The Costs of Different Vaccine Delivery Strategies to Reach Children Up to 18 Months in Rural and Urban Areas in Tanzania

Evidence to Policy and Practice Plan

December 2019

This study was conducted by Fatuma Manzi, PhD, and Kassimu Tani, MA, from Ifakara Health Institute, in collaboration with the Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDEC), Immunization and Vaccine Development (IVD) Program, as part of the Immunization Costing Action Network (ICAN). ICAN was facilitated by ThinkWell and John Snow, Inc. (JSI) and supported by the Bill & Melinda Gates Foundation.

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Introduction

The Immunization Costing Action Network (ICAN) is a research and learning community working to increase the visibility, availability, understanding, and use of immunization delivery cost information. The ICAN aims to build country capacity to generate cost evidence that is policy relevant and a priority for the immunization program. The ICAN is also working with countries to improve interpretation and translation of cost evidence so that it is used in country decision-making processes and informs routine planning and budgeting. The ICAN is supported by the Bill & Melinda Gates Foundation, with technical facilitation from ThinkWell and JSI.

The Tanzania study is part of a suite of costing exercises in three countries – Tanzania, Indonesia, and Viet Nam – with teams in each country that include health economist researchers, immunization managers, and planners from Ministries of Health. The country teams have conducted research that explores the cost of delivering vaccines through different delivery strategies to distinct target populations in diverse geographies. The three country teams also came together during two cross-country workshops to help sharpen methods and learn from each other regarding how to use cost evidence to inform immunization program decisions and routine planning and budgeting.

Tanzania ICAN Study

The objective of the Tanzania ICAN study is to collect reliable immunization delivery cost evidence with programmatic and policy relevance to the Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC) and Immunization and Vaccination Development (IVD).

The Tanzania study estimates the cost to immunize children up to 18 months in rural and urban areas at current coverage levels and using the current mix of delivery strategies. The study looked at the three delivery strategies used as part of routine immunization: 1) Fixed facility delivery; 2) Outreach; and 3) Mobile clinics to reach nomadic and hard-to-reach communities.

Tanzania delivers vaccines through various delivery strategies in different areas, based on community needs and administration targets to reach full immunization coverage. The strategies vary from one area to another, typically driven by geographical accessibility and budget availability. While the majority of immunization sessions occur via fixed facility delivery, outreach sessions are used to reach populations living a short distance from the facility, typically reached by motorcycle and without requiring an overnight stay. Mobile clinics are for further distances, typically requiring a vehicle for transport and an overnight stay. Outreach and mobile sessions are important in a country where 71% of the population lives in rural and hard to reach areas and 18% of the population is nomadic. For this reason, we consider costs in this study for both rural areas with and without nomads in their catchment population. A better understanding of the operational cost of the different vaccine delivery strategies is key to inform planning and budgeting to improve coverage rates and resource allocation.

The study used ingredients-based costing from a government/provider perspective to retrospectively estimate the full, economic and financial immunization-related delivery costs (see Annex 1) incurred at the facility, district, region and national levels during the period July 2016 to June 2017. Unit costs include cost per dose and per fully immunized child (FIC)[1]. The vaccines included in our study are all those on the immunization schedule up to 18 months. A representative sample of 54 health facilities was selected covering different facility types, urban/rural locations, and rural nomad situations from across Tanzania (excluding Zanzibar).

[1] FIC in this case is defined as a child who has received all doses of the primary immunization antigens (i.e. from BCG at birth through the second dose of Measles/Rubella at 18 months).

The 2016-2020 Comprehensive Multi-Year Plan (cMYP) identified the need to conduct a study about the cost per FIC. Cost information in the cMYP is now based on cost norms and historical expenditures. Although several immunization program costing studies had been done in Tanzania, all previous studies were limited to specific antigens especially for new vaccines. Prior to this work, there was no study on the cost of delivering the full schedule of vaccines offered as part of the national expanded program on immunization.

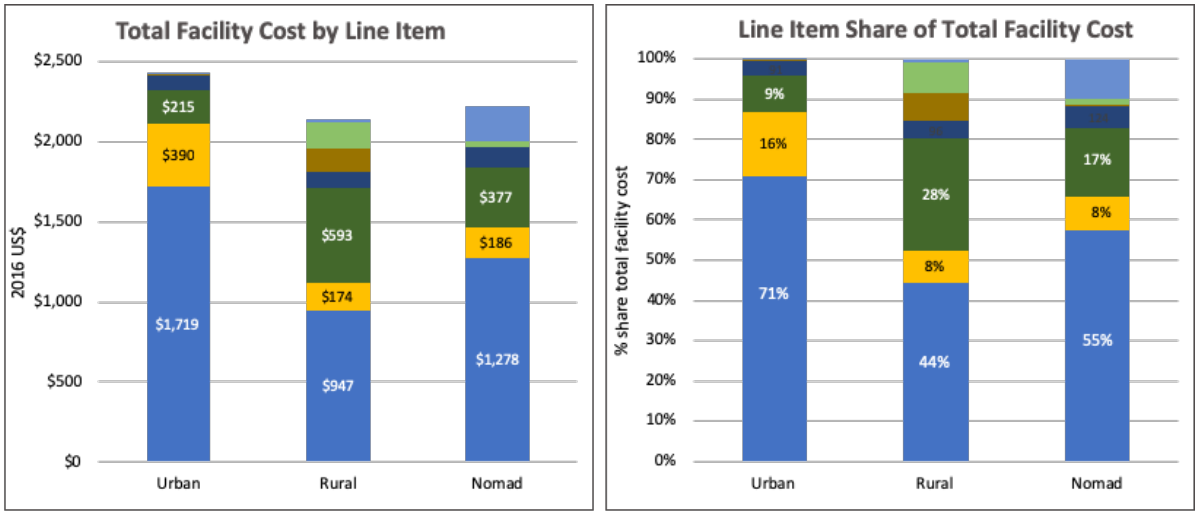
The study was designed and conducted by researchers from the Ifakara Health Institute (IHI), with technical support from ThinkWell and JSI. The study benefited from strong engagement from the MoHCDGEC-IVD and the Directorate of Policy and Planning, starting in 2017 with the development of the research protocol and selection of study area. The team also conducted stakeholder meetings with key partners such as WHO, UNICEF and CHAI as well as engaged with the President's Office for Regional Administration and Local Government (PO-RALG) for clearance and approval for data collection. This was followed by periodic meetings between the research team and MoHCDGEC, and briefings to the ICC and National Immunization Technical Advisory Group (NITAG). The IHI and MoHCDGEC representatives also participated in ICAN's two cross-country workshops that focused on methodological issues, interpretation of results, and elements of this Evidence to Policy and Practice Plan.

Key Findings

All averages presented on the pages that follow are **volume-weighted averages**, not simple averages. A weighted average takes total output (e.g., number of doses) into account. Cost findings in this summary are economic costs, presented in **2016 US dollars.** Financial costs are in the full report (see Annex 1 for definitions).

The study found a very small difference in **total delivery costs** (facility average) by location. The lowest costs were at facilities in rural areas without nomads (US$2,138/year), followed by rural areas with nomads (US$2,224) and then urban facilities (US$2,427/year). Total delivery costs exclude the cost of vaccines, injection supplies and paid human resources (labor), as these costs are not included in facility budgets. Cold chain equipment & energy is the main cost driving line item at all facility types (Figure 1).

Figure 1: Total facility cost by line item (facility average) (excluding vaccine, injection supply, labor cost)



Cost per dose delivered was lowest at rural facilities with nomads in their catchment population (US$0.45), followed by urban facilities (US$0.48) and rural facilities without nomads (US$0.56). The **cost per FIC** was estimated overall to be US$8.04, defining FIC in terms of Measles/Rubella 1st dose (Table 1).

This study confirmed that **outreach is more expensive** than facility-based delivery, but the magnitude of the difference varies immensely by geography (Table 2). Overall, outreach is more than three times as expensive as facility-based delivery (US$1.47 versus US$0.43), but this is largely driven by the nearly five-fold difference between the unit cost of outreach and facility delivery in rural areas without nomads (US$1.91 versus US$0.43). Outreach is more expensive in rural areas than in urban areas, presumably due to the distances covered. Surprisingly, facility-based delivery is more expensive in urban areas as opposed to rural areas.

Table 1: Cost per FIC
(excluding vaccine, injection supply, and labor cost)

Type of cost	Unit cost per FIC (2016 US$)		
	Measles/ Rubella 1st dose	Measles/ Rubella 2nd dose	DTP3
All health facilities (n=51)			
Economic costs	8.04	10.42	8.27
Financial costs	7.55	9.78	7.76
*Urban areas (n=17)**			
Economic costs	8.89	8.09	8.28
Financial costs	8.11	7.38	7.55
*Rural areas without nomads (n=20)**			
Economic costs	8.33	11.38	8.86
Financial costs	7.87	10.75	8.37
*Rural areas with nomads (n=14)**			
Economic costs	7.35	11.30	7.70
Financial costs	6.98	10.73	7.32

Table 2: Cost per Dose by Delivery Strategy
(excluding vaccine, injection supply, and labor cost)

Type of cost	Unit cost per dose (2016 US$)		
	All delivery strategies	Facility-based delivery	Outreach-based delivery*
All health facilities (n=51)			
Economic costs	0.49	0.43	1.47
Financial costs	0.46	0.40	1.46
*Urban areas (n=17)**			
Economic costs	0.48	0.48	0.62
Financial costs	0.44	0.43	0.59
*Rural areas without nomads (n=20)**			
Economic costs	0.56	0.43	1.91
Financial costs	0.53	0.40	1.89
*Rural areas with nomads (n=14)**			
Economic costs	0.45	0.40	1.16
Financial costs	0.42	0.38	1.15

* Outreach-based delivery was not used in all areas. In the 17 urban areas, 6 used outreach. In the 20 rural areas without nomads, 13 used outreach. In the 14 rural areas with nomads, 8 used outreach.

Planned **mobile sessions** were cancelled at all of the sampled facilities during the year of the study, an interesting finding in and of itself and reflective of challenges with district-level funding for delivery costs. Using modelling, we estimated the cost of mobile delivery to be US$5.76 per dose[2], which also decreases the estimated unit costs of the other delivery strategies because overhead costs are spread across more doses (Table 3). Mobile delivery is more expensive due to the greater distances to be covered and use of motor vehicles (as opposed to motorcycles and buses/taxis for outreach).

[2] Cost includes vaccines, injection supplies and labour costs. It was not possible to separate out the delivery portion of the modelled mobile delivery cost due to lack of data and too much uncertainty around assumptions.

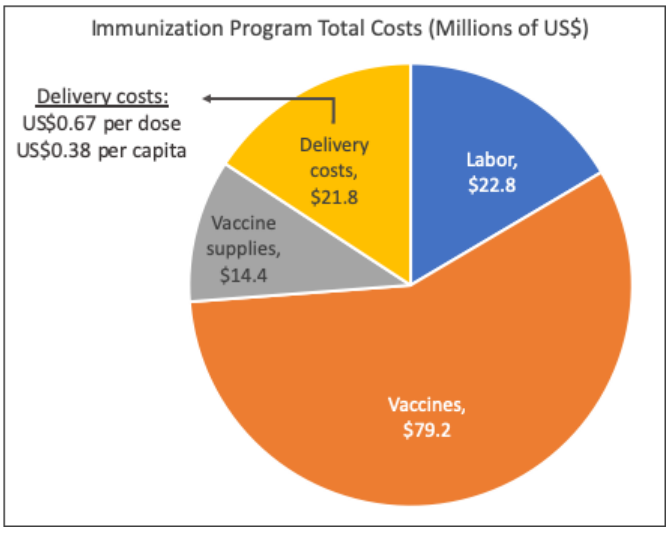
Table 3: Modelled Cost per FIC by Delivery Strategy (including vaccine, injection supply, and labor cost)

Type of cost	Existing delivery (2016 US$)			With mobile delivery (2016 US$)		
	Facility-based delivery	Outreach-based delivery	Mobile delivery**	Facility-based delivery	Outreach-based delivery	Mobile delivery**
Economic cost per dose delivered	3.62	5.88	N/A	2.92	5.15	5.76
Financial cost per dose delivered	3.57	5.85	N/A	2.90	5.15	5.76

** n=18

The **total cost of the immunization program**, including facility, district, regional and national level costs, is estimated to be US$138.2 million, or US$2.41 per capita based on a population of 57.31 million. These estimates include vaccine, injection supply and labor costs. This equates to a cost per dose of US$3.99. Delivery costs only (total costs minus the vaccine, injection supply, and labor costs) total US$21.8 million, or 15.8% of the total program cost. By level of the health system, the delivery cost portion of total costs is comprised of facility-level costs (72.4%), district-level costs (20.5%), regional costs (7.0%) and national costs (0.5%). The immunization **delivery cost per dose and per capita**, including costs from all levels of the health system, equates to US$0.67 and US$0.38 respectively.

Figure 2: Immunization Program Total Costs and Delivery Costs



Findings are largely in line with other Sub-Saharan Africa countries. In four recent studies from Benin[3], Ghana[4], Uganda[5] and Zambia[6], the reported economic cost per dose delivered ranged from US$0.75 to $US3.18, including injection supply costs but excluding vaccine costs. This puts Tanzania's delivery cost per dose of US$1.28 (also including injection supply costs but excluding vaccine costs) at the lower end of this range.

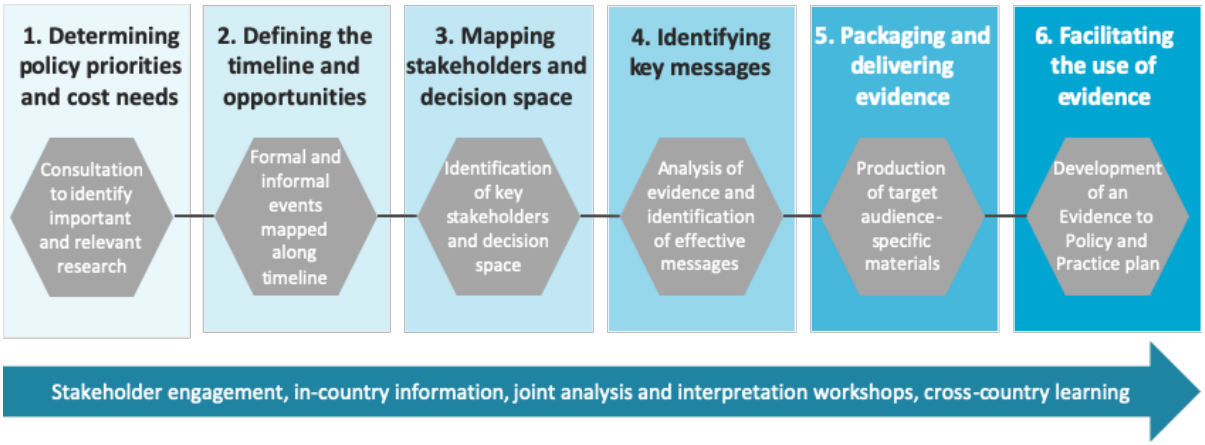
[3] AMP. (2014). Costing and financing analyses of routine immunization and new vaccine introduction in Benin Final Report.
[4] Le Gargasson, JN. et al. (2015). Costs of routine immunization and the introduction of new and underutilized vaccines in Ghana. Vaccine, 33(S1), A40–A46.
[5] Guthrie, TZ. et al. (2014). Costing and Financing Analyses of Routine Immunization in Uganda. Retrieved from https://static1.squarespace.com/static/556deb8ee4b08a534b8360e7/t/5596fa4a.pdf
[6] Schütte, CC. et al (2015). Cost analysis of routine immunisation in Zambia. Vaccine, 33(S1),A47–A52. Retrieved from https://doi.org/10.1016/j.vaccine.2014.12.040

Evidence to Policy and Practice (EPP) Framework

ICAN developed a 'six-step' **Evidence to Policy and Practice** (EPP) framework (Figure 2) with the aim of increasing the chances of decision makers understanding and using ICAN evidence for policy making, planning and budgeting. The framework describes the analytical journey that ICAN took with Ifakara Health Institute, MoHCDGEC-IVD, and other stakeholders, starting with early engagement to determine policy priorities and cost needs, through to cross-country workshops where key stakeholders as well as planning cycles and timing of decision making around budgets were identified, and finally through to joint analysis and interpretation meetings to review findings and identify key messages.

In addition, in 2018 key stakeholders in Tanzania worked with staff from JSI to devise a questionnaire that was used to gather information from 22 identified key informants on the landscape within which immunization budgeting and planning decisions are made. The findings from these interviews, along with the outputs of the cross-country workshops and joint analysis and interpretation meetings, form the basis of the Tanzania EPP Plan.

Figure 3: ICAN Framework for Evidence to Policy and Practice



Tanzania EPP Plan

1. Policy priorities and costing needs

To ensure the policy relevance of the research, Ifakara Health Institute worked with MoHCDGEC-IVD, the Directorate of Policy and Planning, and ThinkWell and JSI to jointly identify costing needs, define the research question, and develop the study methodology. The decision was to focus on costing different vaccine delivery strategies and estimate the cost per FIC and the delivery cost contributed by each level of the health system.

The team also conducted stakeholder meetings with key partners such as WHO, UNICEF, and CHAI to make final adjustments to the proposed study. The team engaged the President's Office, Regional Administration and Local Government (PO-RALG) to give clearance for data collection at regional and district levels.

At the time of these consultations (early 2017), Tanzania was preparing to enter the Gavi Preparatory Transition Phase in 2020[7], meaning the Government of Tanzania would need to invest more funds to support the immunization program, both for vaccines and injection supplies as well as immunization

[7] As of the finalization of the EPP plan, entering the preparatory stage is now considered a potential for 2021, but this is uncertain as it will be based on three years of gross national income (GNI).

delivery costs. In discussions with various stakeholders, it was determined that reliable cost information would be required to make a case to the Ministry of Finance and Planning to mobilize resources for the delivery of the existing schedule of vaccines and inform new vaccine introduction planning. Stakeholders also noted that budgeting and planning processes and procedures were not always well understood by district-level government planners, some of whom were not deeply familiar with immunization, which may have led to lower prioritization of the program, and possible shortages in financing to support the delivery of immunization services.

2. Timeline and opportunities for the use of ICAN evidence

ICAN cost evidence will be useful for advocacy, planning, and resource allocation. Developing sufficient budgets for vaccination activities in Tanzania has been challenging as baseline cost estimates have been unavailable and districts do not know their delivery costs. Stakeholders describe the immunization program as underfunded, but they do not have cost evidence to improve planning, advocate for more funding, or evaluate different delivery options. The amount of funds needed for outreach and other delivery strategies has been estimated primarily relying on historical expenditures plus some adjustment. Cost evidence would be helpful to tackle the problem of transportation availability and determine how to allocate fuel.

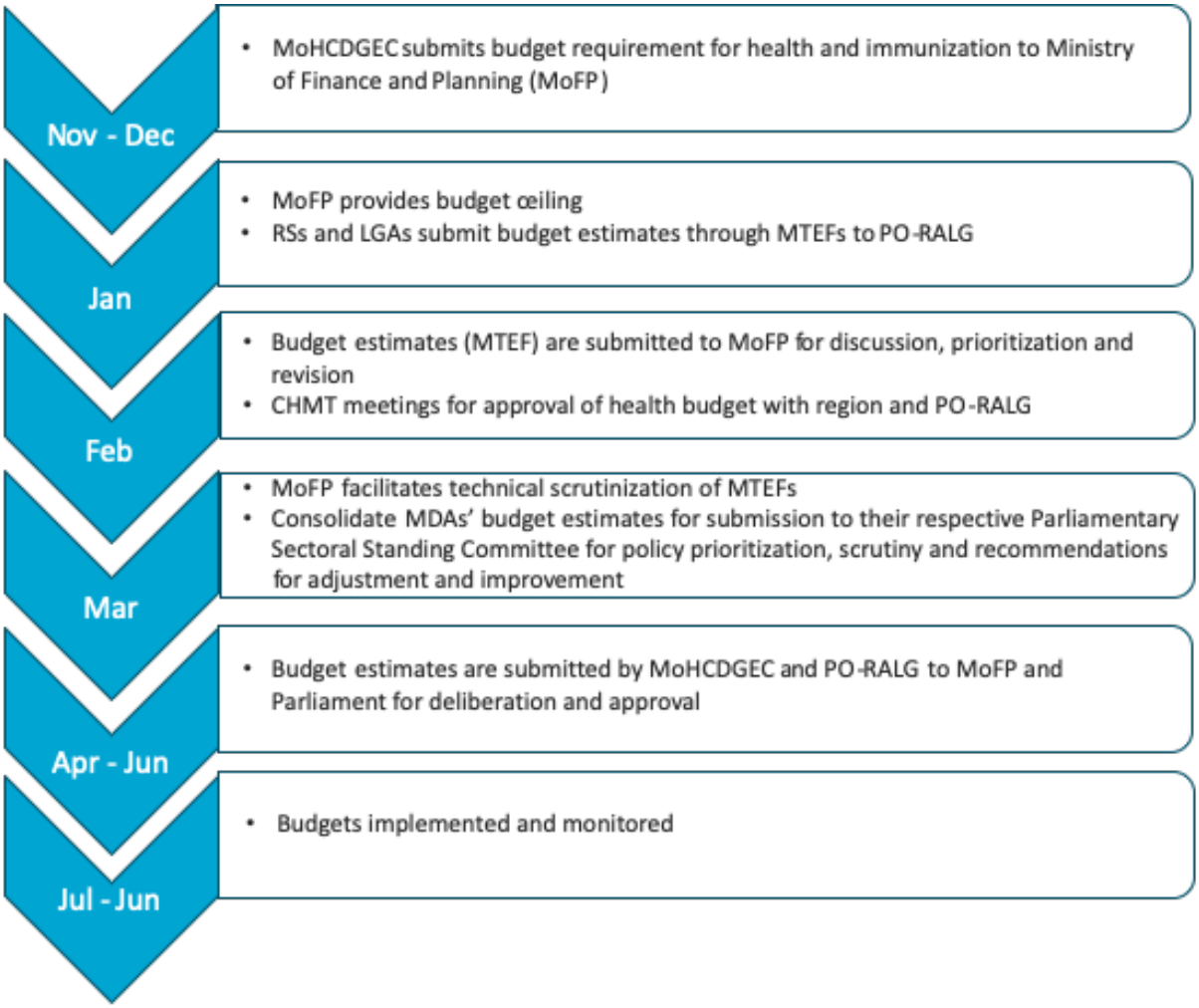
In this context, these findings can provide valuable insights into the cost of different delivery strategies across a range of urban, rural, and nomad settings. Interviews carried out with immunization stakeholders identified several key opportunities with potential entry points for the presentation and use of the ICAN study results:

1. **Annual budgeting and planning process**: The findings can be used for planning at different levels to help determine efficiencies and maximize local resources. Tanzania's decentralized system for budgeting and planning presents a key opportunity to use ICAN findings at the facility and district levels. Funds for operational activities at the district levels are included in the budget of the Comprehensive Council Health Plan (CCHP) that local governments prepare annually starting in October based on national guidelines that are revised every few years. This also aligns with annual plan and budget guidelines provided by the MoFP (normally given out by the end of November or December) which identify the priorities for the coming financial year. The PO-RALG prepares a consolidated budget to IVD. Separately, MoHCDGEC prepares a sector budget, with five lines for immunization (i.e., vaccine, and for EPI offices: water, electricity, diesel, and food and refreshments).

   The release of the study findings and this report is timely for the inclusion of findings in the budgets currently being developed, which will be approved by Parliament in June 2020. Another possibility is to collaborate with CHAI on an update of their microplanning tool (i.e., "minimum checklist") provided to Council Health Management Teams (CHMTs), which aims to improve budgeting for immunization. Input data for CCHPs can also incorporate the learning from the USAID/MCSP CCHP planning that JSI supported in Kagera Region. At the national level, the next revision of the planning guidelines could be a key entry point for the use of ICAN findings.

   A sample roadmap is shown in Figure 4. Rapid action would be required as key activities in the annual process related to initial budget submissions are already underway:

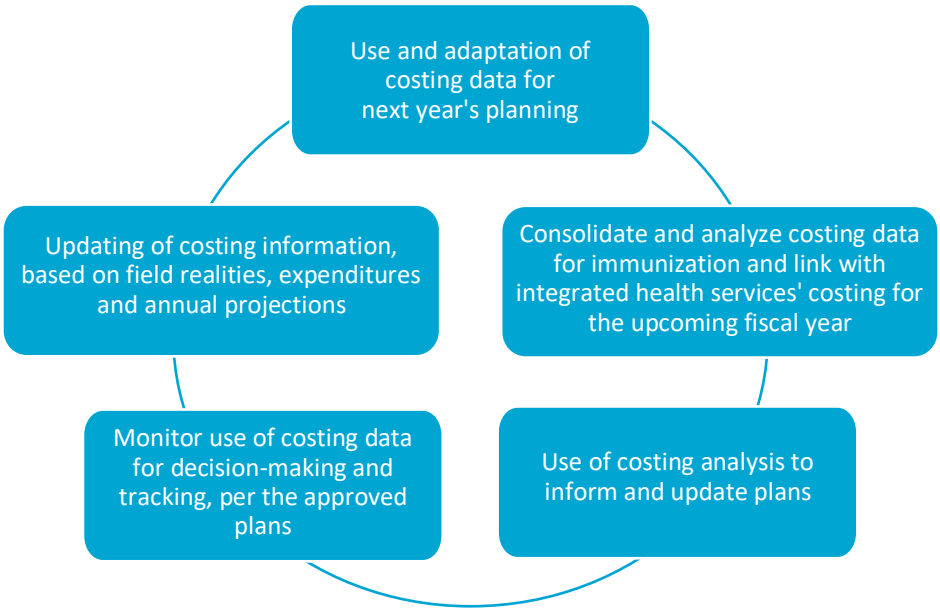
Figure 4: Roadmap for the national budgeting process



NOTE: *MDAs - Ministries, Independent Departments and Agencies; MTEF - Medium Term Expenditure Framework; MoFP – Ministry of Finance and Planning; RSs – Regional Secretariats'; LGAs – Local Government Authorities; PO-RALG - Presidents' Office - Regional Administration and Local Government*

Per the roadmap above, an illustrative budgeting and planning flow model is shown in Figure 5. This process can be further aligned with the dates and timeframe of the annual costing and budgeting cycle.

Figure 5: Budgeting and Planning Flow Model for Budgeting Cycle



2. **National Health Planning and cMYP Development**: The next five-year National Health Plan, as well as the immunization comprehensive multi-year plan (cMYP), will run from 2021-2025. Plans and budgets will be drawn up for the next plan starting from mid-2019 until mid-2020, so the timing is opportune for the use of ICAN evidence for costing national and/or district level delivery activities and new vaccine introductions. New vaccine introduction over the next three years – such as birth doses, adolescent vaccination, and boosters – are all planned and present opportunities to use more accurate costing data.

3. **Directed Health Facility Funding (DHFF)**: DHFF is a direct payment to health facility bank accounts which is an output-based payment to better match payment to priority services and empower facilities to manage funds and procure inputs to deliver health services to their communities. It is used to strengthen basic financial management systems, Planning and Reporting System of Tanzania (PLANREP)[8] and Facility Financial Accounting and Reporting System (FFARS). The findings can now enable more targeted strategy considerations and potentially better predictability on operational costs.

3. Key stakeholders and their decision space

The following stakeholders were identified as key decision makers or influential and should be considered:

- **National level key decision makers** include the Ministry of Finance and Planning, MoHCDGEC, IVD Technical Working Group, PO-RALG, ICC, NITAG, and Ministers and Permanent Secretaries. The Ministers and Permanent Secretaries are the key decision makers. The MoHCDGEC makes decisions and the IVD Technical Working Group makes all policy decisions related to IVD.

[8]PLANREP is the Local Government Planning and Reporting Database. It is designed to assist LGAs in planning and budgeting, tracking of funds received, physical implementation and expenditure. It contains the tools required for preparing CCHPs.

Consequently, mid-level staff in the IVD Technical Working Group (TWG) are influential. The ICC and NITAG are both advisory, not decision making, bodies. Membership on the ICC is broad, including USAID's Chief Health Officer, WHO, UNICEF, CHAI, Red Cross, Christian Social Service Commission, MOE, MOF, MOH, and various CSOs. The TWG is a subcommittee of the ICC. Membership on the TWG is roughly 20 people including PATH, CHAI, WHO, UNICEF, JSI, and senior members of IVD. The remit is to make technical recommendations to the government on vaccine efficacy, cost effectiveness, and safety.

- **National level partners** that are influential and carry a significant weight with identifying and helping to address the needs of the MoHCDGEC and the allocations with the MoFP include the WHO, UNICEF, Gavi, and the Bill & Melinda Gates Foundation. PATH, CHAI and JSI are valued technical partners who can support the presentation and use of evidence.
- **Regional level key decision makers** that play a role in decision making and planning include the Regional Commissioner (RC) / Regional Administrative Secretary (RAS), Regional Health Management Team (RHMT), Regional Immunization Officers (RIVOs), Regional Medical Officers (RMOs), and Regional Reproductive and Child Health Coordinators (RRCHCOs).
- **District level key decision makers** that play a key role in decision making and planning include the District Commissioner (DC), District Executive Director (DED), Council Health Management Team (CHMT), and all councilors, District Immunization Officers (DIVOs), District Medical Officers (DMOs), and District Reproductive and Child Health Coordinators (DRCHCOs).

In addition to the above identified stakeholders, **key champions** who may be able to facilitate use of cost results are the Vice President, Samia Suluhu Hassan or Minister for health First Lady Janeth Magufuli, given their interest in health.

At district level, more standardized costing data will be useful on fully immunized child and immunization service delivery defined by different geographies (e.g., mobile, outreach with nomadic populations, outreach for more routine sessions above 10 km from health facilities). This can be linked with the general budgeting for the CCHPs as well as with the EPICOR system[9], an electronic financial management system, to monitor expenditures and update costs based on reports that have been previously submitted.

4. Table 4: Sample Key ICAN messages and evidence

Stakeholder	Evidence to be Presented	Key Messages
National level key decision maker	• Cost difference per immunized child in rural health facilities compared to urban facilities *Building on the ICAN findings*: • Direct and indirect costs of immunization (actual costs for achieving current coverage and estimating costs to incrementally and sustainability increase coverage)	• The cost of a fully immunized child determined by geographical location *Building on the ICAN findings*: • The cost of a fully immunized child by economic status

[9] EPICOR system is an integrated financial management information system to support the management of income and financial expenditures within the government of Tanzania.

National level partner	• Immunization delivery costs are lower in rural settings when compared to urban health facilities *Building on the ICAN findings:* • Identification of priority areas in the next year's annual planning through dissemination of findings with key stakeholders at regional, council, PO-RALG level • Define inputs into the next cMYP and 5-year projections for IVD	*Building on the ICAN findings:* • Additional contributions to delivery costs including related supplies and labor to drive advocacy for resource allocation for immunization services • Guidance to help different levels define their 'delivery package'
Regional level key decision maker	• Methods of outreach delivery can have a lower cost than facility-based delivery *Building on the ICAN findings*: • Costing for specific strategies, e.g.: ○ mobile services in urban areas ○ matrix for outreach services in nomadic areas (including mapping) ○ Temporary vaccination posts (including monitoring for establishing migratory patterns and locations – e.g. markets) ○ Private sector engagement (e.g. cold chain equipment)	*Building on the ICAN findings:* • Recommendations for specific cost reduction and delivery strategies in urban vs. rural settings • Review of cost and use of REC strategy (can be integrated, but immunization target areas may be different than other health programs) • Establish real cost for outreach vs fixed vaccination services (different scenarios; itemized for different delivery strategies – e.g. market place sites vis-à-vis mobile in nomad/lake or mobile in urban)
District level key decision maker	• Differences in delivery costs between rural facilities with nomadic populations and facilities without nomadic populations	*Building on the ICAN findings:* • Indicate cost difference by presenting utility costs as associated with facility-based delivery costs between nomadic and non-nomadic populations considered

5. Presenting ICAN evidence and messages effectively

To ensure the use of ICAN cost evidence, it is important to present the evidence in a simple manner, tailored to different audiences (for example national, regional, development partners). Research findings are not recommended for dissemination solely at national level, but at the provincial/district levels too. Given the large sample which was designed to be nationally representative, these findings present an excellent opportunity for greater accuracy of planning and budgeting and potentially a more effective use of immunization resources. It would be ideal if the Permanent Secretary of MoHCDGEC, Regional Administrative Secretaries, and District Executive Directors lead the process to ensure that front line implementers and the IVD are fully informed of the evidence and how it can be used.

Stakeholders suggested a number of formats for the presentation of ICAN cost evidence, including:

- **Presentations:** Slide deck describing the study and key findings that can be tailored to different audiences
- **Briefing note:** Two versions that describe the study and key findings – one for national level planners and partners, the other for sub-national level planners
- **Study report**: Full report detailing the study methodology and findings aimed at national and global stakeholders
- **Planning and budgeting tool template:** Identify immunization costing items by type of stakeholder and audience and incorporate into the PLANREP. The ICAN findings could be included with the PLANREP guidelines for planning and reporting systems to be applied throughout the country (and harmonized with current tools that are available in specific areas where there has been partner support)

6. Facilitating the use of evidence

Participants in the November 2019 EPP Dissemination workshop held in Dar es Salaam provided feedback on the potential use of the findings, including:

- Apply to Directed Health Facility Funding (DHFF) – the data can now enable more targeted strategy considerations and potentially better predictability on operational costs
- Assist with having regular (and customizable) estimates that can be used for planning at different levels to help determine efficiencies and maximize local resources
- Lobby for increased resources and also link with messaging on return on investment
- Tailor to the policy makers and funders at different levels – key, basic advocacy messages for each section (data slides) in the costing study – to use with non-finance people
- Build in space for a finance technical advisor at various levels to help with monitoring and use of the study costing data (at least during the initial planning cycle)
- Include practical case studies in budget review meetings to discuss different real-life scenarios (and use the ICAN findings to help inform national level cost estimates as well for the allocation cycle and reporting). Example case studies include:
    - If a facility has 10% outreach to nomads, 30% of services to be conducted by basic outreach, and 60% fixed, what are the base estimated delivery costs per year per FIC, assuming 100% coverage from birth through Measles/Rubella 2nd dose (and excluding vaccine, injection supply and labor costs)?
    - If a district has 10% nomad, 20% urban (with 5% outreach), and 70% rural (with 20% outreach), what are the base estimated delivery costs per year per FIC – including mobile for nomads/islands and including % labor attributable to immunization?

Additional support is needed to address the suggestions above, including for development of the requested briefs from the immunization costing study results. IVD and partners are recommended to pursue further resources with the Bill & Melinda Gates Foundation, Gavi and others (including local stakeholders), to prioritize what information is most needed and the best formats for the briefs to support dissemination and advocacy with various stakeholders. Timely follow-up on this in early 2020, including identifying targeted technical assistance, will be useful for informing IVD's next 5-year cMYP as well as the other policy guidelines.

Annex 1: Costing Definitions

Economic costs represent the value of all resources used to deliver the immunization program, i.e. financial outlays plus opportunity costs of volunteer time and any donated items such as vaccines.

Financial costs are limited to financial outlays, usually with straight-line depreciation of capital assets.

Immunization delivery costs are also referred to as vaccine delivery costs or operational costs. These are the costs associated with delivering immunization services to target populations; in the context of Tanzania, this is exclusive of vaccine, immunization supply, and labor costs.

Annex 2: Tanzania Stakeholders who Contributed to the EPP Plan Prior to the Dissemination Workshop

Name	Organization	Position
Darison Andrew	Shinyanga MC	Municipal Medical Officer of Health (DMO)
Henry Chinyuka	Malinyi DC	DMO
Jessica Gu	Clinton Health Access Initiative	Senior Advisor, Immunization Strategic Planning and Execution
Abbas Hincha	Pwani RS	RIVO
Abdul Kakai	Morogoro - RHMT	RIVO
Peter Kihamia	Kilimanjaro RS	RIVO
Robert Kindoli	Better Immunization Data Initiative Tanzania, PATH	M&E Lead
Santiel Kinyongo	Morogoro RHMT	RRCHCo
Dorothy Lemma	Tanga - RHMT	RRCHCo
Dafrossa Lyimo	MoHCDGEC (IVD) Program	Programme Manager
Aisibu Maimu	Mkinga DC	DIVO
Deus Makunja	Ruvuma - RHMT	RIVO
Fatuma Manzi	Ifakara Health Institute (IHI)	Chief Research Scientist
Clement Marcelli	Tanga RHMT	RMO
Ridhiwan Mnemo	Morogoro	DIVO
Alex A. Mphuru	MoHCDGEC (IVD) Program	Program Officer, Operations
Hassan Mtenga W	PATH	Project Manager
Raphael Munohi	Department of Policy and Planning, MoHCDGEC	Economist
Henry Mwanyika	Better Immunization Data Initiative Tanzania, PATH	Director
Willium Mwengee	WHO	EPI Team Lead
Lusajo Ndagile	Department of Policy and Planning, MoHCDGEC	Economist
Athanas Ngambakubi	Chato DC	DMO
Michelle Remme	London School of Hygiene and Tropical Medicine (seconded to Ifakara Health Institute)	Assistant Professor in Health Economics
Octavian Sanga	Katavi -RHMT	RIVO
Berrington Shayo	Clinton Health Access Initiative (CHAI)	Program Manager, Vaccine
Seif Shaibu	Tanga - RHMT	RIVO
Kassimu Tani	Ifakara Health Institute	Economist
Emmanuel Yohana	MOHCDGEC-IVD	PO - Supply Chain Management
Green Sadru	JSI – Tanzania	Immunization Technical Officer
Caroline Akim	JSI – Tanzania	Senior Immunization Technical Officer
Ssanyu Nyinondi	JSI – Tanzania	Immunization Team Lead

Annex 3: Evidence to Policy and Practice Dissemination Workshop Participants

Name	Organization	Position
BEATRICE KAPUFI	SIMIYU REGIONAL SECRETARIET	RIVO
FRANK MAGANGA	MEATU DC	DMO
YOHANA MODEST	MWANGUDO DISP - MEATU DC	HEALTH FACILITY IN CHARGE
NASSOR MOHAMED	WHO	MR IMMUNIZATION OFFICER
JOSELINE ISHENGOMA	PORALG	IMMUNIZATION COORDINATOR
BONAVENTURA NESTORY MUHINDI	IVD - MOHCDGEC	COLD CHAIN LOGISTICS OFFICER
DANFORD BARNABA	MBEYA REGIONAL SECRETARIET	RIVO
BLANDINA MPUNGA	MASASI DC	DIVO
LEONCE H EPIPHAN	MASUKULU HC - RUNGWE DC	HEALTH FACILITY IN CHARGE
EZEKIEL MVILE	RUNGWE DC	AG DMO
DAFROSSA LYIMO	IVD - MOHCDGEC	PM
NGWEGWE BULULA	IVD - MOHCDGEC	PO
FAUSTA MICHAEL	IVD - MOHCDGEC	PO
KUSIRYE UKIO	MOROGORO REGIONAL SECRETARIET	RMO
SYLVIA MAMKWE	MTWARA REGIONAL SECRETARIET	RMO
DINAH ATINDA	PO-RALG	RMNCAHCO
LAKIA NGAYUNGWA	KILOSA DC	DIVO
KASSIMU TANI	IHI	RESEARCH SCIENTIST
FATUMA MANZI	IHI	CHIEF SCIENTIST
CAROLINE AKIM	HEALTH/MCSP	IMMUNIZATION EXPERT
PRICILLAH KINYUNYI	IVD - MOHCDGEC	PO
DELPHINUS MJUNI	IVD - MOHCDGEC	DM
LUSAJO E NDAGILE	POLICY AND PLANNING - MOHCDGEC	ADPP
HONEST NYAKI	IVD - MOHCDGEC (DODOMA)	PO
EMMANUEL YOHANA	IVD - MOHCDGEC	PO
JONNA JEURLINK	GAVI	SCM
ALEX MPHURU	UNICEF	IMMUNIZATION SPECIALIST
JUHUDI MFAUME	AMREF	M&E
MARIAM SINDANO	IVD - MOHCDGEC	PS
LOTALIS GADAU	IVD - MOHCDGEC	PO
GREEN SADRU	JSI	NITO
LORA SHIMP	JSI	TECHNICAL DIRECTOR
RAPHAEL NSHUNJU	JSI	SITO
BRIAN CASTRO	JSI	PO
JACQUELINE MINJA	JSI	DATA ANALYST
MUGISHA WILSON	JSI	FINANCE MANAGER
HASSAN MTENGA	PATH	MANAGER