FINAL TECHNICAL REPORT / RAPPORT TECHNIQUE FINAL

FINAL TECHNICAL REPORT - ECONOMIC CASE FOR CRVS

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EXECUTIVE SUMMARY

This final technical report highlights the major outcomes and outputs delivered by the Swiss TPH as products of the implementation of the Economic case for CRVS systems project. During the period covered in this technical report – April 2019 to May 2021–, the team at SwissTPH in collaboration with the team at the Centre of Excellence (CoE) for CRVS implemented a number of activities contained in four different –review of existing evidence, development of the framework and stakeholder consultation, development of an economic case in a LMIC and disseminations of results. The results of this project have been:

- Systematic review of the literature to analyse the benefits of CRVS systems in LMIC. A sub analysis of the literature found was conducted to look specifically at the impact of marriage registration on communities and individuals
- Development of the methodology to build an economic case for CRVS in LMIC which includes six case studies for the economic analysis of CRVS systems. The methodology has been exposed to a number of stakeholders and wide consultation with global and regional stakeholders has been held;
- Development of the CRVS Economic Analysis Tool (CEAT), complemented with a guidance document to provide with the methods to implement a costing of the CRVS system which was not considered as part of the original deliverables of the project; and
- Empirical case study providing an economic analysis of measuring some of the SDGs using the CRVS system in Ghana, as opposed to using household surveys.

The project has progressed steadily since the award of the grant until the surge of the COVID19 pandemic. We have completed the four phases of the project. During phase 1, the systematic review "Addressing the evidence gap in the economic and social benefits of CVRS Systems: A Systematic Review" was submitted to the peer reviewed journal "BMC Population Health Metric". In addition, a systematic review's report was drafted and submitted to CoE for CRVS in order to be part of the "CRVS Working Paper Series 2021". We identified an extra product resulting from the analysis of the systematic review. A brief titled "The importance of marriage registration and certification" analysing the benefits for individuals, societies and governments of strengthening marriage registration. This product was submitted for publication together with the report of the systematic review.

In the phase 2, the methodological framework for the economic analysis of CRVS systems was developed and described in a series of guidance documents. We have synthesised the evidence and identified a framework to build an economic case which includes six independent economic analyses. The framework can be used by countries to make an economic case to increase investments on CRVS and to look at the economics of CRVS systems with the objective of improving their efficiency, reduce the cost of their operations or monetizing some of the benefits of CRVS systems. These diverse case studies provide actionable and relevant economic arguments that can be directly integrated in the policy dialogue.

In the second half of 2019 and 2020, the project team consulted with key stakeholders, global and national CRVS experts and different agencies to guide the development of the framework. Some of the participants in these consultations included UNSD, World Bank, Global Civil Registration and Vital Statistics Group, Bloomberg Data for Health Initiative, UNECA, ESCAP or national CRVS stakeholders.

Furthermore, the framework of the economic case was presented in different conferences and regional meetings, such as the Women Deliver 2019 Conference in Vancouver, Canada; fifth Conference of African Ministers responsible for Civil Registration (COM5) in October 2019; the ministerial meeting of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) in October 2020; the preparatory sessions for the 5th meeting of the Regional Steering Group for CRVS in Asia and the Pacific, that will take in October 2021.

Given that the COVID19 pandemic shifted most of the attention of policy makers and CRVS stakeholders to the COVID19 response, the team in consultation with the CoE decided to develop a number of tools to support countries remotely develop an economic case for CRVS. These products were not considered in the original plan but we though that they were necessary resources given the current and future needs from countries. An online CRVS Economic Analysis Tool (CEAT (vatools.net)) was created in order to systematically collect data to feed some of the cases studies case studies included in the methodology. In addition, the team developed a guidance for costing CRVS systems fwhiuch provides a step by step guide on how to cost CRVS systems and the considerations they need to have when embarking in such exercise. Both tools are consistent and provide the CRVS community including governments, development agencies and other CRVS stakeholders with the methods to implement a costing of the CRVS system.

The methodological framework was used to build the economic case for CRVS in Ghana. The case study 1, “Differential Cost of Measuring SDGs with CRVS vs Household Surveys” has been piloted in Ghana as part of the Economic Case for CRVS. In collaboration with the national CRVS stakeholders, the cases study was adapted to the country specificities. The study provided useful cost information for setting-up and implementing CRVS, national population census and different household surveys in Ghana.

Finally, a series of papers are developed and submitted for publication to CoE for CRVS. They synthesis the methodology developed for the economic case for CRVS, the results of the case studies, and the lessons learned during the application.

1. RESEARCH PROBLEM

What is a CRVS system

Continuous and reliable information on the registration and certification of vital events is required to support health policy development, efficient planning, evaluation of programs, and allocation of resources. In LMICs civil registration and vital statistics (CRVS) systems to monitor vital events, such as births, deaths and causes of death (COD), among others, often produce data of low coverage and poor quality (1). The global CRVS community advocates for using vital statistics produced by the CRVS system as the source of a number of SDG indicators or the electoral registries currently measured using household surveys. Given the logistic and financial burden of household surveys, the global CRVS community is advocating for reducing or eliminating these surveys and transitioning to CRVS routine-based monitoring (2).

This advocacy efforts face often resistance due to the lack of robust evidence that shows the benefits of investing in CRVS systems for different stakeholders, including individuals as well as governments. We recently conducted a systematic review of all empirical evidence on the benefits of a functioning CRVS system yielded some interesting results. One of the most striking results was the fact that there is a scarcity of published evidence around the topic with very limited number of papers included. Despite the acknowledged importance of mortality statistics, including COD, we found no studies investigating their direct or indirect benefits. The need for empirical evidence describing the benefits of death registration data from CRVS systems is essential to enhance the value and increase government's incentives to invest in innovation (3).

While there is a substantial body of knowledge showing the benefits of well-functioning CRVS systems (1, 4, 5), the development of an economic case for CRVS addresses fundamental economic questions related to the concept of efficiency and equity.

Why do we need an economic analysis of CRVS systems?

CRVS systems are complex adaptive systems that perform hundreds of daily activities (6) and impact individuals and societies through multiple channels. In order to identify the various pathways by which CRVS system would have an economic impact, a massive exercise would be needed, which requires a significant amount of resources and data.

Even though there is a substantial body of knowledge showing the benefits of a functioning CRVS system, the economic case for CRVS has not been yet developed in terms of cost savings and return on investment (7). This evidence is an essential complement to the social and rights-based arguments that need to be marshalled to convince decision-makers at the highest levels of government and among the donor community to prioritize investments in CRVS systems and explore new ways to make them sustainable. Outlining the potential economic benefits of well-functioning CRVS systems would allow informing decisions and investments by designing appropriate incentives strategies.

Despite the importance of precise, reliable and quality data to measure the progress towards the 2030 Agenda for Sustainable Development, along with the potential to stimulate structural changes, data remains scarce, especially in LMICs (8). Governments set their country priorities and implement policies based on data produced by the national statistical systems, which amalgamates data from different sources, such as the CRVS systems, household surveys, population census, etc. Unlike other data sources, a functioning CRVS system generates up-to-date demographic and health indicators, providing substantial information on changes in population dynamics, inequities in service delivery, and medical and health-care programs (9). By generating high quality and accurate information, CRVS systems support governments directly, contributing to planning and allocation decisions. Civil registration is an

important source of vital statistics, which provide essential evidence to support social and public health policymaking and measure development progress.

The costs of running CRVS systems in LMICs are not well documented or known as well. Often considered as a costly service of the government (10), there have not been rigorous attempts to estimate the resources needed to implement CRVS processes. Resources allocated to CRVS systems are usually based on historical budgets and are spread across national different ministries and agencies. Even though there has been some attempts to estimate the cost of CRVS systems (11-14) and to compare them with other systems to produce vital statistics (15), there has not been a systematic analysis of their cost drivers or the potential for efficiency gains.

Countries will need to decide which new interventions (e.g. mortality surveillance systems with VA) they will implement to get reliable, representative and accurate vital statistics. With the aim of supporting low middle-income countries (LMICs) in building an economic case for CRVS and overcome the challenges in the process, we developed a framework to compile a diverse methodology to capture the complexity. The framework provides different analyses that integrates an economic argument to invest on CRVS systems. Rather than building a single economic case evaluating the cost and the benefits of CRVS systems, the framework identifies different domains that can be used to build an economic case, which is specific to different country settings.

The objectives of the project as described in the original proposal and previous reports are:

1. To develop a framework for capturing the economic and societal benefits associated with CRVS; and to analyze the fiscal benefits and efficiency gains associated with investments in CRVS systems; and
2. To set out the economic argument and evidence base that show that CRVS systems can provide a return on investment for government, multilateral and private sector stakeholders.

2. PROGRESS TOWARDS MILESTONES

This final technical report refers to the entire project period, which lasts from April 2019 to 1 of May 2021. The following milestones have been achieved as detailed in Table 1

Table 1. Milestones' Progress

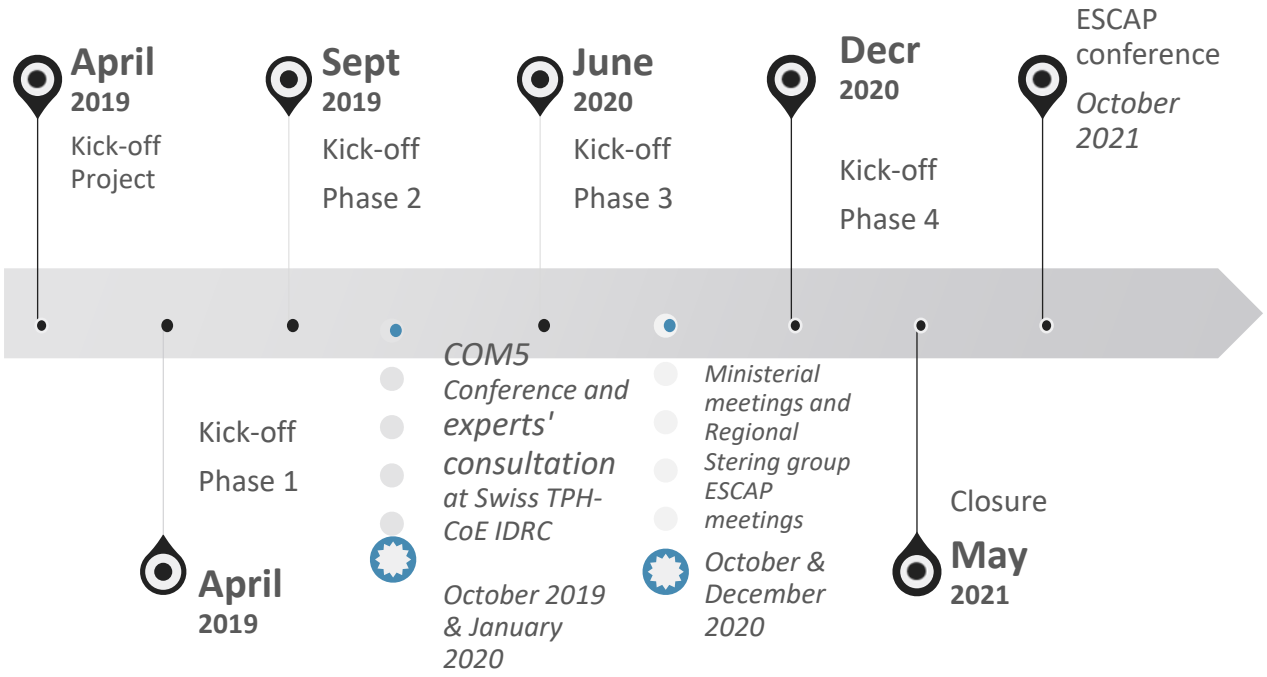
Milestones	Name	Progress Description
Milestone 1.1.	Commencement	The project commencement date was on the 1st of April 2019
Milestone 1.2.	Initial Payment	The initial payment was received by the Swiss TPH in the 2019.
Milestone 1.3.	First technical report	A first technical progress report was submitted on April 2020, 12 months after the start of the project. It contained a comprehensive summary of the work done until that date, as required by IDRC. It was successfully approved.
Milestone 1.4.	Payment by the IDRC	The payment was received one month after the satisfactory progress reports.
Milestone 1.5.	Second technical and financial report	A second technical and financial progress report was submitted on September 2020, covering the period April to September 2020.
	Non Cost extension	A non-cost extension was requested and granted in September 2020. An amendment (No.1) to the grant agreement was signed on the 27th of October. The estimated time for completion of the work is the 25 months. Revised work completion date of the project is thus 1 May 2021 and revised contract completion is 31 July 2021.
Milestone 1.6.	Final technical report	The present final technical report contains comprehensive information detailing the work accomplished and challenges encountered during de implementation of the project.
Milestone 1.7.	Final financial report	A final financial report covering all funds expended on the project is submitted to IDRC in 30th April 2021
Milestones 1.8.	Final payment	Pending

3. SYNTHESIS OF RESEARCH FINDING AND OUTCOMES

The project to develop an economic analysis of CRVS systems has been the result of a thorough review of similar exercises (13-16) and wide consultation process with different CRVS stakeholders at the global, national and local level.

The project has been implemented in 4 sequential phases with a participatory approach and trying to reach wide consensus among all relevant stakeholders (see **Error! Reference source not found.**1).

Fig 1. Timeline of Project's Phases



3.1. Phase 1. Review of existing evidence

3.1.1. Systematic review of the literature

The systematic review of the literature about the benefits of CRVS systems was conducted during the first phase of the project. We submitted the manuscript "**Addressing the evidence gap in the economic and social benefits of CVRS Systems: A Systematic Review",** to the peer reviewed journal "BMC Population Health Metric". In addition, we synthesised the main findings in the **systematic review's report**, which will be published by IDRC as part of the "CRVS Working Paper series" of the CoE for CRVS at the IDRC. We identified an extra product resulting from the analysis of the systematic review, **"The importance of marriage registration and certification"** brief, described below.

With the aim of compiling empirical evidence on the economic and social benefits of the output of a functioning CRVS system. We used standard methodology for systematic literature reviews (17) (18). We have systematically searched and reviewed all peer-reviewed and grey literature assessing the benefits of the products of a functioning CRVS system (e.g., birth, death, marriage, and divorce certificates, or vital statistics) on individuals, communities, or societies. There 2 main concepts in the research question:

1. What we consider as an economic or social benefit: We have included any benefit described in the literature:
    - for individuals, such as women, girls, men, boys and people with non-binary identities, e.g. improved health outcomes, accountable legal status, access to social services such as education, access to social protection programs; or
    - for societies e.g. improved governance, efficiency and effectiveness gains of government resources, reduced fraud, improvements in human rights and/or gender equality, increase of business and commerce, as well as in aid effectiveness
2. What is a functional CRVS system: The way we have operationalized this concept is by looking at the products of CRVS systems. We consider that the benefits of CRVS systems come through the existence of the CRVS outputs:
    - Registration: Vital events are registered in a continuous, permanent, universal and legally binding register;
    - Certification: Individuals / next of kin are provided with a document that certifies the vital event; and
    - Production of vital statistics: Statistics about vital events are generated and used for policy-making.

We included any study published in either peer-reviewed or grey literature as far as they met the inclusion criteria. The evidence found in this systematic review is compelling, even though scarce. The results of the 17 studies included in the review showed that having a functioning CRVS system can lead to a wide range of benefits that can be categorised in 3 main domains:

- Benefits of birth registration and certification
    - Increased access to education and educational attainment
    - Improved health outcomes
    - Access to social protection services
    - Positive impact on economic outcomes for individuals and governments
- Benefits of marriage registration and certification
- Benefits of vital statistics

Having a birth registration and certification can to improve health and educational outcomes. It has a clear link with accessing formal employment or the financial sector through proving citizens identity. This causal path is also seen for accessing social protection programs in which individuals are usually required to have some kind of proof of identity. CRVS documents are also required and essential to access voting cards or national ID, being at the foundation of the legal identity system in most countries.

CRVS systems and specifically birth and marriage registration has been shown to be instrumental in preventing early marriage and child labour. A specific case was made for LGBTQI couples and access to marriage registration in the U.S. A number of studies showed how the recognition from the state as a marriage improved mental health outcomes and reduced the suicide rate among adolescent who identified as sexual minorities.

The lack of any empirical evidence on the benefits of death registration and cause of death must be highlighted. Real-time mortality data is essential for tracking death and its causes, supporting local and national authorities to provide the type of indispensable health services to prevent and respond to specific needs. The absence of a death registration and certificate

reinforce the barriers to access rights and services, perpetuating the discrimination for certain minorities groups and individuals, specifically women and girls.

On the other hand, the quality of the evidence found was ranked as low with study designs that do not allow to make inferences to the whole population. Also, we could not find a large number of empirical evidence for many of the claimed benefits of CRVS systems. This does not mean that they do not have those effects. It means that they have not been documented in a way that the experience can be extrapolated. We believe that in the era of the data revolution and the evidence based policy, the global CRVS community need to make an effort in documenting how CRVS systems can be beneficial for individuals, governments and societies.

Applying a gender and equity lens, we identified population and individual characteristics from different sociodemographic groups to ensure that social stratifying factors were considered during the data extraction and analysis, and to understand how those factors play a role in contributing to inequities in the access to the benefits of a CRVS system. For instance, In India and Kenya, data showed that education outcomes (for example, being enrolled in school at the age of 6 and an increased likelihood of staying in school) were significantly affected by the child's sex, marginalizing girls, and the mother's presence. The authors also pointed out that the lack of a birth certificate did not affect everyone equally. Those with privilege and resources could influence the system to obtain a certificate and eliminate barriers.

3.1.2. The importance of marriage registration and certification brief

After analysing the evidence included in the systematic review, we identified and drafted an extra paper in the form of a brief. A brief, which focus on the benefits for individuals, societies and governments of strengthening marriage registration, **"The importance of marriage registration and certification".** It has been submitted and will be published as part of the "CRVS Working Paper series" of the CoE for CRVS at the IDRC

In this document, we reviewed the international legal framework for marriage registration and the evidence base showing the benefits of being able to register their marriage for women and men. This brief shows the benefits of having a legal framework for marriage registration which will promote rights of individuals, particularly women, girls and people from minority groups. One of the milestones towards moving towards full marriage and divorce registration is the development of an internationally recognized and inclusive definition of marriage.

Reflecting on the definition of marriage and the lack of unique understanding of the concept, we exposed the challenges encountered due to the multi legal system concerning marriage and family law. We focused on the importance of marriage registration, and the challenges to do so. We described the positive effects of marriage registration and the challenges that many women face worldwide. Even though there is evidence showing positive effects of its registration, the majority of evidence comes in the form of conventions, resolutions and reports. There is a need to better document the impact of marriage registration and certification based on scientific research and representing different regions.

Furthermore, we drew out the documented associations of the benefits of registration, including the links to fundamental human rights and development, as well as the barriers to registration. To conclude, we drew some main recommendations of how to bridge the existing gaps.

3.2. Phase 2: Framework development and stakeholder consultation

Building on the body of knowledge around the economics of CRVS systems and with inputs from partners, we have developed a package of tools, resources and products that countries can use to conduct an economic analysis of CRVS.

3.2.1. Framework for the economic analysis of CRVS systems

Due to the inherent complexity of building an economic case combining all the cost and potential benefits of CRVS systems, we decided to provide a number of economic arguments (described as case studies) that could help countries building a comprehensive economic case. We conducted a wide range of analysis aiming at making an economic case suitable to different contexts and needs. So, we synthesised the products into a "methodological framework for the economic analysis of CRVS systems".

The methodological framework synthesizes the evidence and highlights six compelling new case studies (see Figure 2). The framework certainly looks at the economics of CRVS systems with the objective of improving their efficiency, reduce the cost of their operations or monetizing some of the benefits of CRVS systems. These diverse case studies will provide actionable and relevant economic arguments that can be directly integrated in the policy dialogue.

The "**Framework for the economic analysis of CRVS systems**" synthesizes the evidence and highlights six compelling new case studies (see Figure 3). The framework looks at the economics of CRVS systems with the objective of improving their efficiency, reduce the cost of their operations or monetizing some of the benefits of CRVS systems. These diverse case studies will provide actionable and relevant economic arguments that can be directly integrated in the policy dialogue.

Briefly, the case studies identified are:

1. **Differential cost of measuring SDGs with CRVS vs household surveys:** This case study provides a comparative economic evaluation framework for examining the costs of using CRVS systems to supplement or replace household surveys as a component of monitoring country progress to achievement of the SDGs.
2. **Cost of developing a voter registration list with different approaches:** This case study provides a framework for collecting, analysing and comparing the costs of voter registration systems, using varied approaches including fully digitized CRVS systems, community census and other approaches. The intent is to support countries in the development of comparative cost minimization studies and prospective and retrospective economic evaluations of the voter registration systems.
3. **Improving the efficiency of CRVS operations through digitization:** The goal of this case study is to support countries in assessing the costs and potential of improvement in speed, accuracy and completeness that might be achieved through digitization of existing CRVS systems.
4. **Measuring increase in tax revenue as a consequence of functioning CRVS systems:** This case study provides a framework for conducting a multi-country panel data based regression analysis to estimate the association between improvements in CRVS systems and increases in tax revenue. This approach will contribute to estimating net costs of investments in CRVS systems.
5. **Modelling the economic outcomes of CRVS systems:** Similarly to case study 4 this case study is a multi-country assessment of the impact or association of improvements in CRVS systems with GDP growth and GDP. The motivation for this case study is to contribute to the estimation of the economic returns of investments in CRVS systems.
6. **Modelling cost of CRVS to increasing completeness of CRVS systems:** This final case study is intended to help to understand the production function leading to increased completeness in CRVS systems (*i.e.* the relationship between investment in CRVS systems and their completeness). This information is critical to planning CRVS investments and understanding their likely returns in terms of performance data.

Fig 3. Framework for the economic analysis of CRVS systems

Who is the audience?

The methodological framework is widely accessible to those without an economic background, and compiles together the best available evidence, tools and resources in one single package. The framework provides decision makers, stakeholders and the public with a set of methods for evidence-based and transparent decision-making. Some potential users of these resources are policy makers, national and local CRVS managers, funding agencies and development actors, researchers or the global CRVS community.

What will I get out of the analysis?

The framework seeks to support an interactive policy development process between research and decision makers through an extended set of cost, benefits, economic impact and equity effects analysis. The different case studies within the framework include an up-to-date summary of theory and practice as well as an enhance emphasis on practical applications.

Furthermore, a thorough economic analysis is a critical component in informing policies. Planning a high-quality economic analysis might enhance the adequacy and effectiveness of policy decisions by providing governments with the tools to systematically assess the result of the different interventions.

3.2.2. Cases Studies for and Economic Analysis of CRVS systems

1.1.1.1 Differential cost of measuring SDGs with CRVS vs household surveys:

Rationale

CRVS systems play a critical role, both directly and indirectly, in monitoring and achieving many SDGs, targets and indicators, as governments might use the data generated by those systems, such as the population size, growth and distribution, to create and target evidence-based decision-making in public administration. From those indicators, more than one-quarter (67) will require data from a CRVS system to measure the progress of achieving 12 of 17 SDG. Primarily in the form of population data as denominators for population-based targets, such as live births, or total deaths (19).

Moreover, in order to achieve the SDGs an accurate monitoring system reliant of official statistics is necessary. CRVS systems and household surveys have unique advantages and disadvantages for use in the measurement of SDG outcomes. In order to assess the approaches to SDG monitoring, an accurate assessment of the costs of measuring the SDGs through CRVS and use of multiple household surveys is needed. The data generated from costing approaches through household surveys and CRVS systems will allow for the assessment of the efficiency of approaches as well as to build budget impact assessments for SDG monitoring systems. Finally, the cost of such systems may also be used as a limited proxy for the value of the official statistics produced through CRVS systems and household surveys.

Aim and objectives

The overall aim of this case study is to evaluate the economic implications of using CRVS systems to measure SDGs. To compare the cost of producing vital statistics to report SDGs indicators using data from a functional CRVS system, in comparison to using data from other information sources, such as census, DHS and MICS surveys, etc.,

It will provide basic data on the cost of CRVS systems as well as review literature on the cost of other mechanisms such as household surveys to assess the SDG indicators. This will provide cost data and associated information necessary to predict and model the cost of implementation of CRVS systems under varied implementation models as well as to compare models of CRVS cost to alternative approaches to SDG monitoring and evaluation.

This case study will answer the following questions:

- Which SDG indicators can be produced using CRVS systems and which must be produced via other methods such as household surveys?
- What is the cost of implementing a functional CRVS system as compared to the cost of routine household surveys to measure these indicators?
- What is the unit cost per participant, per capita, and per indicator of the system?

Outcome

Cost comparison of different methods to measure SDGs.

Methods

The general methods for this case study will involve comparing the cost of monitoring some of the SDG targets using CRVS systems versus household surveys. This analysis will entail estimating the cost of CRVS systems using an ingredient based approach where possible in combination with top down costing methods where information is not available in a sufficiently disaggregated manner. It will also involve collection of data on the cost of measuring relevant SDG indicators using household surveys by reviewing secondary data. It may be necessary to conduct some costing of household surveys using an ingredients based/micro costing approach as well should models of scale and scope for such surveys become necessary.

Cost comparison of different methods to measure SDGs

The cost of CRVS systems will be collected by conducting a costing study of CRVS systems in a number of example districts within the country which operate functional CRVS systems at varied scales.

Outputs and interpretation of the results

This study will provide information on the overall costs, budget impact and time frame of financial spending that might change from increasing utilization of CRVS systems as opposed to household surveys to monitor progress towards the SDGs. This information will provide critical detail to policymakers to build the case for investment in CRVS systems. If evidence of potential cost-savings is demonstrated, policy makers will be able to examine the potential use of funds made available due to long-term investment in CRVS systems.

1.1.1.2 Cost of developing a voter registration list with different approaches:

Rationale

Electoral rolls are critical infrastructure for democratic governance. The integrity, completeness and quality of these systems can be challenging and expensive to maintain. This case study will assess the cost of developing high quality electoral rolls using household surveys as compared to CRVS systems in order to provide information on investment decisions for countries trying to improve the quality of their electoral systems. In order to assess the approaches to electoral roll development, an accurate assessment of the costs of constructing rolls through CRVS and use of multiple household surveys/census approaches is needed. The data generated from costing approaches through household surveys and CRVS systems will allow for the assessment of the efficiency of approaches as well as to build budget impact assessments electoral roll development and updating systems.

Aim and objectives

The overall aim of this case study is to evaluate the economic implications of using CRVS systems to support "electoral votes". To compare the cost of producing vital statistics to contribute elections using data from a functional CRVS system, compared to using data from other sources. (UNDP approach -"Getting to the CORE: the cost of Registration and Elections").

This case study will answer the following research questions:

- What is the marginal cost of using a functional CRVS system to prepare an electoral roll as compared to the cost of deploying an electoral census methodology to develop such a list?
- Which approach to electoral roll development and maintenance provides more completeness, accuracy and quality?

Outcome:

Cost comparison of different methods to measure electoral votes-

Methods

This case study will utilize several methodologies to develop its outcomes. As the primary goal is a cost comparison, two model will be developed, a model of the cost of a CRVS system and a model of an electoral census that can be adapted to produce cost estimates of the marginal costs of using these approaches to create electoral rolls. UNDP methodology enables the systematic collection of data through a digital online tool targeting the costs of electoral administration blocks and their components to allow a direct comparison of the cost.

Outputs and interpretation of the results

This study will provide information on the overall costs, budget impact and time frame of financial spending that might change from increasing utilization of CRVS systems as opposed to other alternatives for voter registration and electoral roll development. This information will provide critical detail to policymakers to build the case for investment in CRVS systems. If evidence of potential cost-savings is demonstrated policy makers will be able to examine the potential use of funds made available due to long term investment in CRVS systems.

1.1.1.3 Improving the efficiency of CRVS operations through digitization:

Rationale

Implementation of CRVS systems requires a large, distributed workforce collecting data locally in a given country. Implementation of data systems for CRVS have traditionally been "paper based" leading to long delays, difficulty updating and purging lists as well as deduplication challenges. These considerations are especially acute in dealing with internal migration. Shifts

to digital systems offer the potential to rapidly improve the quality, accuracy and completeness of CRVS systems and allow for dynamic updating. Collecting data on the incremental costs of digitizing a CRVS system over time will allow countries to budget and plan for the digital transition as well as to make justified choices about the speed and pace of transition.

Aim and objectives
The overall aim of this case study is to assess the efficiency gains in the use of technology or other improvements of the system.

This case study will answer the following research questions:

- What is the incremental cost of digitizing a CRVS system?
- Does digitization of a CRVS system lead to improved completeness and accuracy?
- Are digital CRVS systems more efficient than paper-based systems?

Outcome
Efficiency gains

Methods
This case study will provide cost data and associated information necessary to predict and model the marginal costs of shifting the implementation of CRVS systems from paper based to digital systems. This case study will utilize a cost comparison between a “paper-based” and a digital CRVS system. The primary approach would be to develop a model of the cost of a locally appropriate paper-based CRVS system and a model of a similar system using a digitized approach. The direct comparison of these two methods compared when producing similar levels of completeness can be interpreted as the incremental cost of digitizing a CRVS. The costs model developed for a CRVS under case study one can be adapted to produce cost estimates of a digital alternative version. An ancillary feature of this case study should include a systematic review of existing literature and published reports on costs coverage, completeness, and accuracy of CRVS systems especially focused on examples of before and after digitization.

Scenario analysis of the resource implications of different implementation options for CRVS

- Paper vs Digital

Outputs and interpretation of the results

This study will provide information on the overall costs, budget impact and time frame of financial spending that might result from digitizing a CRVS system. This information will provide critical detail to policymakers to build the case for investment in CRVS systems. If evidence of potential cost-savings is demonstrated policy makers will be able to examine the potential use of funds made available due to long term investment in CRVS systems. Regardless it will also result in the development of a costed proto-plan for the digitization of the CRVS system in any country or location that undertakes it.

1.1.1.4 Measuring increase in tax revenue as a consequence of functioning CRVS systems

Rationale
A functional CRVS system should enable a government to more effectively and efficiently derive tax revenue, especially income tax revenues. Demonstration of the association of improvements in CRVS systems with increases in tax revenue can serve to make the economic case for CRVS investment by demonstrating and quantifying potential offsets or economic gains arising from the investment.

Aim and objectives

The overall aim of this analysis will be to assess the estimates of the marginal effect of CRVS completeness on tax revenue adjusted for GDP.

- Tax revenue relative to national GDP
- CRVS completeness

This case study will answer the following research question:

- What is the marginal impact of CRVS completeness on tax revenue?
- What is the net marginal revenue expected from an investment in CRVS completeness?

Methods

A functional CRVS system should enable a government to more effectively and efficiently derive tax revenue, especially income tax revenues. This case study will utilize a multi-country panel dataset to estimate the marginal effect of improvements in CRVS completeness on tax revenue. Data from analysis one above on the marginal cost for increasing the completeness of CRVS systems could be united with the results of this analysis to estimate the net marginal gain in revenue from investing in CRVS completeness.

Outputs and interpretation of the results

The ultimate goal of these collective studies is to build an investment case for CRVS systems. In this regard, tax revenue increases are one potential benefit of improving the quality and completeness of CRVS systems. This case study/analysis will provide partial evidence on the potential monetary return for CRVS investment. Quantitative estimates of the return on investment could aid policy makers in their ability to make rational investment decisions as well as to build political will to increasing CRVS estimates.

1.1.1.5 Modelling the economic outcomes of CRVS systems

Rationale

The association between good CRVS system performance and health outcomes has been shown (20).The association between GDP and health has been demonstrated to exhibit bi-directional causality, meaning that increases in GDP are thought to lead to improvements in health (but conversely improvements in the health of populations can lead to improvements in GDP as well). While the relationships are complex and related it is plausible to envision that improvements in health derived from improvements in CRVS could themselves lead directly to improvements in economic outcomes. In addition previous case studies and analyses in this series will have quantified the economic impacts of CRVS improvements on Part of the underlying pathway from CRVS system improvements is believed to be mediated by improvements in economic development which can be measured through GDP growth.
The overall economic impact of CRVS system improvement provides the ultimate case for investment in such a system.

Aim and objectives

The overall aim of this analysis will be to analyse the economic impact of CRVS systems.
This case study will answer the following research questions:

- What is the magnitude of the macro-economic impact of CRVS improvement?
- It will look for associations of lagged changes in GDP to improvements in CRVS systems.

Methods:

The overall economic impact of CRVS system improvement provides the ultimate case for investment in such a system. In general, it is hypothesized that improved CRVS systems lead to increased GDP and provide overall returns as well through increased tax collection

efficiency. Providing general measurements of these phenomena would allow for the valuation of overall investment in such systems.
Where improvements in economic outcomes or other health outcomes can be shown to occur due to changes in CRVS systems it may be possible to examine the net return on the investments required to enact these improvements and to monetize these outcomes such that return on investment for improving CRVS can be calculated.

Interpretation of results
The estimates of the regression coefficient on CRVS completeness from this analysis can be considered a measure of the marginal impact of CRVS completeness on GDP growth. Positive coefficients indicate that CRVS investment would indicate that there is increased GDP growth with investment in CRVS completeness.

1.1.1.6 Modelling cost of CRVS to increasing completeness of CRVS systems

Rationale
Elucidation of the production function for CRVS completeness is critical for making informed investment in improving CRVS systems. Ensuring that CRVS systems are complete and accurate is absolutely necessary to ensure that the data and infrastructure for democracy and planning provided by the CRVS are of the highest possible value and that the decision support they provide is most accurate. This case study/analysis includes two separate approaches to identifying the production function for CRVS completeness by using model based approaches or statistical correlation approaches.

Aim and objectives
Estimate the cost of scale up process, modelling the scenarios for different investments and opportunity-cost for countries.
This case study will answer the following research questions:

- What is the shape and scale of the cost-completeness production function for a specific country CRVS?
- What is the marginal cost of improving the completeness of a given country CRVS system?

Outcome
Cost/investments required to increase the registration completeness of CRVS to X, Y and Z (probably combine with some of the macro studies on the economic benefit of CRVS)

Methods:
CRVS systems require investment to ensure that they are sufficiently complete to produce reliable statistics and guidance for countries which use them. It is anticipated that CRVS completeness generally increases with increasing investment though little is known about the shape of the production function for CRVS completeness, especially for specific locations. This case study will attempt to define and parameterize the production function for CRVS completeness in a specific country.
Two possible approaches might be taken for this case study, the first is a model-based approach in which costs and outputs (completeness or unit cost per participant or per capita) are used to model increasing levels of completeness. The second approach would be based on measurements of unit costs and completeness across various administrative units in a given country and a statistical model (curve fitting approach) is used to identify (a possibly covariate adjusted) relationship between completeness and resource inputs.

Interpretation of results

This case study and analysis will generate data necessary for policy makers to make informed judgements about investments in increasing the completeness of CRVS systems. Estimates of the marginal costs of improving the completeness of CRVS systems and or the unit costs of CRVS systems, which perform at specified levels of completeness, give the raw material necessary for calculations of the opportunity cost of achieving specific CRVS performance goals.

1.1.1.7 Ethical considerations

Although this research is not human subjects' research and thus does not usually require Research Ethics Committee Review, however a letter of non-human subjects research determination could be sought from the appropriate local or institutional human subjects research ethics board to document this fact.

1.1.1.8 Gender and Equity Issues

In each single case study care will be taken in the consideration of the data sources on CRVS and census systems as systems. Systems that produce inaccurate representations of less wealthy or rural areas may do so at a lower cost than required for complete unbiased systems. Additionally, care needs to be taken to ensure that CRVS systems that are used a basis for cost successfully capture outcomes along gender lines as well. If such systems fail to accurately capture events in an unbiased way the results of cost data collection could contain serious biases. Model based approaches to ensuring that both gender and equity biases are taking into account and CRVS approaches even when only secondary data is used. Fail to consider these types of bias will allow for the potential to misinterpret cost comparisons without consideration of incomparable gender and equity outcomes.

3.2.3. Stakeholder Consultation

In collaboration with the CoE for CRVS, SwissTPH presented the methodology to the global CRVS community in different meetings, conferences and brainstorming sessions (see figure 4)

Fig 4 Stakeholders Consultations

- In June 2019, the team was invited to participate in the Women Deliver 2019 Conference in Vancouver, Canada. The first outputs of the systematic review and the conceptualization

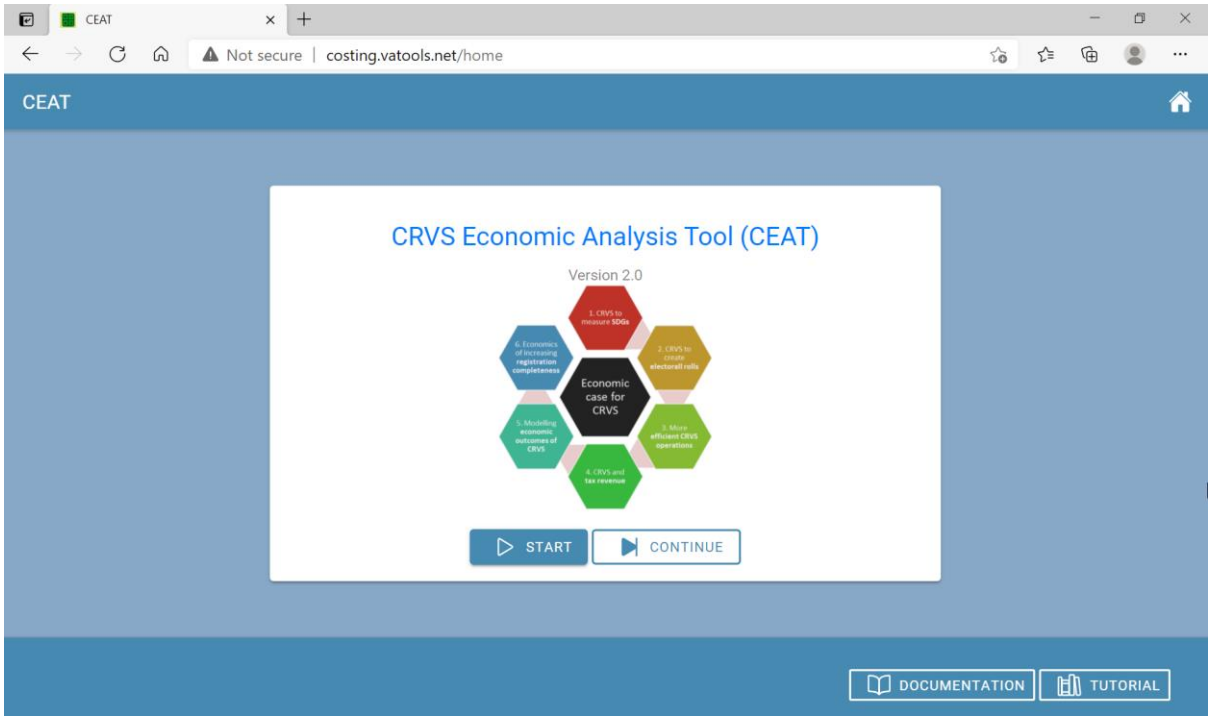
of the economic case for CRVS was discussed with a number of actors presenting in the conference;

- SwissTPH organised a number of **meetings and brainstorming sessions within SwissTPH** to bring together the different views and expertise in order to build the economic case. The inputs from these sessions supported the development of the diverse analyses aiming at making an economic case for CRVS.
- **Fifth Conference of African Ministers responsible for Civil Registration (COM5)** in October 2019, where we shared the preliminary results and ideas to country representatives and global CRVS stakeholders and advocates.
- During 2020, the project team at SwissTPH reached out to different international global experts, expert groups in the area of CRVS and stakeholders to share the methodology to every member of this community.
- The team participated at the preparatory sessions for the **Ministerial meeting of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP**) in October 2020. We aimed with these sessions to summarize the existing knowledge and experience about the cost and benefits of CRVS systems as a foundation to build an economic case for CRVS. We shared the "Methodological Framework to develop an economic case for CRVS" using case studies of the application in some LMICs. The session was planned to bring in perspectives from the private sector and academia, which have traditionally not been part of the global conversation on CRVS but who can help identify the economic benefits of well-functioning CRVS systems for several industries. A diversity of stakeholders from across key public, NGOs and philanthropic institutions were included, such as Global CRVS Group, UN ESCAP, the CRVS Centre of Excellence, UNICEF, and the Bloomberg Philanthropies Data for Health Initiative, among others.
- Due to COVID-19 pandemic, the **5th meeting of the Regional Steering Group for CRVS in Asia and the Pacific"** which was planned to take place in October 2020 was postponed to October 2021. In December 2020, we had different sessions with global stakeholder to prepare and define the new objective of the meeting. Also, we presented the results of the project "**Economics of CRVS systems – Building a case for stronger CRVS system".** So, the sessions focussed on the benefits of CRVS systems and how they can be valued.
- Besides, we facilitated the discussion within the CRVS global and regional community to build a strong economic case for CRVS aiming at attracting resources and attention, as well as the exploring these methodologies as a core component of the different stakeholders to strengthen CRVS system in countries.

3.3. Phase 3: Develop an economic case in a LMIC

3.3.1. CRVS Economic Analysis Tool (CEAT): Cost effectiveness analysis tool

The **CRVS Economic Analysis Tool (CEAT)** has been created with the aim to support countries implementing case study 1, 2 and 3 as described in the methodological framework. The tool is intended to support not only the data collection of empirical data on the cost of CRVS systems, the cost of household surveys or the cost of electoral roles. The CEAT tool also provides the analysis and provides the key figures to be used in decision making processes. The tool can currently be accessed at http://costing.vatools.net/home.


CEAT
Not secure | costing.vatools.net/home
CEAT
CRVS Economic Analysis Tool (CEAT)
Version 2.0
Economic case for CRVS
START
CONTINUE
DOCUMENTATION
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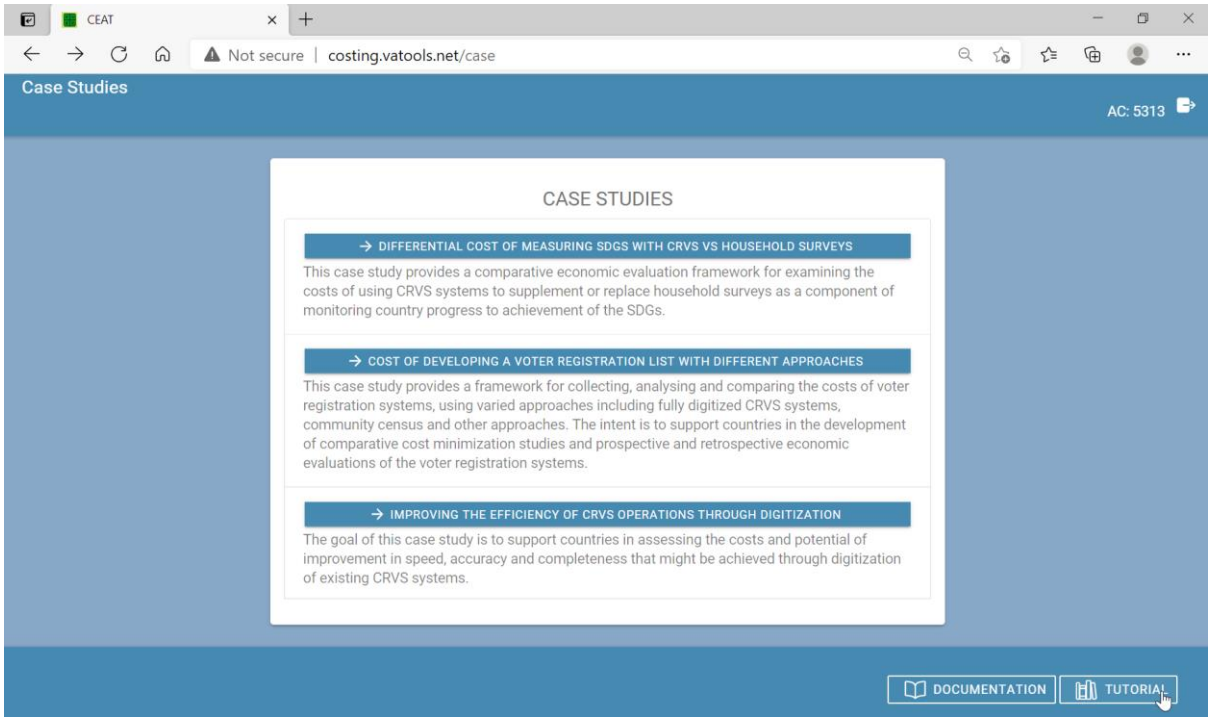
CEAT
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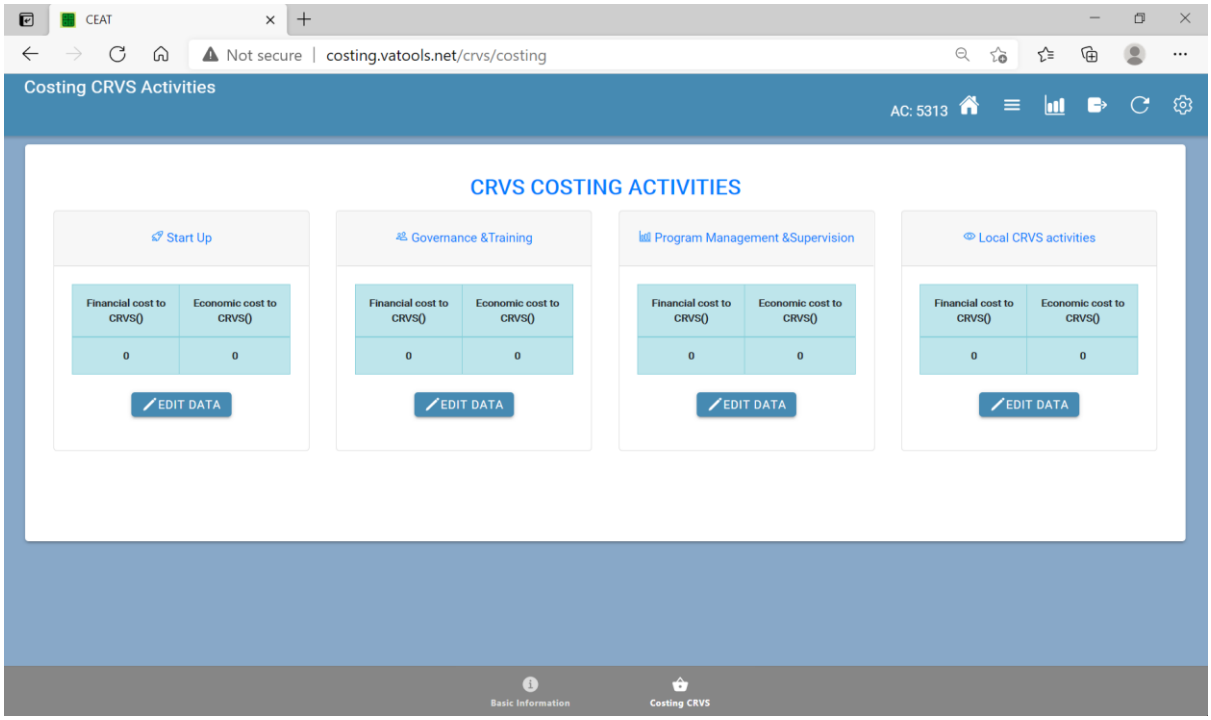
Case Studies
AC: 5313
CASE STUDIES
→ DIFFERENTIAL COST OF MEASURING SDGS WITH CRVS VS HOUSEHOLD SURVEYS
This case study provides a comparative economic evaluation framework for examining the costs of using CRVS systems to supplement or replace household surveys as a component of monitoring country progress to achievement of the SDGs.
→ COST OF DEVELOPING A VOTER REGISTRATION LIST WITH DIFFERENT APPROACHES
This case study provides a framework for collecting, analysing and comparing the costs of voter registration systems, using varied approaches including fully digitized CRVS systems, community census and other approaches. The intent is to support countries in the development of comparative cost minimization studies and prospective and retrospective economic evaluations of the voter registration systems.
→ IMPROVING THE EFFICIENCY OF CRVS OPERATIONS THROUGH DIGITIZATION
The goal of this case study is to support countries in assessing the costs and potential of improvement in speed, accuracy and completeness that might be achieved through digitization of existing CRVS systems.
DOCUMENTATION
TUTORIAL



3.3.2. Guidance Costing of CRVS for Economic Analysis

This is a document for countries with a step by step guide on how to cost CRVS systems and the considerations they need to have. This guidance document is consistent with the **CRVS Economic Analysis Tool (CEAT)** that we are also developing and will be web/based.

The guidance for costing of CRVS systems to build an economic analysis was developed by the team of the Swiss TPH, together with a health economic expert, to provide the CRVS community including governments, development agencies and other CRVS stakeholders with the methods to implement a costing of the CRVS system.

The overall objective of this document is to provide the CRVS community including governments, development agencies and other CRVS stakeholders with the methods to implement a costing of the CRVS system.
There are two specific objectives for the costing of CRVS systems:

1. To estimate the resources needed to run the core CRVS processes for different vital events;
2. To identify the major cost drivers of running CRVS system and sources of inefficiencies.

The guidance document guides the user to do a step by step costing of CRVS systems. This document is attached to this final report, together with the CEAT. The overall methodology is explained in detailed, including the glossary of terms to understand the major concepts. As well as the process on how to do a costing, which information is needed to be gathered before, during and after the costing is done. The analysis takes a system lens, therefore calculating the costs from a provider perspective, but not assessing the additional individual costs for communities and individuals. A combination of top-down and ingredient-based methodologies is used to estimate the total cost of CRVS systems. The top-down costing approach involves allocating overhead and shared costs of the system to CRVS operations, where applicable, using appropriate allocation rules (21). The ingredient-based costing approach is used to estimate the total costs for all CRVS activities by listing all the possible inputs, measuring

quantities and valuing all inputs required for a functioning CRVS system (16). CRVS process maps of each vital event are used to define the scope and boundaries of the costing study.

Further references are included on how to conduct a stakeholder mapping and process mapping. The method to collect the costing data are explained in detailed, having the necessary examples on how to proceed.

The main outputs of the costing study will be the information on the overall costs, budget impact and time frame of financial spending of CRVS systems and the potential changes over time. This information will provide you with critical detail to build the case for investment in CRVS systems.

We included further information on how to interpret and use the CRVS costing data as it is a crucial step to build your economic argument to invest in CRVS systems.

3.3.3. Case Study in Country. Differential cost of measuring SDGs with CRVS vs Household Surveys in Ghana

The case study 1: Differential Cost of Measuring SDGs with CRVS vs Household Surveys has been piloted in Ghana as part of the Economic Case for CRVS.
The selection of the country depended significantly on the availability of data. We attached the full report of this case study to this final technical report.
Rationale

The National Statistical System in Ghana (NSS) is responsible for compiling, producing and disseminating the different statistics from the government. Ghana currently produces data on 62 SDG indicators, of which thirty three percent of these come from censuses and surveys, fifty seven percent come from administrative data sources and the remaining ten percent come from a combination of these data sources (22). Censuses and household surveys provide nationally (or sub nationally in some instances) estimates of indicators that are currently not captured by other routine systems. Those data sources have provided Ghana with a wealth of information to include in their decision-making processes over the last decades (23-25). However, household surveys face some challenges including: - high costs, limited coverage, quality and timeliness of the data. The timely and relevant estimates' barriers add up to the lack of disaggregated data. Nevertheless, censuses and surveys will remain central to SDG indicator data production and act as sources of validation for other data sources (22).

Finding the right balance among the different data systems to monitor SDGs remains a challenge for most LMICs, including Ghana. The global CRVS community advocates for using CRVS systems as the source of a number of SDG indicators currently measured using household surveys. Given the logistic and financial burden of household surveys, the global CRVS community is advocating for reducing or eliminating them and transition to CRVS based monitoring (2). However, CRVS system in Ghana will need to be strengthened to provide accurate statistics covering most of the population (22).

Aim and objectives
The overall aim of this case study is to support evidenced-based decision making for countries looking to monitor progress towards the SDG goals by providing basic data on the cost of CRVS systems as well as review literature on the cost of other mechanisms such as household surveys to estimate the SDG indicators. This data can inform policy decisions about investment in CRVS systems and household surveys by providing the basis for predictions and models of the cost of implementation of CRVS systems under varied implementation approaches as well as to compare models of CRVS cost to alternative approaches to SDG monitoring and evaluation.
This case study answered the following questions:

- Which SDG indicators can be produced using CRVS systems and which must be produced via other methods such as household surveys?

- Is it cost-saving to implement a functional CRVS system as compared to routine household surveys to measure these indicators?
- What is the unit cost per participant, cost per capita, and cost per indicator of the system?

Outcome

Cost comparison of different methods, such as CRVS system, household surveys and census to measure SDGs.

Data sources in Ghana

The various data sources are categorized into two groups: First, the primary sources of data, which are the results of those censuses and household surveys in the country. Secondly, the secondary sources of data, which are the ones collected primarily collected with other purposes, such as administrative data, such as CRVS system.

Outputs

Data on cost were combined with measures of system outputs to present cost per year, the unit cost per person-years, and cost per SDGs indicator per year. Table 1 presents some of the information that has been used to calculate the outcome of interest. For example, to calculate cost per year for the population census, we assumed the census statistics are valid for 10 years (taking consideration of the time for planning, data collection, analysis, and dissemination of the official country statistics) before undertaking another census. To calculate the unit cost per person-years, we had to compute total person-years (2021-2030 inclusive) for Ghana using mid-year population and 2.15 percent population growth rate. Thereafter dividing total cost for undertaking national population census by the total person-years (2021-2030 inclusive). To obtain the costs per indicator per year, we divided the cost per year for the national census by the number of indicators captured within the census.

Results

In the report of this case study, we presented the information on the financial cost for setting up and running the CRVS over 10 years. The national population census is conducted after every 10 years and requires an average of 5 years plans. The report as well presents information on the costs for conducting the different household surveys

Comparing CRVS cost per year (US$352,106) are lower than the costs per year for the national population census (US$9,268,839), the Demographic and Health Survey costs per year (US$697,259), Malaria Indicator Survey costs per year (US$828,473) and Living Standard Survey per year (US$610,318). The main cost driver for the CRVS is the personnel cost (> 70 percent), while actual field work and training is the main cost drivers for the national population census and household surveys (> 30 percent). CRVS has the lowest unit cost per person year (US$0.010) compared to National Population Census (US$0.265). CRVS unit cost per person year is approximately equal to the other household surveys such as Malaria indicator survey (US$0.007), multiple cluster indicator survey (US$0.005) and Demographic and health survey (US$0.010). CRVS can complement the national population census, as it can produce most of the indicators produced by the national population census, with a minimal costs per indicator per year (US$5,679.14). National population census turns out to have highest net present value (US$164,164,441), followed by the CRVS (US$20,359,482) while the multiple cluster indicator survey has the lowest NPV (1,748,940).
The study provides useful cost information for setting-up and implementing CRVS, national population census and different household surveys in Ghana

3.4. Phase 4. Dissemination of Results

Finally, a series of paper were developed to describe the methodology for the economic case for CRVS, including the results of the case study (see in project output and dissemination description).

4. PROJEC PROJECT OUTPUTS AND DISSEMINATION

We developed a number of deliverables at the end of the Economic case for CRVS project:

- Report publication with the results of the systematic review. This report is part of the "CRVS Working Paper series" of the CoE for CRVS at the IDRC.
- Peer review publication with the results of the systematic review: "Addressing the evidence gap in the economic and social benefits of CVRS Systems: A Systematic Review". The final manuscript is submitted to the peer reviewed journal "Population and Health Metrics".
- Brief article on the benefits of marriage registration and certificate: "The importance of marriage registration and certification".
- A framework to build an economic case for CRVS with methodological notes and tools: The "Methodological Framework for the economic analysis of CRVS systems", which synthesizes the evidence and highlights six compelling new case studies.
- Case study 1: Differential cost of measuring SDGs with CRVS vs household surveys.
- Case study 2: Cost of developing a voter registration list with different approaches.
- Case study 3: Improving the efficiency of CRVS operations through digitization.
- Case study 4: Measuring increase in tax revenue as a consequence of functioning CRVS systems.
- Case study 5: Modelling the economic outcomes of CRVS systems.
- Case study 6: Modelling cost of CRVS to increasing completeness of CRVS systems.
- Model to project the cost of CRVS systems and to model different scenarios using empirical data: A web/based tool "CRVS Economic Analysis Tool", which includes a costing module that countries can use to estimate the cost of their CRVS system.
- A guidance document to estimate the cost of CRVS systems in countries, "Guidance costing of CRVS for Economic Analysis". This guidance document is consistent with the CRVS Economic Analysis Tool.
- Implementation of a case study described above and published their results. "Case Study 1: Differential Cost of Measuring SDGS with CRVS vs Household Surveys in Ghana."

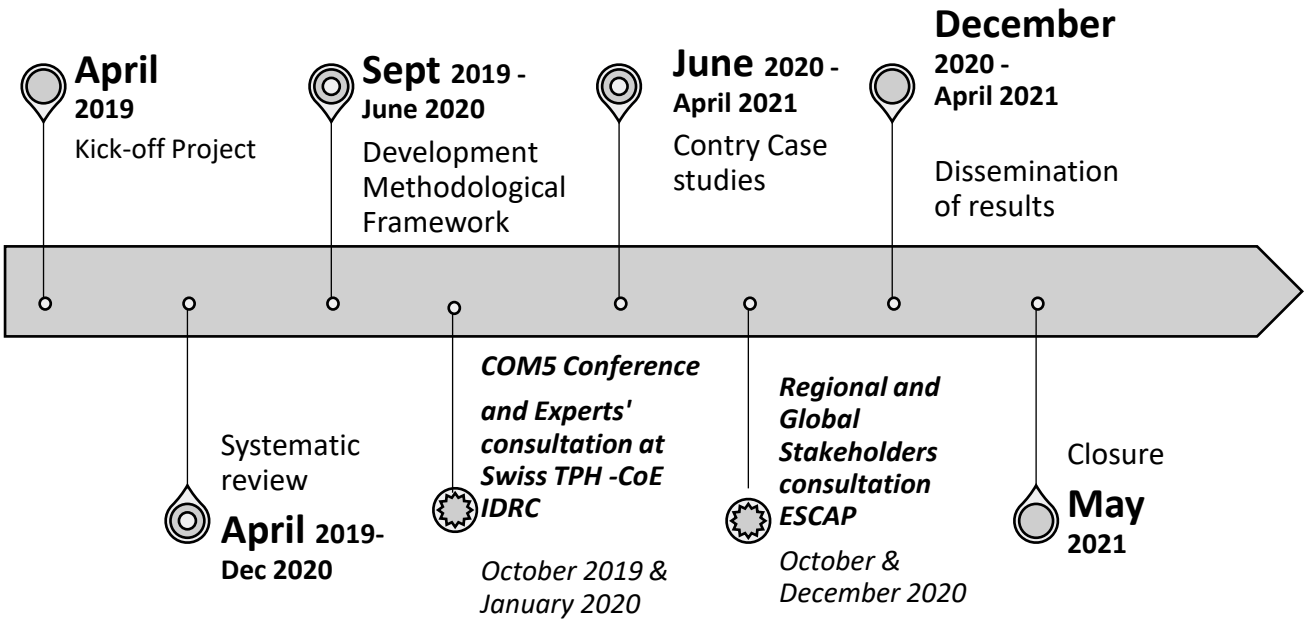
Fig 5 Project Outputs

Systematic Review: report and peer reviewed publication	Marriage registration Brief	Methodological Framework for the economic analysis of CRVS systems	Case Study 1: Differential cost of measuring SDGs with CRVS vs household surveys
Case Study 2: Cost of developing a voter registration list with different approaches	Case Study 3: Improving the efficiency of CRVS operations through digitization	Case Study 4: Measuring increase in tax revenue as a consequence of functioning CRVS systems	Case Study 5: Modelling the economic outcomes of CRVS systems
Case Study 6: Modelling cost of CRVS to increasing completeness of CRVS systems	CRVS Economic Analysis Tool	Guidance costing of CRVS for Economic Analysis	Economic Case in LMIC: Differential Cost of Measuring SDGS with CRVS vs Household Surveys in Ghana.

5. PROJECT IMPLEMENTATION AND MANAGEMENT

The activities described in the present final technical report refer to the entire project period, which lasts from the 1st of April 2019 to the 1st of May 2021.

Fig 6. Timeline of main project's activities



The project have been progressed towards the accomplishment of the four core phases. Each phase included a block of activities:

Phase 1. Review of existing evidence related to the economic case for CRVS and general methodology on investment cases, through the completion of a systematic review of the benefits of CRVS system and an additional paper on the importance of marriage registration and certification.

Phase 2. Development of the methodological framework to build an economic cases for CRVS and review of the methodology through a stakeholders consultation.

Phase 3. Develop an economic case for CRVS and conduct two case studies in LMICs, and

Phase 4. Dissemination of the results.

Phase 1. Review of existing evidence related to the economic case for CRVS and general methodology on investment cases

As described in the Synthesis of

Progress towards milestones

This final technical report refers to the entire project period, which lasts from April 2019 to 1 of May 2021. The following milestones have been achieved as detailed in Table 1

Table 1. Milestones' Progress

Milestones	Name	Progress Description
Milestone 1.1.	Commencement	The project commencement date was on the 1st of April 2019
Milestone 1.2.	Initial Payment	The initial payment was received by the Swiss TPH in the 2019.
Milestone 1.3.	First technical report	A first technical progress report was submitted on April 2020, 12 months after the start of the project. It contained a comprehensive summary of the work done until that date, as required by IDRC. It was successfully approved.
Milestone 1.4.	Payment by the IDRC	The payment was received one month after the satisfactory progress reports.
Milestone 1.5.	Second technical and financial report	A second technical and financial progress report was submitted on September 2020, covering the period April to September 2020.
	Non Cost extension	A non-cost extension was requested and granted in September 2020. An amendment (No.1) to the grant agreement was signed on the 27th of October. The estimated time for completion of the work is the 25 months. Revised work completion date of the project is thus 1 May 2021 and revised contract completion is 31 July 2021.
Milestone 1.6.	Final technical report	The present final technical report contains comprehensive information detailing the work accomplished and challenges encountered during de implementation of the project.
Milestone 1.7.	Final financial report	A final financial report covering all funds expended on the project is submitted to IDRC in 30th April 2021
Milestones 1.8.	Final payment	Pending

section, we completed the final draft of the systematic review's manuscript "**Addressing the evidence gap in the economic and social benefits of CVRS Systems: A Systematic Review"**. It was sent to be peer reviewed and inputs from the different groups (e.g. the CoE for CRVS_IDRC) were included. The final manuscript is submitted to the peer reviewed journal "Population and Health Metrics" for publication. **A report of the systematic review findings** was submitted to IDRC to be issued as part of the "CRVS Working Paper series". Moreover, both documents were sent together with the second interim report.

As described previously, the systematic review has been an extensive part of this project, requiring the involvement of 2 reviewers (Rebeca Revenga [RR] and Carment Sant [CS]) and substantial time to design it and monitor the progress (done by Daniel Cobos [DC]). We also engaged with a professional search strategist to assure the quality of the search strategy for the systematic review.

Although we used machine learning methods to reduce the burden in the screening, it still required a higher than expected person-time. The scarcity of evidence required a more sensitive (and less specific) and broader search strategy, which needed to be done several

times in the different research libraries. As a consequence, the number of studies to screen was extremely high. The methodology for the systematic review was described above.

In addition, the team developed a brief to support the advocacy efforts to strengthen the marriage registration and certification considering the potential benefits for women, girls and LGBTQI community. We reviewed the international legal framework for marriage registration and the evidence showing the benefits of having a marriage registration and certification: **"The importance of marriage registration and certification"** brief.

Phase 2. Development of the methodological framework to build an economic cases for CRVS and review of the methodology through a stakeholders consultation.

During the process of developing the methodology for an economic case for CRVS, we have encountered some challenges described in the previous interim reports. The lack of strong evidence on the economic benefits of functioning CRVS systems, upon which building the case, has been one of the main obstacles in the progress towards this goal. In addition, the complexity of CRVS systems with multiple stakeholders involved usually scatter in different location increased the difficulties of developing the methodology.

Nevertheless, after a number of workshops, brainstorming sessions and meetings which were held to combine the various expertise of SwissTPH in the first phase of the project, the team developed the methodological framework for the economic analysis for CRVS. It consisted in diverse analyses aiming at making an economic case for investments or improving their efficiency of CRVS. Six case studies were developed to build up an economic case for CRVS, described with detailed in the methodological framework document (see Figure 2).

As a consequence of the difficulties encountered to identify the methodology, this phase required a significant increase in the person time dedicated by the team at SwisTPH exceeding the planned staff time allocations. It also required hiring 2 expert economists to support the definition and documentation of the methods.

We would like to highlight the participation of the project team in the **Fifth Conference of African Ministers responsible for Civil Registration (COM5)** in October 2019, where we shared the preliminary results and ideas to country representatives and global CRVS stakeholders and advocates.

During 2020, the project team at SwissTPH reached out to different international global experts, expert groups in the area of CRVS and stakeholders to share the methodology to every member of this community (UNSD, World Bank, Global Civil Registration and Vital Statistics Group, Bloomberg Data for Health Initiative, UNECA, ESCAP and national CRVS stakeholders)

Furthermore, the team participated in the preparatory sessions for the M**inisterial meeting of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP**) in October 2020. We aimed with these sessions to summarize the existing knowledge and experience about the cost and benefits of CRVS systems as a foundation to build an economic case for CRVS. We shared the "Methodological Framework to develop an economic case for CRVS" using case studies of the application in some LMICs. The session was planned to bring in perspectives from the private sector and academia, which have traditionally not been part of the global conversation on CRVS but who can help identify the economic benefits of well-functioning CRVS systems for several industries. A diversity of stakeholders from across key public, NGOs and philanthropic institutions were included, such as Global CRVS Group, UN ESCAP, the CRVS Centre of Excellence, UNICEF, and the Bloomberg Philanthropies Data for Health Initiative, among others.

Due to COVID-19 pandemic, the **5th meeting of the Regional Steering Group for CRVS in Asia and the Pacific"** which was planned to take place in October 2020 was postponed to

October 2021. In December 2020, we had different sessions with global stakeholder to prepare and define the new objective of the meeting. Also, we presented the results of the project "**Economics of CRVS systems – Building a case for stronger CRVS system".** So, the sessions focussed on the benefits of CRVS systems and how they can be valued.
Besides, we facilitated the discussion within the CRVS global and regional community to build a strong economic case for CRVS aiming at attracting resources and attention, as well as the exploring these methodologies as a core component of the different stakeholders to strengthen CRVS system in countries.

Phase 3. Develop an economic case for CRVS and conduct two case studies in a LMIC

In collaboration with a Tanzanian not for profit organization SwissTPH developed the **CRVS Economic Analysis Tool (CEAT) tool.** It included a costing module that countries can use to estimate the cost of their CRVS system. This tool builds on the work done previously (11) and expands to conduct a full economic analysis of CRVS systems.

Furthermore, we created a guidance document consistent with the CRVS Economic Analysis Tool (CEAT). **The guidance costing of CRVS for economic analysis** was developed to provide the CRVS community including governments, development agencies and other CRVS stakeholders with the methods to implement a costing of the CRVS system.

The COVID19 pandemic compromised significantly the timeline of the project because the data collection was about to start in Tanzania and Ghana when the COVID19 pandemic started in March 2020. As presented in the last interim report, we had started the planning and first steps to start the implementation of a case study in Tanzania and a second country. The case study selected was: Differential Cost of Measuring SDGs with CRVS vs Household Surveys.

The team managed to conduct the case study in Ghana remotely adapting some of the information already gathered from Tanzania. The project team supported by two health economists (August Kuwawenaruwa and Johua Yukich) started the data collection for the case study. As described previously, case study required considerable time to design and conduct the case study and monitor the progress (done by Daniel Cobos).

In the case of Tanzania, the lockdown and major restrictions to movement exacerbated the challenges to conduct the case studies in-country. We encountered several barriers to get the approval and /or to conduct the data collection, and unfortunately, the limitations prevent us to access the local governmental institutions.

From June to September 2020, we had several meetings with local stakeholders and government institutions in Tanzania. The process of approval and endorsements involved the participation of different local stakeholders, UNICEF Tanzania, the CoE for CRVS, the national CRVS stakeholders and RITA, which is the responsible for the registration and management of information on key life events.

Furthermore, the team developed and submitted an implementation protocol "Cost minimization of measuring SDGs or developing national ID/electoral rolls from a functioning CRVS system vs other methods (e.g. household surveys)" to implement the first case study of the economic case for CRVS in a LMIC. We adapted the case study's protocol to the country specificities. COVID-19 pandemic exacerbated the constrains in the process.

By November 2020, almost a year into the COVID-19 pandemic, Tanzania had national level elections. The preparatory election events started in September 2020, increasing the barriers to access any public stakeholder and government institutions. With the death of Tanzania's president John Magufuli in March 2021 and the increase number of COVID-19 cases, it was difficult to persuade further development. Finally, the approval to start the data collection was postponed indefinitely in Tanzania.

Phase 4. Dissemination of results

We have developed a series of papers to describe the methodology for the economic case for CRVS, including the results of the case study (see in project output and dissemination description).

6. ADMINISTRATIVE REFLECTIONS AND RECOMMENDATIONS

During the project design, implementation, monitoring and evaluation, we have counted with the support of the CoE for CRVS' program officer in every step of the way. We must highlight the technical expertise provided by the COE team was really useful. In addition, the flexibility and understanding to extend the project deadline was key to complete the assignment.

Regarding the support through the development and dissemination phase,

- Together with CoE, we managed to reach a very broad range of stakeholders at local regional and global level. So, giving stakeholders access to the research results and methodological framework before its official release was a very valuable approach. We integrated the feedback in each of the documents submitted.
- The project took place during a period of profound change and challenges worldwide. The support provided by the CoE administrative and technical team helped us to achieve the final outcomes. This report describes how SwissTPH together with CoE responded to these changes and overcoming the difficulties.
- Further feedback has been provided to the program officer in several meetings and discussion, as well as in every interim report.

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