

Institution: University of Edinburgh		
Unit of Assessment: 1		
Title of case study: F: Implementation of EQUIST, a framework to guide effective and equitable investment in health interventions, to reduce maternal and child mortality and morbidity in low-and-middle-income countries		
Period when the underpinning research was undertaken: 2011 – 2013		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Igor Rudan	Chair of International Health and Molecular Medicine	2001 – present
Harry Campbell	Chair of Genetic Epidemiology and Public Health	1995 – present
Evropi Theodoratou	Chair of Cancer Epidemiology and Global Health	2007 – present
Period when the claimed impact occurred: 2016 – 2020		
Is this case study continued from a case study submitted in 2014? N		
1. Summary of the impact		
<p>Underpinning Research: University of Edinburgh (UoE) researchers developed a novel conceptual framework — the EQUitable Impact Sensitive Tool (EQUIST) — that identifies cost-effective interventions for maternal, neonatal and child health (MNCH) and targets the most effective and equity-focused strategies to fast-track the reduction of maternal and child mortality in low-and-middle-income countries.</p>		
<p>Significance and Reach of Impact: At least 10 countries have, on the strong recommendation of the funders, used EQUIST to develop their investment cases required to release funding from the Global Financing Facility for MNCH programmes. In 2017, these investment cases leveraged a combined USD382,000,000 (GBP278,952,000; 01-21) and a further USD290,000,000 (GBP211,793,000; 01-21) as World Bank loans. This funding has resulted in improved health outcomes, including:</p> <ul style="list-style-type: none"> • The under-5 mortality rate in Cameroon falling from 103 to 79 per 1,000 live births between 2018 and 2019; • An additional 3,600,000 children receiving a basic nutrition package in Mozambique in 2019 as compared with 2017; • 10,000 additional women receiving antenatal care, 50,000 additional women having assisted deliveries and 60,000 additional women seeking postnatal care in DR Congo in 2019 as compared with 2017. 		
<p>EQUIST has also been used to directly influence national health policies: The United Nations Children’s Fund used it to develop prioritised plans in 11 countries in Eastern and Southern Africa, and 15 further African countries used EQUIST analyses to leverage resources towards health and nutrition programmes. In Angola alone, this contributed to a USD400,000,000 (GBP292,096,000; 01-21) increase in the health and education budget.</p>		
2. Underpinning research		
<p>The Challenge: Cost-effective and equitable resource allocation for maternal and child health interventions</p> <p>Maternal, neonatal and infant mortality rates remain unacceptably high in many low-and-middle-income countries (LMICs), despite global efforts to reduce them. A major challenge for the United Nations Children’s Fund (UNICEF) is to plan and deliver maternal and child health interventions that are both cost-effective and equitable. Equity, i.e. distributing resources based on the needs of the recipients, is a key concept in reducing health inequalities: while interventions are more complicated and costly to deliver to poor rural communities, health needs (and therefore potential impact of the intervention) in these communities are typically greater and thus a given level of intervention will make a more marked difference. UoE researchers have developed and validated</p>		

a tool to model this complex balance of health need (ie potential impact), feasibility and cost of delivery (efficiency) and clinical effectiveness to identify the most cost-effective *and* equitable strategies to reduce maternal and child mortality.

UoE research identifies inequity as a major challenge to improve global child health

In 2011, Rudan and Campbell produced a *Lancet* series on childhood pneumonia and diarrhoea together with researchers from UNICEF, the World Health Organization (WHO), Johns Hopkins University and London School of Hygiene and Tropical Medicine. This work identified key interventions that are cost-effective against pneumonia [3.1–3.3], but it also particularly highlighted key barriers to the reduction of inequities in access to health services between the most deprived and wealthier groups in society [3.2]. As a result of this insight, UNICEF initiated a call for proposals for advanced methodologies to estimate the effects of equity-focused approaches to improve child health. This competitive USD60,000 (GBP43,833; 01-21) funding was won by Rudan's proposal entitled "*Developing a user-friendly Excel-based program to model the complex interplay between the cost of intervention scale-up, the targeted population by equity strata, and the burden of disease averted.*"

Development and principles of the EQUitable Impact Sensitive Tool (EQUIST)

In March–May 2012, Rudan and Campbell, together with the Chief of Health at UNICEF at the time, developed and published the conceptual framework EQUIST [3.4]. EQUIST models the complex interplay between 3 key determinants of a health intervention discussed above: efficiency, clinical effectiveness and impact. These determinants predict the cost-effectiveness of an intervention across different socio-economic strata in the population, and thus allow EQUIST to identify key bottlenecks that constrain the coverage of interventions, and to target the most cost-effective and equity-focused strategies that can address them. In this way, EQUIST provides critical data for national and international policymakers for planning equitable and cost-effective interventions to reduce maternal and child mortality, particularly among more deprived populations.

Validation of the EQUIST tool

The UoE researchers, together with the UNICEF Chief of Health, validated EQUIST by applying it simultaneously in 5 exemplar countries representative of larger WHO regions: Nigeria, Egypt, Bangladesh, Cambodia and Peru. To allow the closest possible scrutiny, the modelling exercise focused on a single disease (pneumonia) and a single intervention (integrated community case management). The modelling showed that planning based on EQUIST would be more cost-effective while leading to greater impact via benefitting more of the populations most in need [3.5].

This research clearly demonstrated that the 'mainstream' approach of targeting easier-to-reach parts of society were never the most cost-effective methods for achieving impact. For example, in Peru, a USD1,000,000 (GBP730,453; 01-21) investment would lead to 5,209 lives saved using a 'mainstream' model targeting the wealthiest quintile of society, while the same investment would save 7,191 lives using an equity-promoting model targeted at the poorest quintile [3.5].

3. References to the research

[3.1] Walker CLF*, Rudan I*, Liu L, Nair H, Theodoratou E, Bhutta ZA, O'Brien KL, Campbell H, Black RE. Global burden of childhood pneumonia and diarrhoea. *Lancet*. 2013; 381:1405-16. doi: [10.1016/S0140-6736\(13\)60222-6](https://doi.org/10.1016/S0140-6736(13)60222-6)

[3.2] Bhutta ZA, Das JK, Walker N, Rizvi A, Campbell H, Rudan I, Black RE; Lancet Diarrhoea and Pneumonia Interventions Study Group. Interventions to address deaths from childhood pneumonia and diarrhoea equitably: what works and at what cost? *Lancet*. 2013; 381:1417-29. doi: [10.1016/S0140-6736\(13\)60648-0](https://doi.org/10.1016/S0140-6736(13)60648-0)

[3.3] Hazir T, Begum K, [...], Rudan I, Bryce J, Qazi SA, Campbell H. Measuring coverage in MNCH: a prospective validation study in Pakistan and Bangladesh on measuring correct treatment of childhood pneumonia. *PLoS Med*. 2013; 10:e1001422. doi: [10.1371/journal.pmed.1001422](https://doi.org/10.1371/journal.pmed.1001422)

[3.4] Chopra M, Campbell H, Rudan I Understanding the determinants of the complex interplay between cost-effectiveness and equitable impact in maternal and child mortality reduction. *J Glob Health* 2012; 2:010406 [doi: 10.7189/jogh.02.010406](https://doi.org/10.7189/jogh.02.010406)

[3.5] Waters D, Theodoratou E, Campbell H, Rudan I, Chopra M. Optimizing community case management strategies to achieve equitable reduction of childhood pneumonia mortality: An application of Equitable Impact Sensitive Tool (EQUIST) in five low- and middle-income countries. *J Glob Health* 2012; 2:020402 [doi: 10.7189/jogh.02.020402](https://doi.org/10.7189/jogh.02.020402)

4. Details of the impact

Impact on UNICEF training policy

In 2012–2013, UNICEF expanded the EQUIST model into a user-friendly global data science platform and subsequently launched training in EQUIST use in Cameroon, Haiti, Kenya, DR Congo, Senegal, Mozambique (2016); Guinea-Bissau, Bangladesh, Sudan, Djibouti, Uganda, Lebanon, Malawi, Myanmar (2017); and Ghana, Côte d'Ivoire, Chad and Ethiopia (2018) [5.1a]. Furthermore, UNICEF held workshops to instruct EQUIST trainers in Budapest (2017) and in New Delhi (2019) [5.1a]. The Fourth Global Symposium on Health Systems Research in Vancouver in 2016 [5.1b]) and Institutionalizing Community Health Conference Johannesburg in 2017 [5.1c]) included sessions where researchers, government officials and international development professionals were trained to use EQUIST.

This educational activity around EQUIST has served to institutionalise — among decision-makers in LMICs — a focus on equity in the planning, prioritisation and resource allocation for MNCH interventions. This was demonstrated in 2017 through a UNICEF assessment, which received responses from 124 individuals representing UNICEF, the United Nations (UN) Populations Fund, United States Agency for International Development, WHO, Ministries of Health and academia from 35 countries. Some 97% of respondents agreed that EQUIST had strengthened decision-makers' focus on the most marginalised by providing evidence-based data. A health officer at a development and aid agency stated: *"In reality, the poor and the hard-to-reach populations are forgotten and the EQUIST tool will enable to put the focus on those populations and to have a real impact in the planning."* [5.2].

Impact on funding release from Global Financing Facility

The most direct impact of EQUIST on reducing maternal and child mortality is achieved through its use to leverage funding from the Global Financial Facility (GFF). Launched in 2015 by the UN, World Bank and key partners, the GFF is a key financing platform in support of the UN's Global Strategy for Women's, Children's and Adolescents' Health as well as the Sustainable Development Goals [5.3].

To receive funding from the GFF, each applicant country must develop its own national, prioritised plan to improve health outcomes for women, children and adolescents, known as an "Investment Case" (IC), detailing the planned health financing reforms and health system strengthening interventions, as well as the projected impact on health outcomes. EQUIST is key to preparing an IC: Chief of Health at UNICEF at the time stated: *"The GFF and the agencies that launched it now broadly consider EQUIST as the most useful and comprehensive tool that is available to recipient countries to generate successful investment case studies. [...] Therefore, potential applicant countries are now advised – and their representatives trained at high-level workshops - to use EQUIST in order to maximise their chances of being awarded funding."* [5.4a].

Similarly, an official at UNICEF's Health Systems Strengthening Unit notes: *"All parties including UNICEF, World Bank and GFF are encouraging national authorities to use EQUIST for developing their prioritised plans for Investment Cases in support of their financing their [MNCH] portfolios."* [5.4b]. Indeed, countries that followed this advice were more likely to be successful: the African Institute for Health Policy and Health Systems notes that *"investment case studies that were based on EQUIST have so far had a greater success in obtaining GFF funding than if they were not based on EQUIST."* [5.4c].

To enable countries to make use of EQUIST in developing their ICs, UNICEF organised intensive capacity-building workshops between 2016 and 2018 in Cameroon, Haiti, Kenya, DR Congo, Senegal, Mozambique, Guinea-Bissau, Bangladesh, Sudan, Djibouti, Uganda, Lebanon, Malawi, Myanmar, Ghana and Côte d'Ivoire [5.4a].

The earliest examples of ICs based on EQUIST came from Cameroon, Mozambique and DR Congo [5.4a], followed by Burkina Faso, Côte d'Ivoire and Senegal, all in 2017.

- **Cameroon:** EQUIST was used as the main tool to design the IC. It identified that interventions targeting premature births would save the most lives, and focus should be on 4 target regions. The IC outlined a health financing strategy that allocated resources based on results, focusing on high-burden regions and ensuring that resources reached primary and secondary healthcare facilities [5.5a; 5.6a]. Cameroon received USD127,000,000 (GBP92,762,231; 01-21) from GFF in 2017 [5.4a].
- **Mozambique:** The IC proposed a national scale-up of a school health programme to improve sexual and reproductive health and rights of adolescent girls. The IC states that "*the EQUIST tool was used to obtain estimates of the potential impact of the interventions listed.*" [5.5b] Mozambique received USD175,000,000 (GBP127,841,455; 01-21) from GFF in 2017 [5.4a].
- **DR Congo:** The IC prioritised key health system and financing reforms to accelerate health and nutrition progress across all the country's provinces. The IC was compiled as a collaborative effort: the Ministry of Health defined MNCH priorities, UNICEF conducted a health system bottleneck analysis using EQUIST, and the GFF helped to pool funds from its own and its partners' budgets [5.5c]. DR Congo received USD40,000,000 (GBP29,225; 01-2021) from GFF in 2017 [5.4a].

Furthermore, in 2017, following submission of ICs explicitly based on EQUIST [5.5d–f], Burkina Faso received USD20,000,000 (GBP14,608,000; 01-21) from GFF and a further USD80,000,000 (GBP58,431,000; 01-21) as a World Bank loan; Senegal received GFF support as well as USD10,000,000 (GBP7,292,000; 01-21) from the World Bank; and Côte d'Ivoire received USD20,000,000 (GBP14,608,000; 01-21) from GFF and a further USD200,000,000 (GBP146,097,000; 01-21) as a World Bank loan [5.4a]. Numerous countries have followed the example of these frontrunners and submitted ICs based on EQUIST, including Mali, Pakistan, Zambia and Mauritania [all 5.4b].

Impact of GFF funding on healthcare delivery and maternal and child health

The GFF rigorously monitors and reports on the impact of the funding leveraged by ICs in the recipient countries. The impacts are most pronounced in Cameroon, Mozambique and DR Congo, which were the first countries to submit ICs based on EQUIST. The GFF annual reports 2017–18 [5.6a] and 2018–19 [5.6b] show that:

- In **Cameroon**, the share of the health budget going to primary and secondary care increased from 8% in 2017 to 21% in 2019. This, coupled with downstream system-strengthening strategies targeted to high-burden regions, resulted in the under-5 mortality rate falling from 103 per 1,000 live births to 79, and the prevalence of stunting among children under 5 falling from 32% in 2018 to 28.9% in 2019 [5.6a,b].
- In **Mozambique**, the government increased the ratio of health spending to total domestic expenditure, which in the first year of implementation resulted in increases in the number, reach and capacity of community health workers. These systemic shifts are already improving health outcomes: for example, in 42 prioritised districts, the percentage of births taking place in a healthcare facility jumped from 66% in 2017 to 80% by December 2018. In addition, Nutrition Intervention Packages were rolled out in the 8 highest-burden regions and provided 3,600,000 additional children with basic nutrition services [5.6b].
- In **DR Congo**, the share of the national budget allocated to health rose from 7% in 2016 to 8.5% in 2018. This system-strengthening investment has led to increased access to, and consequently utilisation of, key services: between January 2017 and December 2018, 10,000 additional women received antenatal care, 50,000 additional women had assisted deliveries and 60,000 additional women sought postnatal care [5.6b].

In Côte d'Ivoire, the National Coordinator of the Reproductive Health Research Unit confirmed that use of EQUIST *"has improved planning on the choice of strategies and interventions that should have the most impact on maternal, newborn and child deaths in this country. We expect that several thousand lives should be saved as a direct result of these improvements."* [5.7].

The overall impact of EQUIST is summarised by the UNICEF Health Systems Strengthening Unit: *"We are confident that in the years ahead, use of EQUIST will be expanded to many more countries and support LMICs to achieve greater advances in their pursuit of achieving Universal Health Coverage for reaching Sustainable Development Goal 3."* [5.4b].

Impact on national health policies

In addition to leveraging funding from the GFF, EQUIST has been used to directly influence national health policy and resource allocation in 26 African countries. In 2018, UNICEF deployed EQUIST in 11 countries in Eastern and Southern Africa to identify bottlenecks and develop prioritised plans to address them. In Angola, these plans contributed to a nearly USD400,000,000 (GBP292,069,000; 01-21) increase in the approved budget for health and education, benefitting more than 16,000,000 children. In West and Central Africa, 15 further countries undertook in-depth equity and bottleneck analyses of health and nutrition programmes using EQUIST and used these to leverage domestic resources [5.8].

EQUIST was also used by the West African Health Organization in their "Moving maternal, neonatal and child health evidence into policy in West Africa" project, undertaken to promote implementation of evidence-informed policymaking to improve MNCH in Benin, Burkina Faso, Ghana, Mali, Nigeria and Senegal [5.9]. This study concluded: *"If the national decision makers are also interested in bridging implementation gaps and in the development of policies that are based on a thorough assessment of how the health system is functioning, particularly with regards to producing equitable health outcomes, then EQUIST is highly imperative."*

5. Sources to corroborate the impact

[5.1] Training events in EQUIST. a. Spreadsheet of UNICEF-organised training events b. Transcript of talk from EQUIST summer school, confirming trainer training events in Budapest and New Delhi c. Fourth Global Symposium on Health Systems Research 2016 programme d. Institutionalizing Community Health Conference 2017 programme

[5.2] UNICEF Health System Strengthening Unit Working Paper, Dec 2017. Early Experiences with the Equitable Impact Sensitive Tool (EQUIST) p. 8

[5.3] World Bank website announcing launch of GFF in July 2015

[5.4] Letters of support to attest to the importance of EQUIST in ICs and GFF funding decisions:

a. Letter of support from former UNICEF Chief of Health, now at World Bank

b. Letter of support from UNICEF Health Systems Strengthening Unit

c. Letter of support from the Director of the African Institute for Health Policy and Health Systems

[5.5] Role of the EQUIST in individual investment cases:

a. Cameroon investment case (in French); EQUIST use described on p. 63

b. Mozambique investment case; EQUIST use described on p. 92

c. DR Congo: GFF webpage on DR Congo; Country Office Annual Report 2018, mentioning use of the EQUIST in the "National Health Development Plan 2019–22", p. 3.

d. Burkina Faso investment case (in French); EQUIST use described on p. 11

e. Senegal investment case (in French); EQUIST use described on p. 55

f. Côte d'Ivoire investment case (in French); EQUIST use described on p. 13

[5.6] Impact of GFF funding from GFF Annual Reports

a. 2017–18 core impact indicators for Cameroon

b. 2018–19. DR Congo on p. 16-20; Mozambique on p. 32-34; Cameroon on p. 62 as labelled on report

[5.7] Letter from National Coordinator of the Reproductive Health Research Unit of Côte d'Ivoire

[5.8] UNICEF Global Annual Report 2018 Goal Area 1 ('Every Child Survives and Thrives') p.180

[5.9] Uneke et al 2018 Globalization and Health [doi: 10.1186/s12992-018-0422-1](https://doi.org/10.1186/s12992-018-0422-1)