer reviewed studies are used for costing in SPDs, and are they appropriate?	10 sources cited are not primary sources 14 primary sources are over 10 years old, especially integrated health services 8 sources with no geographical match to country costing, especially integrated health services 3 sources with no population match 5 sources with no scope match, majority unknown due to insufficient information	Cite primary sources to ensure costing data are appropriate for country context Potential dearth or unfamiliarity of more recent costings in area of integrated health services, particularly for opioid substitution therapy, cash transfers, voluntary counselling and testing, mental, health, hepatitis B, opioid substitution therapy, cervical cancer, syphilis and sexually transmitted infections Potential dearth or unfamiliarity of more geographically pertinent studies, particularly in the area of integrated health services Is this reflective of the siloed HIV response of the past decades, and the only recent interest in moving to integrated care? Are there opportunities to do cost analysis of integrated health services in low- and middle-income countries? Insufficient reporting of activity scopes—assumptions should be clearly stated if and when specific activities are excluded in costing or are shared across intervention areas, or across health areas

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