CRA Charles River Associates

An Evidence-Based Framework to Determine Funding Requirements for NCCPs

January 2025

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National Cancer Control Programs (NCCPs) are a key tool in reducing the burden and impact of cancer around the world. To identify the critical success factors related to program targets and financing, this paper analyzes 26 NCCPs from low-, middle-, and high-income countries (LIC, MIC, HIC),[i] supplemented by program evaluations. It describes how different countries have approached funding to meet their stated goals and describes a framework for establishing a sustainably funded NCCP that can be appropriately and consistently evaluated.

Currently, NCCPs rarely specify the funds that need to be committed or the spending that occurs in practice. When evidence of funding impact is collected, it is rarely linked to specific NCCP interventions. The incidence, prevalence, or mortality of cancer can be monitored, but often only after a long delay. Therefore, intermediate measures, such as vaccination rates or cancer screening coverage, are crucial for assessing progress in a timely manner. Setting targets, with associated funding and monitoring outcomes, will enable progress in cancer control. The establishment of a financing system, with monitoring of spending and outcomes, not only helps a country evaluate its own performance but could also guide other countries' NCCP development.

1. Rising cancer burden and the case for NCCPs

In 2020, cancer accounted for nearly 10 million deaths globally. Aging populations and exposure to risks like tobacco use, alcohol consumption, unhealthy diets, physical inactivity, and air pollution are expected to increase cancer mortality going forward.[1,2,3] From 2020 to 2050, the global economic burden of cancer is projected to reach $25.2 trillion.[4]

The World Health Organization (WHO) defines an NCCP as a structured program aimed at reducing cancer incidence and mortality, while improving the quality of life for cancer patients. WHO advocates for the development of NCCPs as a key component to a successful strategy to address cancer globally, emphasizing their potential to optimize resources to meet each country's specific needs. NCCPs achieve objectives through strategies that encompass prevention, early detection, diagnosis, cancer care, treatment, survivorship, and palliative care (see Figure 1).[5]

Figure 1: Components of an NCCP

NCCPs have the potential to lower cancer-related mortality and to increase well-being for patients and families, leading to other economic and societal benefits, by motivating policy reform. For example, while systematic evaluations are unavailable, analyses of screening programs show returns on investment (ROIs) ranging from $2.33 to $4.36 per dollar invested. Prevention and treatment strategies yield returns of up to $7.80 per dollar invested, and comprehensive cancer control strategies are estimated to avert 12.5% of global cancer deaths, while generating lifetime benefits of $12.43 to $38.20 per dollar invested.[5,6,7,8]

A study involving 144 countries demonstrated that those that implemented NCCPs achieved better outcomes, including lower mortality and higher survival rates. This was particularly true in countries with higher socioeconomic and healthcare development, where stronger pre-existing systems, better

[i] The classification of countries follows the World Bank's income classification. For the purposes of this analysis, we have grouped lower-middle-income and upper-middle-income countries into a single category.

infrastructure, and greater resources likely amplified the effectiveness of these programs. These factors suggest that NCCP outcomes may also depend on the initial conditions in which NCCPs are implemented.[9] NCCPs can also provide wider benefits shared across all stakeholders affected by cancer (Figure 2).

Figure 2: Stakeholders that may benefit from NCCPs

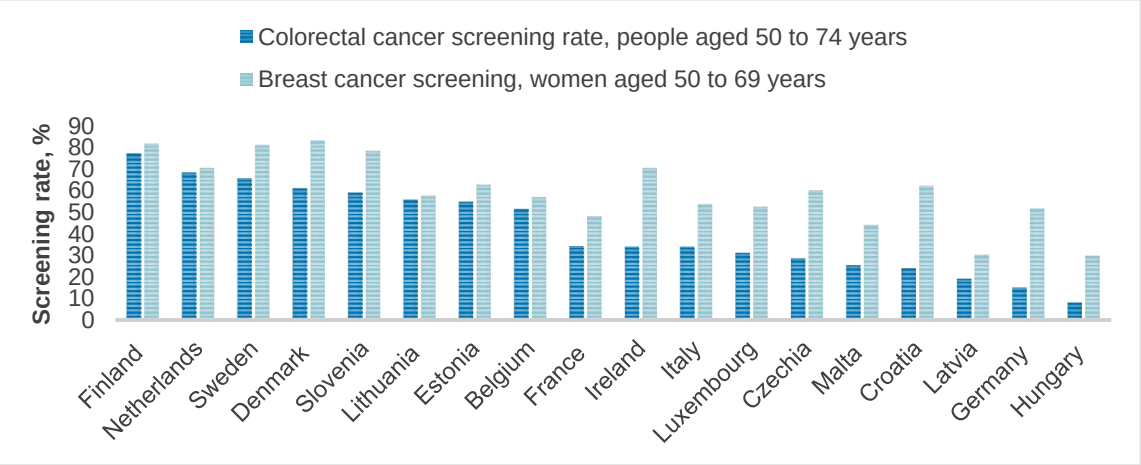
1.1 State of NCCP adoption and disparities in scope

By 2021, over 80% of countries had NCCPs.[10] Wide disparities in their scope, quality and comprehensiveness yielded considerable variation in outcomes.[11] A 2024 World Economic Forum article describes this as “striking cancer inequity” across different countries and regions.[12] HICs were the first countries to introduce NCCPs, and generally they are more comprehensive than those adopted in MICs and LICs. However, NCCPs across all countries, including the more developed ones, often outline ambitious goals without clear strategies or financial commitments for implementation or defined key performance indicators (KPIs) for measuring success, limiting their effectiveness.

Case Study 1: France's NCCP and cancer screening participation[13,14,15,16]

France's NCCP aims to improve cancer screening, yet colorectal and breast cancer screening rates in 2024 were 34% and 48%, respectively, below the EU average (see Figure 3 for comparison of selected EU countries). This reflects gaps in implementation rather than a lack of planning. Key challenges include insufficient funding for screening (approximately €600 million in 2022); communication gaps, particularly for colorectal cancer; and socioeconomic disparities, such as lower participation among less-educated women and immigrant populations. Geographic variations and shortages of healthcare professionals further hindered screening efforts.

Figure 3: Cancer screening rates (2022)



Source: Eurostat (online data code: hlth_ps_prev)

Where NCCPs have been developed in MICs and LICs, there are still significant financial, logistical, and systemic barriers to implementation.[17] For instance, Malaysia's NCCP is primarily focused on upgrading facilities to enhance diagnostic capacities. While the plan acknowledges the gaps in infrastructure and service in remote and rural regions, objectives and targets are concentrated in major urban hospitals.[18] This illustrates how resource limitations can constrain the full realization of well-defined goals.

Ethiopia's NCCP highlights broader challenges, including insufficient treatment infrastructure, poor access to cancer therapies, supply chain bottlenecks for medicines, a shortage of trained healthcare professionals, and heavy reliance on external donors.[19] These systemic barriers show the complexity of implementing effective cancer control measures in resource-constrained settings and highlight the necessity for clear, sustainable funding mechanisms.

These examples highlight that while NCCPs may be well-designed, the financial resources required to address the significant gaps in infrastructure, workforce, and medicine supply chains are often not articulated. Achieving meaningful progress in cancer control requires not only aspirational goals, but also adequate funding commitments that align with the scale of the challenges.

1.2 Differences in NCCP priorities across HICs, MICs, and LICs

MICs and LICs are projected to experience the most significant cancer mortality increases, with rates expected to nearly double by 2050.[2] In contrast, HICs face the greatest financial burden of cancer, accounting for 0.72% of their GDP.[4]

Unsurprisingly, given the different challenges facing patients and healthcare systems in HICs, MICs, and LICs, their respective NCCPs include different priorities.[11] The analysis of selected NCCPs shows that NCCPs in LICs focus on improving the baseline level of care by building foundational healthcare services and increasing access to essential medicines, including chemotherapy.

By contrast, MICs have better healthcare infrastructure, but require more investment in cancer-specific capital (for example, diagnostic equipment) and labor (cancer specialist and expert centers) to keep up with the growing burden.

HIC healthcare systems already have investment in cancer care resources (although they need to be continually updated), but there is a greater focus on addressing inequities in access, particularly for marginalized population groups.

These differences underscore the need for each country to adopt a strategic approach in their NCCPs, tailored to each country's individual healthcare context with dedicated funding to implement strategies. As appropriate, financing NCCPs should be supplemented by external funding, such as through non-profit, public health, or international development organizations (see Figure 4).

To better achieve cancer control objectives, a comprehensive financial commitment across all NCCP components is essential. Countries should also aim to leverage synergies in funding activities, avoiding a siloed approach that allocates resources to individual programs or activities in isolation.

Figure 4: NCCP priorities for HICs vs MICs vs LICs

	High Income Countries (HICs)	Middle Income Countries (MICs)	Low Income Countries (LICs)
Proportion of government financing of healthcare system	>60%	40% – 60%	<40%
Key priorities	Equity, innovation, and advanced technologies	Infrastructure, access to care, and workforce development	Prevention, capacity building, community-led initiatives, and essential care access

Source: Analysis of WHO Health Expenditure and ICCP database (See Appendix)

2. Developing inclusive NCCPs with comprehensive costing and funding strategies

Only 27% of NCCPs include details on the level of funding required to fulfil the stated objectives (representing a meaningful increase over the last five years).[18,20] In Europe, only 15 of 28 NCCPs mention funding and few provide a specific budget or committed amount; instead, many simply state that funding is needed.[21] Even when funding is noted, it is often as an aggregate amount and there is a lack of clarity on how funds are allocated to priorities.

Funding has been identified as an important limitation in the implementation of NCCPs in European countries.[21] Limited data and the integration of cancer control plans within broader healthcare budgets often obscure the specific costs associated with NCCPs, complicating tracking and evaluation. This is a persistent problem. In 2002, the WHO cited the absence of cost estimates as a cause of unrealistic targets and a key issue in the policies and managerial guidelines for NCCPs.[5] Recent research has shown that the number of NCCPs including a funding allocation has increased, but this continues to be a significant issue.[21]

2.1 The extent to which NCCPs include allocation and evaluation of funding

We reviewed 26 plans and documented where the funding allocation was explicit, the granularity of funding, and how these allocations were determined.[12]

European HICs, such as Spain[22] and Switzerland[23], consistently state the need for an NCCP budget allocation, but do not provide any detail on the amount of funds or the mechanism with which to fund their objectives.

Countries like France,[24] Australia,[25] and Japan[26] commit to a specified level of resources allocated to cancer control. However, in many HICs, there is a lack of consistently detailed costing calculations or explanations of the methodologies used to derive aggregate funding estimates in their NCCPs. For instance, Japan's plan includes annual funding allocations for specific objectives, demonstrating a commitment to financial transparency;[26] Ireland publishes annual implementation reports that list investments made, such as funding for cancer surgeries and rapid access clinics.[27] The Irish reports, however, lack detailed cost breakdowns or explanations of how investments were calculated; there is often insufficient detail on the assumptions and methodologies used to determine funding amounts as well as the achieved outcomes relative to the amount spent.

This incomplete information makes it challenging to evaluate the effectiveness of allocated resources, if they are even allocated in the first place, and their impact on cancer control. Comprehensive evaluations require data not only on spending but also on the outcomes achieved to ensure that the investments are leading to the desired improvements.

The problems created by a lack of dedicated funding and insufficient evaluation of how funding impacts cancer outcomes have been well documented. In Ireland, for example, the persistent challenge of securing adequate funding has been partly due to a lack of comprehensive funding evaluations, which may explain its limited improvements in cancer outcomes.[28]

Case Study 2: Funding gaps in Ireland's National Cancer Strategy[28,29,30,31]

Ireland's National Cancer Strategy 2017–2026 reveals a significant gap between implemented recommendations and objectives achieved. While 40 of 52 recommendations have been followed—such as recruiting 172 new staff in 2022—only one of the 23 key objectives has been fully met. This discrepancy highlights that while individual actions are being implemented, they have not effectively translated into broader strategic goals, such as expanding screening programs or meeting treatment targets. A critical factor is the consistent underfunding of the strategy. Over five of its seven years, it faced a cumulative funding shortfall of €180 million, representing the gap between planned and actual government allocations. For example, Ireland's NCCP budget was expected to increase by €110 million between 2016 and 2024, but the actual increase was only €65 million. This financial deficit has directly impacted key initiatives such as screening programs that have not expanded as intended, persistently long waits for treatment, and delays with the delivery of surgeries and radiotherapy. Additionally, Ireland continues to lag other European countries in clinical trial participation and access to new cancer medicines. In 2020, the country had the highest cancer incidence in Europe; by 2022, it ranked 15th out of 27 EU countries for cancer mortality.

NCCPs in MICs have generally been introduced more recently and provide higher-level commitments to goals and activities. Our analysis identified certain countries (Kenya, Myanmar, Mauritius, Morocco, Peru) that are examples with more granular costing estimates that are aligned with the NCCP's stated priorities. While these programs have prioritized emerging tumor areas such as cervical, breast, colorectal, and oral cancers, funding challenges remain.

By contrast, we find the most clear and detailed funding requirements in the LICs (see Table 1), with varying levels of granularity in terms of cost breakdowns. Many cervical cancer-specific plans in LICs were developed using WHO's Cervical Cancer Prevention and Control Costing (C4P) tool. This tool was developed to aid countries in planning and budgeting.[32] Mongolia, Myanmar, Nigeria, Zambia, and Tanzania, among others, have used the C4P tool to estimate the costs of their cervical cancer prevention and management strategies to align with global guidelines and elimination targets, with a focus on vaccination and screening. These countries thus have clear funding plans for that aspect of the program (see Table 1). By providing a breakdown of costs across four main cervical cancer activities, the C4P tool helps governments understand financial requirements, allocate resources effectively, and make strong cases for both domestic and external financing, ultimately supporting the alignment of cervical cancer initiatives with funding needs.

While the C4P tool has been valuable in creating targeted funding plans for cervical cancer control programs in LICs, it has its limitations. Given the tool is intended for countries that are building up their programs essentially from scratch and for a single tumor area, it includes the cost of micro-expenses (e.g., stationery). These costs and the granular level of detail may be unnecessary for general application in MICs and HICs, and for use in costing non-tumor specific NCCPs, where complementarity across multiple objectives is essential.

Table 1: NCCP budgets across MICs and LICs and examples of cervical cancer plans

Type of plan	Country	Budget	Focus
NCCP	**Peru**[33]	$734.4 million	Availability of medical supplies and technologies for comprehensive cancer care; operational capacity and quality of health services for comprehensive cancer care
	Morocco[34]	$782.7 million	Enable comprehensive and innovative care
	Kenya[35]	$243.6 million	Adult cancers; shared infrastructure costs; NCCP activities
	Myanmar[36]	$108.3 million	Effective diagnosis and treatment of cancer
	Mauritius[37]	$3.98 million	Laboratory services and hematology; breast cancer screening
	Ethiopia[19]	$93.2 million	Diagnosis and treatment of cancer; medical equipment; medicines and training
	Nigeria[38]	$213.0 million	Prevention and supply chain management (logistics)
	Rwanda[39]	$38.9 million	Early detection and screening of cancers and diagnosis and staging; equipment; construction costs and medicines / pharmaceutical products
Cervical cancer specific plan	**Mongolia**[40]	$29.8 million	Service delivery for screening and treatment
	Myanmar[41]	$9.5 million	Secondary prevention through screening and pre-cancer treatment
	Nigeria[42]	$1.0 billion	Extensive plans for vaccination, screening, and infrastructure development
	Tanzania[43]	$94.7 million	Expanding screening services with the goal of increasing the number of screening facilities from 624 to over 6,000
	Zambia[44]	$42.9 million	Extensive plans for vaccination, screening, and pre-treatments

Although not particularly granular, the transparency of these funding commitments provides a view on country priorities and the extent to which funding is aligned to those priorities.

For example, Nigeria's significant investment in cervical cancer reflects its focus on infrastructure expansion; Mongolia, Myanmar, and Tanzania have adapted their strategies to their constrained resources. This demonstrates a stark difference in the resources committed by countries, even within the same income-level group.

3. Framework for sustainable funding commitments and costing estimates in NCCPs

Detailed costing and funding plans are difficult to develop as they require granular cost breakdowns, evidence-based estimates, and a sustained commitment to transparency and accountability. These are further complicated by the integration of cancer services into broader health coverage systems, which often obscures specific budgetary needs for cancer control.[11]

Our framework identifies some of the information required for funding commitments in a simplified example. Our goal is not to recommend the level of funding, but rather, explain the types of cost data necessary to evaluate the performance of a country's NCCP and how to acquire that data.

The WHO C4P tool, while useful for cervical cancer-specific plans in LICs, has limitations when applied to comprehensive cancer control. Its single-tumor focus overlooks complementarities across

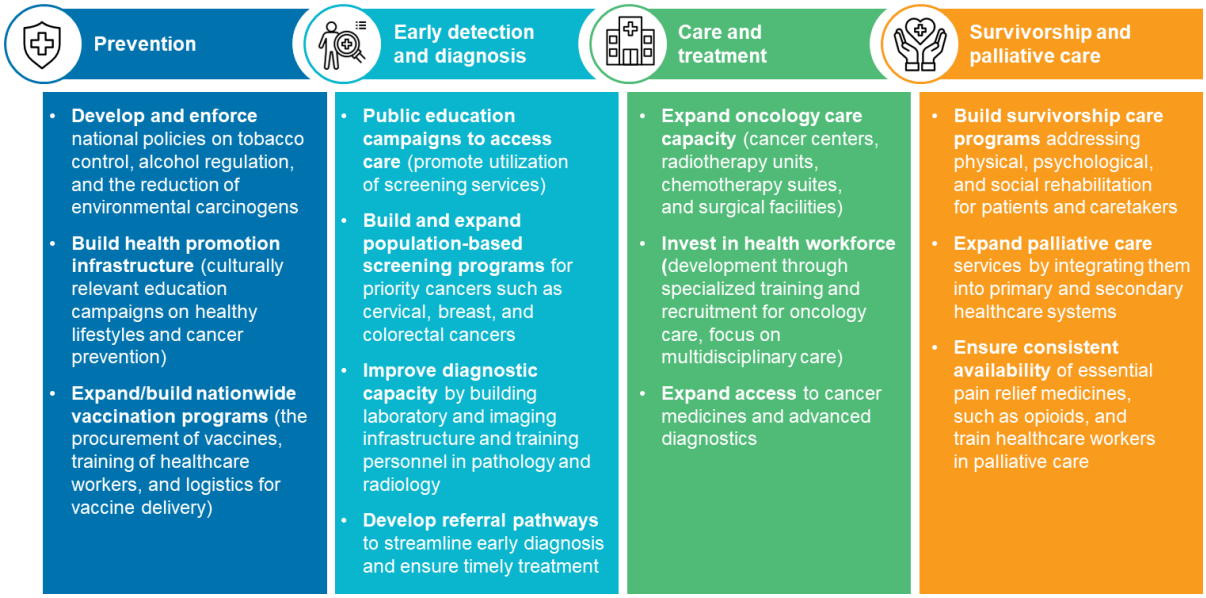
cancer types, such as shared investments in diagnostic infrastructure or workforce training that could benefit multiple cancers.

In contrast, our proposed framework emphasizes the development of a cross-tumor strategic plan with financial backing, to ensure a more integrated and holistic approach to cancer control. Key principles of this framework include adaptability to different national contexts, a focus on shared cost elements (e.g., infrastructure, workforce, and prevention programs), and prioritization of resource efficiency through complementary investments. Our approach seeks to simplify the funding process while fostering alignment with broader health system objectives. This ensures that the financial planning for NCCPs not only addresses individual tumor priorities but also supports systemic improvements that benefit overall cancer outcomes.

3.1 Key objectives under NCCPs that require costing

There tend to be four common objectives across NCCPs: (1) prevention, (2) early detection and diagnosis, (3) care and treatment, and (4) survivorship and palliative care (see Figure 5).

Figure 5: Different components of NCCP funding and common objectives



CRA analysis of 26 NCCPs (see Appendix)

We analyzed 26 NCCPs to identify the most prevalent objectives (see Appendix for methodology).[12] While all countries identified a focus on prevention and workforce training, other objectives across income groups vary by healthcare capacity and resources.

- HICs tend to include objectives such as mitigating environmental risk factors, genetic testing, and introducing new screening (e.g., lung cancer), reflecting a focus on innovation and precision care.
- MICs balance prevention with scaling infrastructure and workforce capacity, but focus less on advanced diagnostics (e.g., genetic testing).
- LICs more consistently mention foundational objectives like public awareness and introduction of HPV vaccination and cervical cancer screening programs, alongside building healthcare infrastructure and diagnostic systems.

3.2 Developing a framework for NCCP costing estimates

Drawing on the (limited) number of examples of granular funding information, we can set out a stepwise guide to the development of funding estimates for a given set of priorities, emphasizing gap identification and target setting, as prerequisites for evaluation (see Table 2).

Table 2: Developing a costing estimate framework

Steps to determine costs	Description
Prerequisite 1: Identification and data assessment *Start from specific interventions (e.g., scaling HPV vaccination, expanding radiotherapy capacity) that require financial inputs, forming the basis for targeted cost estimation.*	The NCCP should identify the gaps in cancer control that need to be addressed concerning epidemiology and existing infrastructure.
Prerequisite 2: Articulation of objectives and targets *Targets provide the framework for scaling interventions and calculating costs for specific activities, such as infrastructure upgrades, workforce training, or public awareness campaigns.*	The plan needs to include actions and timing. Costing can vary significantly depending on whether the objective is incremental improvement (e.g., expanding existing screening programs) or building new infrastructure (e.g., establishing cancer treatment centers). This should also consider how long it may take to build capacity.
Framework for costing estimates *Cost estimates are necessary for funding allocation*	**Key actions** • Estimate costs based on objectives/targets • Break down estimates into key resource components, including: ○ **Infrastructure**: Building or upgrading cancer centers and diagnostic labs. ○ **Human resources**: Recruiting and training healthcare workers. ○ **Equipment and technology**: Procuring diagnostic tools and machines. ○ **Medicines**: Ensuring access to medicines and supplies. ○ **Prevention and public awareness**: Launching campaigns for vaccination, screening, and risk reduction. ○ **Data systems**: Establishing cancer registries for monitoring and evaluation.

Once the necessary amount of funding has been determined, progress can be assessed using information on inputs and outputs. First, disbursement of financial resources must be monitored, such as the amount spent on a certain number of radiography machines. Second, outcome metrics evaluate the impact of the funding against objectives, such as the number of people screened and diagnosed, and improved patient outcomes from treatment. These measures can create a means for countries and donor funders to promote accountability or to adjust resources when not meeting goals.

3.3 Sample application of costing framework

The example below, focusing on HPV vaccinations, underscores some elements in cost estimation. Accurate cost estimates for these components can be obtained from both primary and secondary sources specific to each market, such as government resources and immunization program databases.[45]

3.3.1 Application of the costing framework to HPV vaccination

HPV was chosen as a primary example due to its inclusion in numerous NCCPs across various income levels (see Table 3). While not all countries provide a granular breakdown of the costs involved in their cervical cancer prevention activities, the HPV vaccine is widely available and is a well-established tool for reducing the incidence of cervical cancer.

Several countries have undertaken efforts to estimate the costs associated with implementing or expanding HPV vaccination programs, providing directional guidance on how specific activities are prioritized even without full costing details. Additionally, tools such as the WHO's C4P help in estimating the costs of HPV initiatives, offering specific data and guidance, particularly for LICs and MICs.[32]

HICs face challenges in achieving high (90% or more) vaccination rates. Vaccination rates in HICs range between 70-80%,[46] which suggests that infrastructure and resources are largely in place to vaccinate the easier-to-reach population,[ii] with efforts focused on activities like awareness and education for those populations that face geographical, socio-economic, biological (age, disability), and/or cultural barriers. Apart from outreach efforts, raising vaccination rates may also require adoption of new technologies, such as telemedicine; improved infrastructure, such as streamlined travel from remote areas; and additional human resources, such as local healthcare workers with community connections.[47,48]

At the same time, even within the easier-to-reach populations, HPV vaccine uptake could be higher. For instance, one study in the United States identified a key barrier to higher HPV vaccination rates as parents lacking information or feeling dissatisfied with the quality of information provided.[49] Consequently, initiatives to improve HPV vaccination included funding vaccination reminders sent through electronic health record data systems, developing mobile applications to educate parents, providing continuing education for healthcare workers to enhance communication with parents, and calculating per-clinic costs to implement these strategies. Similarly, the United Kingdom addressed these barriers by focusing on fostering better communication between parents and clinicians to address parents' concerns. Recommendations in the United Kingdom emphasized monitoring vaccine uptake, identifying subgroups with lower coverage, and optimizing the use of existing infrastructure and staff.[50]

MICs, with vaccination rates ranging from 30-50%,[51] may have some infrastructure in place but often require scaling-up efforts to meet targets. This usually involves workforce expansion and upgrades to vaccination centers. In countries like Sri Lanka, for example, vaccination is routinely available at most healthcare facilities, with significant resources allocated to education; community outreach; and consistent, rigorous supervision and record-keeping.[52] In Sri Lanka, opportunity costs—mainly healthcare and non-healthcare workers' time spent on vaccine delivery and monitoring—accounted for 74% of HPV vaccination costs, while vaccine procurement accounted for 7%.[52] Therefore, funding efforts in such settings would prioritize workforce investments and improvements to data systems.

While certain areas were identified as requiring substantial investment, most areas in HICs and some in MICs need only modest additional funding to bridge the gap. In contrast, LICs, where current HPV vaccination rates are below 10%,[51] face severe challenges due to the lack of infrastructure, human resources, and technology needed to conduct population-based vaccination campaigns. Therefore, significant investment is needed across many resource components in LICs. Countries such as Ethiopia and Guyana report significantly fewer vaccination sessions per health facility compared to

ii Easier-to-reach population is typically characterized by better access to healthcare services, digital technologies, and information; higher education and health literacy; trust in healthcare systems; and residence in urban or suburban areas with well-developed infrastructure

MICs like Sri Lanka, with fixed vaccination sessions scattered throughout the year.[52] These countries also contend with limited access to facilities with adequate cold storage for HPV and other vaccines. While vaccines themselves may be procured through donations or at reduced costs in LICs, the primary financial need is developing infrastructure and building human resource capacity (see Appendix, Section 5.1.4 for details on methodology).

Table 3: Framework to determine funding requirements example: HPV vaccination program

Focus of costs for HPV vaccination programs		Key resource components				
		Infrastructure and equipment	**Human resources**	**Technology**	**Medicine**	**Education and public awareness**
		Establishing dedicated vaccination centers and clinics with adequate equipment (e.g., cold storage capacity)	*Training healthcare workers and volunteers to administer the vaccine*	*Implementing systems for tracking vaccination coverage and monitoring targets (e.g., electronic health records)*	*Access to the HPV vaccine and related medical supplies*	*Public education campaigns on the importance of the HPV vaccine in preventing cervical cancer and other related diseases*
HIC	Increasing HPV vaccination in clinical settings and targeting low uptake populations **Current Rate**: 70-80% **Target Rate:** 90%	■ *Vaccination centers already established*	→ *Continuing medical education programs to improve communication with parents*	→ *Additional implementation of reminder systems or individualized mobile apps*	■ *Likely already procured through national vaccine tendering systems*	→ *Educational materials to deliver culturally tailored safety messages for parents in specific population groups*
MIC	Expanding workforce development to meet demand **Current Rate**: 30-50% **Target Rate:** 70%	→ *Potential upgrades to expand facilities and increase capacity for more vaccinations*	↑ *Continuous training and expansion of HCP workforce*	→ *Improving health information management systems and data systems*	↑ *Total costs based on new target population rates and required doses*	■ *Initiatives are already active and additional activities are unlikely to expand vaccination rates further*
LIC	Improving cold structure infrastructure and expanding vaccination centers **Current Rate**: <10% **Target Rate:** 50%	↑ *Building additional vaccination centers and properly equipping healthcare facilities*	↑ *Training broad range of healthcare and non-healthcare related workforce*	↑ *Building record keeping systems and aligning facility records with national data*	■ *Likely donated or given access through low-cost schemes*	↑ *Launching educational initiatives to raise awareness on HPV*

KEY: ↑ = significant funding needed; → = some additional funding needed; ■ = no additional funding needed, therefore no costing activities required for the NCCP

Although some costs are outlined in NCCPs, more data on cost estimates can be found in country-specific studies that estimate funding required to achieve NCCP HPV objectives. These examples show that estimating costs is feasible across HICs,[49,50] MICs,[52] and LICs.[52]

3.4 Complementarity and sequentiality in investments in NCCPs

Ensuring that interventions work together to maximize impact, while building on foundational systems, improves the efficiency of the investment in cancer control and can potentially reduce the total cost (see Figure 6). For example, HPV vaccination paired with cervical cancer screening reduces cancer incidence and mortality more effectively than standalone interventions.[53] Combining treatment with palliative care improves survival and quality of life.[54]

Figure 6: Examples of sequenced investments

Example 1: Data infrastructure before screening

Establish registry to assess burden → **Introduce screening initiative**

Establishing cancer registries prior to implementing screening programs allows for better assessment of cancer burden and monitoring of screening effectiveness. For example, the Surveillance, Epidemiology, and End Results (SEER) Program in the US captures comprehensive cancer data, facilitating informed decision-making for screening initiatives.[55]

Example 2: Capacity building before advanced treatments

Training HCPs on NGS → **Coverage of NGS** → **Optimized access to personalized treatments**

Training healthcare professionals and developing infrastructure should precede the introduction of complex treatments like Next-Generation Sequencing (NGS) to ensure readiness and effective utilization. In the Asia-Pacific region, countries have focused on building capacity and infrastructure before integrating NGS into clinical practice.[56] Utilization of NGS may lead to increased demand for, and need for access to, personalized, biomarker-driven treatments.

Figure 7: Korea case study

South Korea's NCCP

→ Since initiating its NCCP in 1996, South Korea has seen a significant increase in five-year cancer survival rates, from 43% in the 1990s to 70.4% in 2017. This success is attributed to well-sequenced investments in cancer registration, prevention, early detection, and treatment services.[57]

Over time, NCCPs globally have evolved to prioritize prevention and early detection over treatment-centric approaches. This shift reflects growing recognition of the cost-efficiency and greater societal benefit of preventive interventions.[58] For example, breast cancer screening programs combined with public awareness campaigns have led to earlier detection, reducing the need for costly late-stage treatments.[59]

By integrating interventions—such as prevention and screening—or sequencing foundational investments like data infrastructure and workforce capacity, countries can develop cost-effective, sustainable cancer control strategies. Complementarity and sequencing shows that funding decisions should be considered holistically rather than being based on individual priority objectives. By ensuring funding is provided across activities and in the optimal sequence, countries can achieve improved outcomes and more cost-effective investment decisions.

The experiences of countries like South Korea demonstrate that well-planned and phased investments can deliver substantial long-term gains in cancer survival and quality of care (see Figure 7). However, it is also critical to collect and analyze data to guide and adjust policies as needed. For example, South Korea's experience with thyroid cancer screening highlights the risks of over-screening, where excessive screening efforts led to unnecessary treatments without significant improvements in outcomes.[60] This underscores the importance of data-driven decision-making to ensure that investments in cancer control are both effective and appropriate.

For policymakers, prioritizing investments that build upon existing systems while ensuring complementarity across interventions, and monitoring the impact, or outcomes, will be key to addressing the growing cancer burden effectively.

4. Dedicated funding and accountability for longer and better lives amid a growing prevalence of cancer

Call to action – Leveraging the framework for NCCP success:

NCCPs are a vital tool to reduce the impact of cancer to patients, the healthcare system, and society. At their best, they have been shown to lead to collaborative policymaking, a coherent priority setting process, and implementable actions. But without a sustained financial commitment and performance indicators, they can fail to achieve their goals. Based on our review of NCCPs and NCCP evaluations, we offer the following recommendations for cancer control achieved through these programs.

- **Identify needs and determine dedicated funding allocation** – Identification of key cancer control needs to pursue meaningful, credible financial commitments; target investments to needs; and allow countries to seek out and secure resources. These requests for funding should be based on reliable cost estimates.
- **Deploy funding strategically and monitor progress** – While NCCPs are often structured to achieve ambitious targets such as an absolute reduction in mortality from a certain type of cancer, interim metrics can show nearer-term progress, such as lower rates of smoking or greater access to medicines. Implementing this recommendation allows for comparison within and across countries and adjustment of funding and programs over time.
- **Collaborate and share knowledge** – This is essential to achieving NCCP objectives, as financial commitments often require shared contributions from various stakeholders. Governments, international development organizations, healthcare providers, patient advocates, and the private sector can work together to align objectives, share best practices, pool expertise, determine resource needs, identify synergies, and ensure effective monitoring for the benefit of patients and health systems.

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5. Appendix

Methodology

5.1.1 Literature review

This research takes a global perspective, examining NCCPs across HICs, MICs, and LICs to understand funding challenges and implementation strategies. A total of 60 sources were included in this report, with studies published between 2010 and 2024, focusing on topics such as cancer incidence, mortality, economic costs, and NCCP implementation. Data were sourced from multiple platforms, including Google Scholar, WHO databases, the International Cancer Control Partnership (ICCP), and grey literature such as policy briefs and non-indexed reports.

The search strategy included both English and local languages. Key terms included “cancer”, “national cancer control program”, “NCCP”, “cost(ing)”, “funding/investment”, “healthcare spending”, and “economic burden”. Additional focus areas included prevention, early detection, diagnosis, treatment, survivorship, palliative care, research, cervical cancer, return on investment, and program benefits. To capture income-related disparities, searches also incorporated terms specific to income classifications such as HICs, MICs, and LICs.

This analysis relies on publicly available data and stakeholder reports, which may not capture all nuances of funding decisions or their downstream impacts. Future research could include interviews with key stakeholders across HICs, MICs, and LICs to enrich the findings.

5.1.2 NCCP key objectives and differences based on the country income level

Our analysis focused on NCCPs developed by ministries of health or equivalent government agencies. To ensure comparability, we excluded broader health policies that only feature cancer in some sections (e.g., non-communicable disease plans), plans with a narrow focus on a specific objective (e.g., specific screening programs), regional plans, and those developed by non-governmental organizations. This approach prioritized government-led, nationwide cancer plans to reflect their central role in coordinating resources and aligning objectives with national health systems. To determine the key elements in NCCPs, we conducted a targeted review of 26 NCCPs available on the International Cancer Control Partnership (ICCP) Portal and accessed additional NCCPs directly from official government sources, focusing on the latest NCCPs in each country if multiple NCCPs are available (see Table 4 in this Appendix). The selection process ensured geographic and economic diversity, capturing a mix of regions, healthcare systems, and cancer control approaches. Countries were chosen based on the availability of publicly accessible and structured NCCPs, stratified by income levels according to World Bank classifications to reflect differences in priorities and challenges. Geographic diversity was prioritized, with representation from Africa, Asia, Europe, North America, and Latin America. In addition, we also looked at five cervical cancer-specific plans developed by the WHO for five low- and middle-income countries.

To identify the key components of NCCPs, we consulted the WHO guidelines for cancer control.[iii] These guidelines provided a framework for understanding the essential elements required for effective cancer prevention and management. Based on this review, we identified six core components common to most NCCPs: prevention, early detection, diagnosis, treatment, survivorship, and palliative care. These components were consistent with global standards for comprehensive cancer control planning.

[iii] World Health Organization. Controlling cancer. Retrieved from https://www.who.int/activities/controlling-cancer

For this research, we refined the six WHO components to develop a simplified framework better suited to the primary objective of estimating the costs associated with NCCPs. This framework consolidated overlapping elements while preserving their conceptual integrity. Specifically, early detection and diagnosis were merged, as were survivorship and palliative care. The resulting framework was comprised of four key components: (1) prevention (2) early detection and diagnosis (3) care and treatment and (4) survivorship and palliative care.

This methodological approach allowed us to systematically evaluate and streamline the components of NCCPs into a practical framework for costing/funding analysis. By grounding our framework in WHO guidelines and cross-referencing it with actual NCCP content, we ensured that it remained both evidence-based and globally relevant.

We analyzed NCCPs across countries categorized by income levels, using the World Bank's income classification system. According to this framework, HICs have a Gross National Income (GNI) per capita of $14,005 or more, MICs range from $1,146 to $14,005 (including upper and lower MICs), and LICs fall below $1,145.[iv] Our study included 8 HICs, 14 MICs, and 4 LICs to ensure balanced representation across economic contexts. More MICs were selected to ensure we capture the broad range of countries that fall into this income category, across lower- and upper-middle income countries. Table 4. NCCPs reviewed and categorized by income level.

Income level	Country	Link to NCCP
HIC (n=8)	Australia	Australia Cancer Plan 2023
	Canada	Canadian Strategy for Cancer Control (2019-2029)
	France	Stratégie Décennale de Lutte Contre Les Cancers (2021-2030)
	Germany	Nationaler Krebsplan 2017
	Ireland	National Cancer Strategy (2017-2026)
	Saudi Arabia	National Plan Cancer Control (2014-2025)
	Spain	Cancer Strategy of the Spanish National Health System (2021)
	US	National Cancer Plan 2023
MIC (n=14)	Argentina	Plan National de Control de Cancer (2018-2022)
	Brazil	National Prevention Policy and Cancer Control 2023
	China	健康中国行动（2019-2030）癌症防治行动 (Healthy China Initiative, Cancer Control Initiative 2019-2030)
	Kenya	The National Cancer Control Strategy (2023-2027)
	Malaysia	National Strategic Plan for Cancer Control Program (2021-2025)
	Mauritius	National Cancer Control Program (2022-2025)
	Mexico	Programa de Acción Específico Prevención y Control del Cáncer (2021-2024)
	Morocco	Plan National du Cancer de Prévention et de Contrôle (2020-2029)
	Myanmar	Myanmar National Comprehensive Cancer Control Plan (2017-2021)
	Panama	Plan Estratégico Nacional para la Prevención y Control del Cáncer (2019-2029)
	Peru	Plan Nacional de Cuidados Integrales del Cáncer (2020-2024)
	Romania	Planul Național de Combatere a Cancerului 2022
	South Africa	National Cancer Strategic Framework (2017-2022)
	Turkey	Turkey Cancer Control Program 2021
LIC (n=4)	Ethiopia	National Cancer Control Plan (2016-2020)
	Malawi	National Cancer Control Strategic Plan (2019-2029)
	Nigeria	National Strategic Cancer Control Plan (2023-2027)
	Rwanda	Rwanda National Cancer Control Plan (2020-2024)

iv World Bank Country and Lending Groups. Retrieved from https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups

We conducted a review of NCCPs across 26 selected countries,[v] using a structured framework to extract and assess key objectives. The framework categorizes objectives into four core components: (1) prevention, (2) early detection and diagnosis, (3) care and treatment, and (4) survivorship and palliative care. Each NCCP was reviewed for its stated objectives, cost breakdowns, financing plans, and focus areas, with careful consideration of the country's economic and healthcare context.

Step 1: Systematic extraction of NCCP objectives

For each country, we applied the framework below to identify and extract objectives and activities listed in the NCCP. Specifically, we conducted a targeted search for the following items in each NCCP:

- Prevention: Tobacco/alcohol control, public awareness, HPV vaccination/HBV reduction, and addressing environmental risk factors.
- Early detection and diagnosis: Screening programs (e.g., breast, cervical, colorectal cancers, lung), diagnostic infrastructure, and genomic testing.
- Care and treatment: Guidelines, healthcare workforce development, care facilities/infrastructure, access to medicines and cancer research.
- Survivorship and palliative care: Follow-up care for survivors, psychosocial support, and palliative care initiatives.

This framework was developed based on the WHO guidelines for cancer control, in combination with the components used in a global study analyzing NCCPs and NCD plans.[iii,vi] The review also involved extracting additional detailed elements outside of the four core components, such as the existence of financing plans, cost breakdowns, and equity considerations to assess how well the NCCP addressed specific objectives.

Table 5. Common NCCP objectives across income levels – differences in focus

Income level (illustrative example)	Prevention	Early Detection & Diagnosis	Care & Treatment	Survivorship & Palliative Care
	HPV vaccination	***Breast cancer screening***	***Cancer care workforce***	***Palliative care access***
HIC	Increase uptake, particularly in underserved populations	Increase uptake in underserved populations and align with international guidelines	Equip staff to manage advanced technologies and multidisciplinary care, with a focus on workforce retention	Optimize referral and access to palliative care, and integrate into all cancer care settings
MIC	Increase uptake and expand capacity to manage rising demand	Expand the number of screening units, improve follow-up systems, and accelerate referrals	Upskill healthcare workers, improve workforce distribution, and increase specialist capacity	Ensure palliative care is standardized and integrated into routine care, supported by adequate resources, and trained staff

v Selected countries: HIC: Australia, Canada, France, Germany, Ireland, Saudi Arabia, Spain, and the US; MIC: Argentina, China, Colombia, Brazil, Kenya, Romania, Malaysia, Mexico, Morocco, Myanmar, Mauritius, Peru, South Africa, Turkey; LIC: Ethiopia, Malawi, Nigeria, Rwanda

vi Romero, Y., Trapani, D., Johnson, S., et al. (2018). National cancer control plans: A global analysis. Lancet Oncology, 19, e546–e555.

LIC	Build capacity for coordinated vaccination programs, ensuring vaccine supply and delivery	Establish routine screening programs, train healthcare workers, and set up basic pathology labs	Build specialist presence for basic treatments (e.g., chemotherapy, radiotherapy) and involve community workers	Define a basic package of palliative care services and build capacity of healthcare providers /caregivers/community-based services

Analysis of 26 NCCPs

Step 2: Contextual analysis of country-specific objectives

Recognizing that specific NCCP objectives may vary by economic context, we assessed each plan within its income group – HIC, MICs, and LICs. This allowed us to account for differences in healthcare infrastructure, available resources, and baseline capacities across the income groups.

For each of the objectives mentioned in our framework, we determined whether they were explicitly mentioned as an objective in the 26 NCCPs across HICs, MICs and LICs. This allowed us to calculate the prevalence of the objectives in each income category, by looking at the number of countries that mentioned the objective, divided by the number of countries in that income category (e.g., 7 out of 8 HICs mentioned cervical cancer screening as an objective in their NCCP).

Step 3: Synthesis of HIC, MIC, and LIC objectives

After analyzing the frequency of objectives within income categories, we identified objectives where there were the largest differences between HICs, MICs, and LICs (see Table 6). We defined a substantially large difference as a more than 25% (not inclusive of 25) difference between two of the three income categories and highlighted these in yellow. In each of the highlighted rows, we also bolded the highest frequency across the three income categories. We then highlighted rows in green where the frequency of mentions is more than 75% (not inclusive of 75) across all three income levels, highlighting objectives that are widely included in NCCPs globally.

Table 6. Frequency of objectives mentioned in NCCPs across HICs, MICs, and LICs

NCCP Component	Objective	HICs (n=8)	MICs (n=14)	LICs (n=4)
Prevention	**Tobacco/Alcohol Control**	88%	79%	100%
	Public awareness	75%	86%	100%
	HPV vaccination/HBV reduction	88%	79%	100%
	Environmental risk factors	**100%**	86%	50%
Early detection and diagnosis	**Breast cancer screening**	100%	79%	100%
	Cervical cancer screening	88%	79%	100%
	Colorectal cancer screening	**88%**	57%	50%

	Lung cancer screening	**38%**	7%	0%
	Diagnostic infrastructure	63%	71%	**100%**
	Genomic testing/Precision diagnostics	**63%**	36%	50%
	Healthcare training	88%	86%	100%
Care and treatment	**Treatment guidelines**	63%	64%	**100%**
	Cancer care workforce	88%	86%	100%
	Care facilities infrastructure	63%	71%	**100%**
	Cancer research	**100%**	71%	75%
Survivorship/ Palliative care	**Follow-up care**	50%	64%	50%
	Psychosocial support	88%	71%	**100%**
	Palliative care	88%	93%	100%

5.1.3 Development of the framework for cost estimates

A critical challenge in efficiently implementing NCCPs is the lack of detailed cost estimates for specific activities, which are essential for effective planning and resource allocation. To address this, we developed a systematic approach to identify, assess, and provide guidance on estimating the costs associated with NCCP activities that are frequently mentioned across HICs, MICs, and LICs. This framework leverages data from NCCP documents, retrospective expenditure records, and academic studies to provide insights into costing specific interventions. Below, we describe the development process in detail, highlighting key questions, methods, and findings that informed the framework.

Step 1: Assessing the availability of detailed cost estimates in NCCPs

The first step in developing the framework was to review NCCPs across different income groups to determine whether detailed cost breakdowns for specific activities were included. This analysis focused on priority activities such as HPV vaccination programs, cervical and breast cancer screening.

NCCPs in HICs often integrate cancer control activities into broader healthcare budgets, leading to a lack of specific cost estimates for individual components. While these plans highlight goals and targets, detailed financial modelling for activities is often absent.

NCCPs in MICs and LICs tend to include more specific financial details for individual activities, reflecting the need for targeted external funding and resource mobilization. However, the cost estimates in these plans can be incomplete or not sufficiently detailed across all required resources.

Step 2: Retrospective analysis of expenditure data

We identified data limitations in these sources. Expenditure data often lacked granularity, making it difficult to disaggregate costs into categories such as human resources, equipment, and public awareness campaigns.

Where data were available, it provided a benchmark for estimating costs in other countries or contexts. For example, HPV vaccination programs typically included costs for vaccine procurement, cold chain logistics, and training healthcare providers.

Step 3: Leveraging academic studies and/or cost-effectiveness analyses

Given the gaps in both NCCPs and retrospective data, the next step involved synthesizing findings from academic studies and cost-effectiveness analyses. These sources provided valuable insights into the cost components and resource requirements for specific cancer control activities.

Based on the findings from the three steps above, we constructed a framework for estimating costs for specific NCCP activities. This framework categorizes costs around six key components:

1. Infrastructure: Costs associated with building or upgrading facilities, such as diagnostic labs or radiotherapy centers.
2. Human resources: Recruitment, training, and salaries for healthcare providers and support staff.
3. Equipment and technology: Procurement and maintenance of diagnostic and treatment equipment.
4. Medicines: Procurement of cancer medicines, vaccines, and related supplies.
5. Public awareness and prevention: Campaigns to promote vaccination, screening, and early diagnosis.
6. Data systems: Establishing or enhancing cancer registries and surveillance systems to track progress and outcomes.

5.1.4 HPV vaccination program

We began by analyzing different HPV vaccination targets compared to current coverage rates. To do so, we reviewed international databases to identify relative objectives across country income levels. This step provided a foundational understanding of the disparities in vaccination coverage and the goals set by various countries.

Using the three-step methodology described above, we used our analysis of 26 NCCPs to identify if countries have costed their HPV vaccination program as an objective. We found some evidence of costs in NCCPs from countries such as Morocco and Malawi. However, these did not include a comprehensive, granular breakdown of the cost components used to derive the total cost, and therefore it is difficult to conclude whether this can be applied or extrapolated more widely to HICs and other MICs and LICs.

Next, we examined existing studies that have attempted to cost HPV vaccination initiatives, focusing specifically on the types of activities funded within HIC, MIC, and LIC contexts. From the search, we identified the WHO Cervical Cancer Prevention and Control Costing (C4P) tool, which provided a granular list of cost elements required to fully cost an HPV vaccination program (see Table 7).[vii]

vii World Health Organization. WHO cervical cancer prevention and control costing (C4P) tool. Retrieved from https://www.who.int/tools/who-cervical-cancer-prevention-and-control-costing-(c4p)-tool

Using this list as a basis, we then identified and categorized key funded activities, such as awareness campaigns, workforce expansion, and infrastructure development, to understand how resource allocation may differ across these settings by income level.

Given the limited availability of detailed examples with such specificity on costing in literature, the final step involved applying the framework more broadly to provide an overarching view of where countries at each income level prioritize their resources. This included examining the allocation of resources across the key costing components: infrastructure, human resources, equipment and technology, medicine, and prevention/public awareness. Using these examples as a guide, we offer recommendations on where costs are most critical for HPV vaccination initiatives, differentiating by significant funding needed, some additional funding needed, and no costing activities required, enabling policymakers to develop tailored costing estimates and strategies.

Table 7. Costing framework for HPV vaccination programs

Key resource components	WHO Cost element	Specific cost components
Medicine	**Vaccine procurement**	• Cost of vaccines and injection supplies • Cost of freight, clearance, insurance, and taxes
Infrastructure and equipment	**Vaccine storage and equipment**	• New cold chain equipment for cold storage expansion (annualized) • Additional incinerators
Human resources	**Program planning (microplanning)**	• Health personnel time, per diem • Transport and venue rental • Opportunity costs: Value of personnel time spent in meetings
	Service delivery	• Transport (e.g., vehicles, fuel, maintenance) • Personnel per diems to travel to vaccination sites • Supplies, e.g., cotton • Waste management and crisis management • Opportunity costs: Value of personnel time spent on vaccination
	Training	• Development of training materials • Per diems and travel allowances • Venue rental • Transport (e.g., fuel, maintenance) • Training materials • Stationery • Opportunity costs: Value of personnel time spent on training
	Supervision	• Travel allowances • Transport (e.g., fuel, maintenance) • Stationery • Opportunity costs: Value of personnel time spent on supervision
Education and public awareness	**Sensitization**	• Per diems and travel allowances • Opportunity costs: Health worker/community mobilizers time spent in information meetings and one-to-one sessions
	Information, education, and communication (IEC)/social mobilization	• Per diems and travel allowances • Stationery • Printing of materials • Production of TV and/or radio materials • Opportunity costs: Facilitator time in meetings; value of personnel and volunteer time spent on material development and other activities
Technology	**Monitoring and evaluation**	• Tally sheets or registers • Pens and pencils • Vaccination cards • Materials for surveillance

About Charles River Associates

Charles River Associates is an economic and strategy consultancy with offices in North America, Europe, Latin America and Australia. CRA offers services to all the key functions of the life sciences industry and specialises in public policy issues. CRA focuses on delivering high quality, robust analysis in a compelling fashion that is accessible to the target audience and has worked for the industry, national trade associations, and individual companies on a wide range of issues over the last 20 years.

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