KfW Development Bank

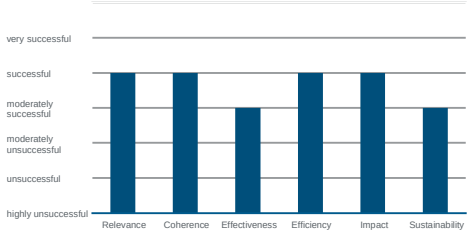
Ex-post evaluation: Support for the Expanded Programme on Immunisation (EPI), Malawi

Title	Support for the Expanded Programme on Immunisation (EPI)		
Sector and CRS code	Basic health services 12220		
Project number	2014 67 604		
Commissioned by	Federal Ministry for Economic Cooperation and Development (BMZ)		
Recipient/Project-executing agency	Republic of Malawi/Ministry of Health and UNICEF (implementation partners)		
Project volume/ Financing instrument	EUR 5 million, grant		
Project duration	November 2014 – November 2019		
Year of report	2023	**Year of random sample**	2021

Objectives and project outline

The objective at outcome level was to contribute to the prevention of tuberculosis, polio, measles and tetanus as well as to increase the effectiveness of the Expanded Programme on Immunisation (EPI). At impact level, this was intended to contribute to improving the health of the population, especially that of children under five years of age, and to achieving SDG 3. The project supported the EPI by financing vaccines and equipment to improve the cold chain, as well as training, consulting and awareness-raising measures.

Overall rating:
moderately successful



Key findings

The project co-financed the national immunisation programme at a time when there was a considerable shortage of funds, albeit with limited success.

- Financing of vaccines was very relevant for a continuous implementation of the EPI; the provision of cooling infrastructure is even more relevant in retrospect than at appraisal, as new vaccines and the COVID-19 pandemic have increased the demand for cold chains.
- The implementation was effective and efficient as it was based on existing, well-established structures in the cooperation between the Ministry of Health and UNICEF as well as Gavi.
- The high effectiveness of vaccinations is evidenced by science. By preventing diseases, they ease the burden not only from the health system, but also from households this also includes reduced opportunity costs of relatives who provide care, especially women.
- Although the quantitative successes in terms of vaccination coverage rates are lagging behind the initial, ambitious targets, the successes outweigh over the years and also in comparison to Malawi's neighbouring countries.
- The improved health is reflected in lower mortality rates and increased life expectancy, creating the conditions for further socio-economic developments.
- Due to Malawi’s significant donor dependency and limited financial leeway, as well as the limited – staff – capacities of its health system, the sustainable continuation of the EPI is subject to increased risks.
- The long-term impact of vaccinations at target group level remains unaffected.

Conclusions

- The EPI is implemented vertically with strong structures, but does not promote an integrated approach to basic healthcare.
- The implementation was delegated to UNICEF by the Ministry of Health and built on the existing cooperation between the Ministry of Health and UNICEF as well as with the Global Vaccine Alliance (Gavi).
- Despite challenges in the initial installation, the launch of solar powered refrigerators has been a model in retrospect due to their lower operating costs and independence from the national electricity supply, including in the case of extreme weather events.

Ex-post evaluation – rating according to OECD-DAC criteria

Overview of partial evaluations:

Relevance	2
Coherence	2
Effectiveness	3
Efficiency	2
Overarching developmental impact	2
Sustainability	3
Overall rating:	**3**

General conditions and classification of the project

The national immunisation programme is under the political responsibility of the Malawian Ministry of Health (MoH). Gavi is the main financier of the EPI. UNICEF is the implementing organisation responsible for vaccine procurement and cold chain infrastructure as well as their delivery. MoH, UNICEF and Gavi together form the EPI National Task Force. Vaccines are procured centrally by UNICEF via international manufacturers on behalf of the MoH and distributed within the country from one national vaccine warehouse to the health care facilities in the respective districts via three regional vaccine warehouses (North, Central, South). UNICEF has supported Malawi since 1979 in implementing the national vaccination programme, while Gavi has been involved in the programme since 2011. UNICEF and the World Health Organisation (WHO) also provide technical assistance. Vaccine procurement is currently being financed by Gavi and the Health Sector Joint Fund, a multi-donor vehicle. Further financing to support the EPI is also obtained from various organisations.

Brief description of the project

The FC bridged a shortfall of the Malawian government in the national vaccination programme, which largely depends on donor contributions. In 2014/2015, the project supported the Expanded Programme on Immunisation (EPI) in Malawi through:

(a) The provision of "traditional" vaccines to combat tuberculosis, polio and measles, as well as maternal and neonatal tetanus (MNT);

(b) Cold-rooms and refrigerators to ensure the cold chain and

(c) Consulting and training measures (including needs analyses, maintenance and repair of the cold chain) as well as communication and awareness-raising measures (including Immunisation Days, posters and other advertising measures).

This was intended to help prevent the above-mentioned diseases as well as reduce the burden of disease and child mortality. The MNT also specifically addressed the risk of tetanus infection borne by mothers when giving birth in places with inadequate hygiene as well as their newborn babies.

The implementation was delegated to UNICEF by the Ministry of Health and built on the existing cooperation between MoH, UNICEF and Gavi.

The primary target group was infants, non-immunised children under the age of five and pregnant women.

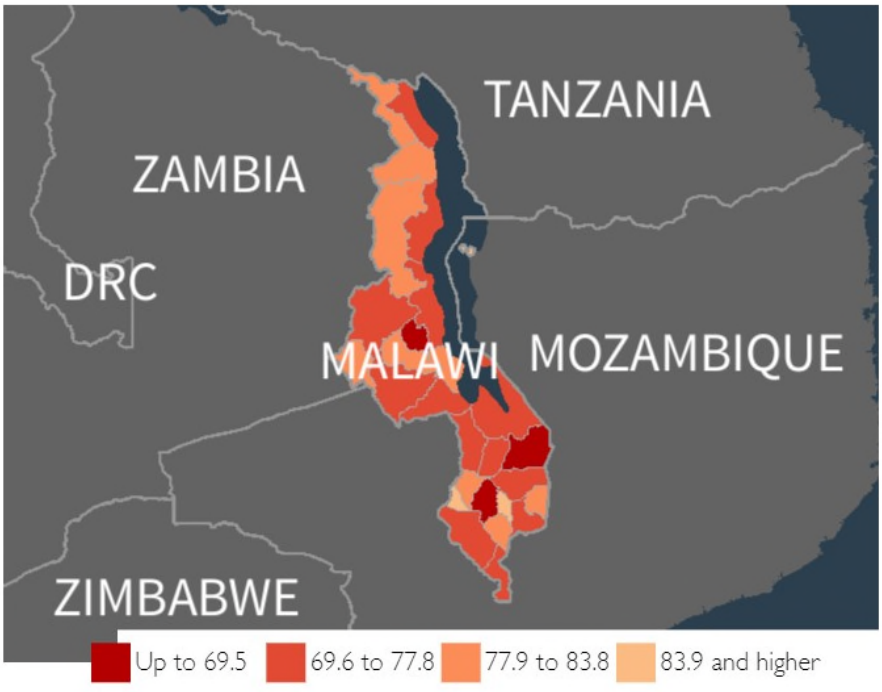
Breakdown of total costs

The total costs of the EPI during the project's implementation period include not only vaccines and injection material (EUR 12.2 million), but also cold chain infrastructure (EUR 1.2 million) and consultancy services (EUR 1.8 million), communication and awareness-raising measures (EUR 100,000) as well as a one-time fee paid to UNICEF in the amount of 8% (EUR 400,000). Gavi funded vaccines against diphtheria, pertussis, hepatitis B, Hib, pneumococcus and rotavirus. The Malawian government's own contribution included part of the financing of vaccines and injection material as well as the implementation of vaccinations via national health structures. The project made a financing contribution to the EPI of EUR 5 million in the period October 2014 to December 2015. The largest co-financier of the EPI at the time was Gavi; the contributions from the Malawian government were low.

In EUR million	Inv. (planned)	Inv. (actual)
Investment costs (total)	**15.7**	**15.7**
Counterpart contribution	1.0	1.0
External financing	14.7	14.7
of which BMZ budget funds	*5.0*	*5.0*
of which Gavi	*9.7*	*9.7*

Map – Malawi

The map shows the percentage of children between 12 and 23 months who received all eight basic vaccinations per district (as of 2015 – i.e. with data collection before implementation of the project).



ICF, 2015. The DHS Program STATcompiler. Funded by USAID. http://www.statcompiler.com. October 9 2023

Relevance

1. Policy and priority focus

The project's objectives were aligned with global and national policies and priorities. Because the project aimed to contribute to the prevention of diseases and the reduction of child mortality, it was aligned with both the Millennium Development Goals (MDG 4) applicable at the time of the appraisal and the Sustainable Development Goals **(SDG 3** with sub-goal 3.2 to reduce infant and child mortality and 3.8 with regard to access to vaccines for all) applicable since 2015. In addition, the project is aligned with the goals of the **Immunisation Agenda 2030** (WHO: IA2030) of the global health community: to create a world in which all people of all ages and from anywhere in the world can fully benefit from vaccinations. Vaccination programmes also help uphold the human right to health (Art. 25, UN Charter of Human Rights).

At the time of project implementation, the EPI was integrated into the **national health strategy** (Health Sector Strategic Plan 201-2016, HSSP). The aim of the HSSP was and is to contribute to improving the Malawian population's quality of life by reducing the risk of preventable diseases and deaths. The central component of the HSSP was and is the Essential Health Package (EHP), within the framework of which various, mainly preventive measures to improve the state of health are (should be) made available free of charge, with a focus on children. This also includes measures to increase the vaccination rate and quality of the vaccinations administered as part of the EPI, whereby the strategic measures align with the project[1].

The project is aligned **with the German Federal Government's strategy for global health** with the prevention of diseases through the expansion of vaccination programmes and the promotion of fair and continuous access to vaccines. The FC project is also integrated into **UNICEF's Malawi country strategy,** whose main objective is to reduce child mortality as part *of Early Childhood Development*.

Malawi achieves(achieved) high overall values in terms of vaccination coverage rates in a regional comparison and the implementation of the national vaccination programme has largely been rated as satisfactory since its introduction in 1979 (Gavi, 2014), even though the WHO targets 90/80/80 have not yet been achieved (cf. Effectiveness). At the time of project planning, there was already an urgent need to expand storage capacities and the cold chain as new vaccines were introduced. In addition, existing cold chain infrastructure had to be replaced and maintained. With the C*old Chain Rehabilitation Plan*, the government aimed to meet this need[2]. There is currently an even greater requirement for adequate cold chain infrastructure due to the COVID-19 pandemic, the re-emergence of wild poliovirus after 30 years[3] and the cholera epidemic resulting from natural disasters.

Malawi was and is still highly dependent on external financing of the EPI. The "traditional" vaccines financed as part of the project are not financed by Gavi and their financing is at risk if there are insufficient government funds. FC financing has bridged such a financial gap. Due to the persistently weak state structures, implementation via UNICEF was and still is expedient.

2. Focus on needs and capacities of participants and stakeholders

[1] The main focus of the EPI was on preventable diseases of a global scale, such as tetanus, polio and measles, with a strategic focus on: 1) availability of vaccines and injection material, 2) adequate cold chain and cold chain management, 3) adequate vaccination staff capacities, 4) adequate awareness of immunisations and 5) optimal performance of monitoring indicators.

[2] The five-year cold chain rehabilitation and expansion plan has taken into account the replacement of all refrigerators that are over 15 years old and those that are not PQS (not Performance, Quality and Safety prequalified by WHO). Health facilities that do not have functioning refrigerators have also been included. Thus, new refrigerators will need to be acquired and allocated to replace this dated equipment, as well as to increase capacity to meet the needs of new vaccine introductions, as well as a growing population. About 197 refrigerators running on kerosene and 312 refrigerators running on gas will need to be replaced in the next five years. The budget for the 5-year plan has excluded cold chain equipment that will be procured with financial assistance from KFW through UNICEF. Proposed walk-in cold-storage rooms in the five districts and one zonal office have also been included in the five-year rehabilitation and expansion plan. This is in anticipation of an increase in storage capacity as a result of the national roll-out of HPV and inactivated polio vaccine and high population in these five districts. The plan therefore takes into account the replacement of 509 gas/kerosene refrigerators; 182 non-PQS refrigerators; 295 over ten years refrigerators and 114 refrigerators that were found to be not working and irreparable. This will be a gradual process as more funds need to be mobilised and at the same time priority will be given to the most critical category. (EPI, 2016–2020, p. 135)

[3] The first case of infection with the wild polio virus (WPV) was reported in Malawi in February 2022. This was followed by another eight cases in Mozambique – the origin of the WPV was in Pakistan according to www.polioeradication.org. Subsequently, extensive vaccination campaigns were launched across southern Africa with the bivalent OPV vaccine against WPV type 1. This campaign reached more than 33 million children within one year (UNICEF/WHO).

The project's target group was all infants, non-immunised children under the age of five and pregnant women in Malawi in 2014 and 2015. The project's indirect target group was the entire population of Malawi (approx. 16.2 million people in 2014). At the time of the appraisal, the proportion of infants among the total population of Malawi was estimated to be 5%. For children under the age of five and pregnant women, this figure stood at 17% and approximately 6% respectively. Basic immunisation takes place in infancy and childhood, which is why infants and children form such a central target group. In pregnant women, contact with health centres is used to refresh or catch up on vaccinations, especially to protect newborns. Even though vaccination rates are relatively high, continuous implementation of national vaccination programmes is crucial for preventing and closing gaps in immunisation.

The primary target group was defined solely on the basis of age and vaccination status, regardless of socio-economic status, gender or place of residence. The project involved the provision of a basic social service in the context of a high proportion of poor people in the target group. The proportion of people living below the poverty line remains high – in 2019, this stood at over 50% as measured by the national poverty line and over 70% as measured by the international poverty line of USD 2.15 (2017 purchasing power parity (PPP)) per capita per day. The poverty rate increased even further by 2023 (World Bank) and is in turn significantly higher among rural populations than in urban areas. Vaccinations administered as part of the EPI were already made available to the entire population free of charge before the project was implemented. In addition to the vaccinated infants and children, mothers (and women) in particular benefit from a lower burden of illness due to the basic immunisation, as they usually take care of the sick or disabled family members.

The EPI has been and is being implemented nationwide with outreach activities, which tackle access restrictions resulting from low coverage by health care facilities, especially in remote areas.

The core problem for the EPI was structural underfinancing of the Malawian health sector with a direct impact on the implementation of the EPI. According to the Malawian government, the MoH invested only 4% of its budget in routine vaccinations in 2012-2014, while in 2015/2016, only 3% of its own resources was available for implementing the EPI[4]. A total of approximately 90% of the EPI financing still comes from external donors, of which an average of 75% comes from Gavi[5]. In the years before and during project implementation (2010-2015), EPI expenditure increased significantly due to the introduction of new vaccines (PCV13, Rotarix, Pentavalent). The Malawian government estimates that vaccine spending has increased by a total of 175% over these years [6].

In September 2013, the national government of Malawi was shaken by a corruption scandal, which led to many donors discontinuing their support for the health sector. At the beginning of 2014, this resulted in bottlenecks in the provision of the necessary funds for purchasing urgently needed investments and routine vaccines. Norway and Germany (FC), among others, stepped in and helped to close this gap. The project conceptually addressed part of the challenges identified by Gavi 2014 for routine vaccinations: inadequate cold chain and logistics, data management and lack of vaccines and injection material, lack of consumables (including fuel for outreach activities and distribution of vaccines, kerosene and gas for cooling devices).

3. Appropriateness of design

Vaccinations are undeniably essential measures for protecting the life and health of the target group. The WHO estimates that around 56 million lives were saved by measles vaccinations worldwide between 2000 and 2021. Since 1988, more than 18 million paralysis cases and an estimated 1.5 million deaths have been prevented by polio vaccinations worldwide, according to the *Centre for Disease Control and Prevention*. Vaccinations protect the target group directly and also prevent the spread of diseases/ help to contain or eliminate them – on a global level.

The vaccines to be funded (tuberculosis, polio, measles and tetanus) were chosen because they are traditionally funded by the Malawian government, while Gavi finances newer routine vaccines against other diseases (Pentavalent against diphtheria, pertussis, hepatitis B, HIB; PCV against pneumococcus and Rotarix against rotavirus). Vaccinations are offered free of charge to the entire population as part of the EPI; specific outreach activities aim to support areas with lower vaccination coverage in particular.

[4] EPI Comprehensive Action Plan 2016-2019

[5] UNICEF Budget Letter 2021/2022

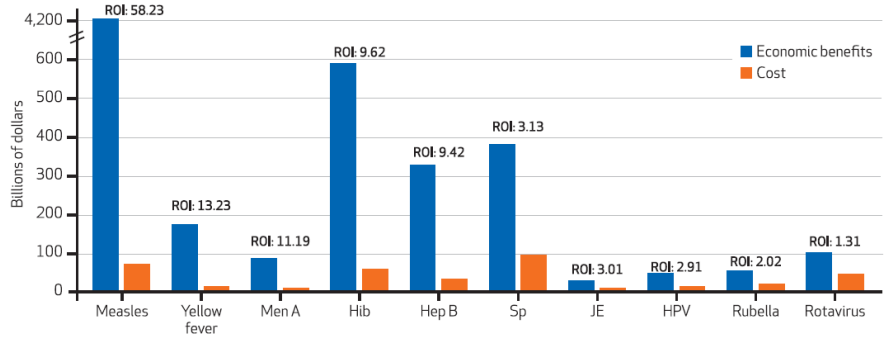
[6] EPI Comprehensive Action Plan 2016-2019

The results chain was and is logical: By supporting the EPI with the financing of vaccinations/injection material and cold chain infrastructure, the adequate storage and distribution of vaccines can be improved and the supply of vaccinations for the target group can increase. Ensuring the functionality of the cold chain, including through training measures for the staff involved, is crucial for the effective and efficient implementation of the EPI, not least by reducing rates of waste caused by improper storage. The introduction of solar powered refrigerators was conceptually even more relevant from today's perspective than assumed at the time of the appraisal, given the challenges regarding reliable electricity supply in the country. Increased numbers of vaccinations available helps to maintain high vaccination rates and increase low ones, which leads to the prevention of diseases and thereby to a reduced burden of disease, which in turn improves the health of the population. As a result, routine vaccinations during childhood benefit them in particular and child mortality can be reduced. Diseases and the burden of disease on families pose a central risk of poverty, especially for women (cf. Impact), so avoiding diseases helps alleviate such risks.

The design of the project was appropriate, realistic and suitable for addressing the aforementioned deficiencies in the EPI. It could be assumed that the vertical implementation via UNICEF is the most effective and efficient implementation method, not just in light of previous corruption risks, even if this does not work towards an integrated strengthening of the health system. All procurement was to be done through UNICEF to achieve cost benefits. Distribution of routine vaccines on site was to be in accordance with national regulations and under the responsibility of the MoH. The vaccinations themselves were the responsibility of the subordinate organisational units or health care facilities.

There is sufficient evidence that the benefit of vaccinations is many times greater than the cost invested, across all antigens; with two doses of the measles vaccination via outreach campaigns, the benefit is 58 times greater than the cost[7].

Estimated Costs, Economic Benefits Based On Costs Of Illnesses, And Return On Investment For Immunization, By Antigen, In 94 Low- And Middle-Income Countries, 2011–20



SOURCE Authors' analysis based on health impact estimates derived from Gavi's 2014 strategic demand forecast and dose estimates from Gavi's 2014 adjusted demand forecast (Notes 8 and 25, respectively, in text). **NOTES** Costs and economic benefits are reported in 2010 US dollars. Men A is *Neisseria meningitidis* serogroup A. Hib is *Haemophilus influenzae* type b. Hep B is hepatitis B. Sp is *Streptococcus pneumoniae*. JE is Japanese encephalitis. HPV is human papillomavirus.

Source: Ozawa et al., 2016: Return on investment from childhood immunisation in low- and middle-income countries, 2011-20

The target system was slightly adjusted over the course of the ex-post evaluation (cf. Annex 1).

4. Response to changes/adaptability

As a result of major floods at the turn of the year 2014/15, around 10% of the committed FC funds were reprogrammed for measles vaccination campaigns and courses of vitamin A; this was in response to the increased risk of a measles outbreak. Approximately 450,000 children under five years of age benefited from these integrated vaccination campaigns across 15 districts. Given the high return on investment in measles vaccinations, this reprogramming is also effective from an economic perspective.

[7] Ozawa et al. 2016, UNICEF 2021

Summary of the rating

The project addressed relevant weaknesses in the national vaccination programme with an appropriate design and via an established implementation structure in direct cooperation with UNICEF, at a time when the health sector in Malawi was experiencing significant funding deficits. The introduction of solar-powered refrigerators is even more relevant today than it was at the time of the appraisal. The project was and remains relevant from today's perspective.

Relevance: 2

Coherence

5. Internal coherence

German DC's involvement in Malawi is focused on programmes that benefit the population directly. The health sector represents one of the Federal Ministry for Economic Cooperation and Development's three focal points in its bilateral cooperation with Malawi. Further priorities are the promotion of primary education and the private sector. The aim of German DC is to contribute to ensuring a comprehensive supply of high quality and affordable health services, especially for mothers and newborns.

This project was part of the DC programme for supporting the health sector in Malawi, whose programme objective was and is to improve universal access to and use of high quality basic health services *(Essential Health Package)*, in particular in the area of sexual and reproductive health (including the fight against HIV/AIDS). In addition to the present project, German DC also supported measures at the time of project implementation for promoting mother-child health, strengthening private public partnerships in the health sector, improving reproductive health and providing basic health services. Synergies between the vaccination programme and other DC measures were not addressed in a targeted manner; however, the strengthening of basic health services, including the infrastructure required for this, also facilitated the implementation of the EPI via these or in cooperation with these structures, despite continued significant weaknesses. Since the end of 2015, German DC's involvement in the Malawian health sector has been via the *Health Service Joint Fund* (HSJF), which pursues a new coordinated donor approach in the health sector (see External Coherence).

The project helps uphold the human right to health and is in line with the SDGs and the International Vaccination Strategy (see Relevance).

6. External coherence

At the time of project implementation, the donor landscape in the health care sector was described as "strongly fragmented" overall, with around 260 implementation partners. In December 2015, the Malawian government, Germany, Norway, the United Kingdom and Belgium signed joint political declarations of intent for a **Health Services Joint Fund (HSJF)** as well as providing more coordinated financial supervision in the health sector. The HSJF is a coordination mechanism through which donor funds with common non-governmental disbursement structures are channelled into defined packages of measures (earmarking). Among other things, the HSJF also finances vaccines. The *Global Fund to Fight AIDS, Tuberculosis and Malaria* promised Malawi a further USD 517 million in promotion for the period 2024-2027. Discussions are currently ongoing regarding linking this intervention more closely with the Health Services Joint Fund (HSJF)/ using this mechanism.

The project made use of the EPI's established structures, both in terms of the executing agency structure with UNICEF and in the subsequent implementation, in particular via the health centres, which offer almost all (95%) vaccinations. In its 2015 appraisal report, Gavi described the health care system as robust, functional and effective with regard to vaccinations, but with bottlenecks in transport and vaccination staff (incl. staff turnover). These bottlenecks have a direct impact on the quantity and quality of vaccination services (vaccinations only offered on special vaccination days, inconsistent outreach campaigns, etc.). During the evaluation, it became clear that the EPI's structures are vertical and controlled, which in turn contributes to effectiveness in view of the generally weak capacities. It was also observed that the various actors still have their own monitoring systems.

Summary of the rating:

The one-off direct co-financing of the national vaccination programme was not directly linked to other German DC measures and no explicit synergies were sought, but this was not detrimental to the project's structure and objective. The much more central coordination and complementarity within the framework of the EPI was achieved through direct cooperation with UNICEF as an implementing organisation and subsidiary coverage of existing financing gaps, which is why the coherence is rated as good.

Coherence: 2

Effectiveness

7. Achievement of (intended) targets

The goal adjusted as part of the EPE was to contribute to the prevention of tuberculosis, polio, measles and tetanus as well as to increase the effectiveness of the EPI.

The validity of the data from the EPI is difficult, as this is recorded on paper instead of electronically. Disaggregated data on vaccination rates by gender, place of residence or socio-economic status is of limited validity due to small survey sizes in the *Demographic & Health Survey* (DHS) 2015-2016. A new DHS is being developed but is delayed. The information also differs depending on the source.

As Malawi has committed to the WHO target of 90/80,[8] these indicators were used for the evaluation in addition to vaccination rates for individual antigens. It must be taken into account that the project consisted of interim financing lasting for one year between 2014 and 2015, and that the longer-term trend was highly dependent on further support for the EPI, which is why the original indicators with data at the time of the appraisal and the final inspection are also included.

The target achievement at outcome level is summarised in the table below:

Indicator	Status during PA (2013)	Target value PA/EPE	Actual value upon final follow-up (2015)	Actual value at EPE (2022)
(1 - NEW) 90% vaccination coverage rate at national level (here for the traditional vaccines funded as part of the project). *	n/a	90%	Partially fulfilled (not for measles and MNT)	Partially achieved: Achieved for polio and Penta 3 Not achieved for tuberculosis (89%), measles rubella (MR1 86%, MR2 63%) and MNT
(2 - NEW) Vaccination coverage rate of 80% in 80% of the districts (traditional vaccines funded as part of the project). *	n/a	80%/80%	72% - not achieved (8 out of 29 districts did not reach the 80% coverage rate)	62% - not achieved (11 out of 29 districts did not reach the 80% coverage rate)
(3) Proportion of children vaccinated against measles under one year of age 1st dose and 2nd dose (launched 2015) **	88%	1st dose 90% (2014) 92% (2015)	Not achieved 1st dose: 86% (2015) 2nd dose: 8%	Not achieved 1st dose: 82% 2nd dose: 60%

[8] "Reaching every district" (RED) is a strategy to achieve the goal of 80% immunisation coverage in all districts and 90% nationally in the WHO member states. (Source: WHO)

(4) Proportion of children vaccinated against polio under one year**	89%	93% (2014) 95% (2015)	Not achieved 89%	Not achieved 87%
(5) Proportion of children vaccinated against tuberculosis under one year**	96%	97% (2014) 97% (2015)	Not achieved 90%	Not achieved 84%
(6) Proportion of pregnant women vaccinated against tetanus*	65%	70% (2014) 70% (2015)	Achieved 72% (2015)	67% Not achieved

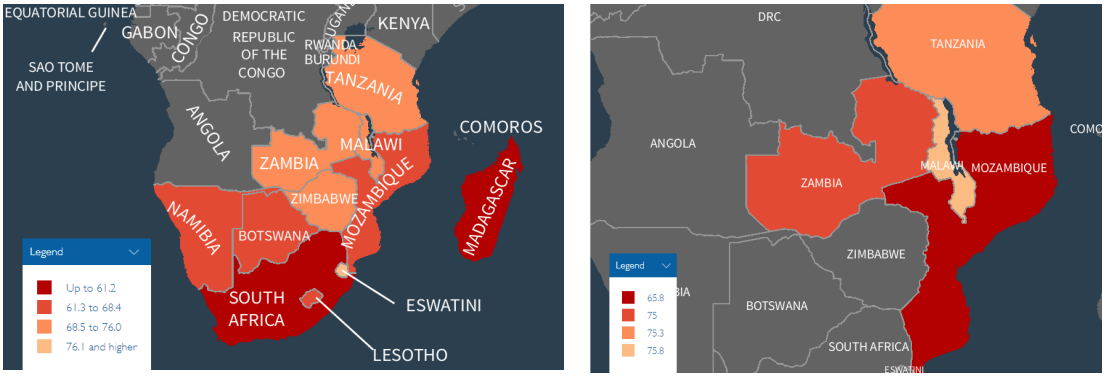
Source: * Information provided by UNICEF for 2022 as part of the EPE – values are above those reported by WUENIC; **WHO Immunization Data Portal

When interpreting the indicators, it must be taken into account that the results in 2019 – i.e. before the COVID-19 pandemic – were better than at the time of the evaluation in 2023. At national level, a vaccination coverage rate of over 90% was achieved for the traditional vaccines also financed in the project for BCG (91%), OPV3 (polio, 3rd dose 94%) and MR1 (measles-containing vaccine, 1st dose 92%), but not for the second measles vaccination MR2 (75%) and MNT (71%). At district level, only 7 out of 29 districts, i.e. 24% of the districts, did not achieve 80% vaccination coverage. Taking into account that supply bottlenecks with vaccines have not yet been a fundamental problem for the EPI, particularly in comparison with the supply of medicines, it can be assumed that the declines in vaccine coverage can be compensated for in the long term.

According to UNICEF, the declines in vaccination coverage compared to the situation before the project are at least partly explained by an overburdening of the EPI due to the re-emergence of polio in Malawi and the current cholera epidemic, but in particular also by the effects of the COVID-19 pandemic, which not only resulted in reduced demand (misunderstandings and vaccination fatigue), but also in reduced supply. Furthermore, the EPI is under constant strain due to extreme weather events such as Cyclone Freddy, which hit Malawi in 2023. Such weather events result in the destruction of infrastructure (transport, cold chain, electricity supply) and the availability of vaccination staff in the affected areas.

Even if the individual indicators were only partially met, or even if they weren't met at all, vaccination coverage in Malawi remains high in a regional comparison – both when considering more developed countries, some of which are significantly more developed, such as South Africa, and in comparison with Malawi's immediate neighbours, as the following maps illustrate. Against this background, it was also ambitious to assume during the appraisal that the EPI would increase its performance once again.

Percentage of children 12-23 months who had received all eight basic vaccinations



Source: The DHS Statcompiler (accessed October 2023)

The situation regarding the proportion of incomplete vaccination courses, i.e. the vaccination rate for vaccines administered in the second year of life, remains challenging (cf. MR2 coverage of only 63% in 2022), with a drop-out rate of less than 10% recommended by the WHO as a guideline value.

8. Contribution to achieving targets

The vaccines[9] along with syringes and disposal containers were procured in accordance with the design adapted with regard to measles, and were distributed and administered as part of the EPI; the cold chain infrastructure was procured, distributed and installed. As a result of training and awareness-raising measures, it contributed to the effectiveness of the EPI and in so doing successfully supported its implementation. The high staff turnover, especially in the implementation, reduces the effectiveness of the training in the long term.

With the FC investment in vaccines of EUR 1.5 million during the project period, a relevant gap in relation to traditional vaccines was covered, even though Gavi made a much higher contribution in comparison with EUR 9.7 million. However, this was due to the more modern and more expensive routine vaccines. Therefore, it can be clearly deduced that FC contributed to maintaining routine immunisation against polio, measles, tuberculosis and tetanus during the project period. Data on doses actually administered is not available; tracking ends with the number of doses as well as the vaccination kits and waste containers procured. Valid data on waste rates is missing (cf. Efficiency), with UNICEF (2021) reporting that up to 80% of vaccines are (must be) disposed of at individual health care facility level. Vaccines were distributed on the basis of the national supply management tool, but this is not yet used everywhere. The decentralised health structures are in some cases very weak, as is the follow-up of vaccine use along with the required follow-up supplies, which is therefore estimated at national level.

In principle, the vaccinations are available to the population free of charge under the EPI. Nevertheless, the literature reports of access restrictions – place of residence, gender, mother's educational status, number of children and income, among others, seem to be decisive on the demand side[10]. Factors on the supply side include the distance to the nearest health care facility, transport challenges in hard-to-reach areas and a lack of staff capacities there (only individual *Immunisation Days* instead of a permanent supply). The EPI tries to reach difficult-to-access areas with the *Reach Every Child* approach launched in 2017, whereby financing bottlenecks remain a challenge[11].

The second measles vaccination was introduced by the Malawian government in 2015. The project supported the further training of vaccination staff in this regard (as well as the use of the new bivalent polio vaccine for Malawi instead of the trivalent vaccine). At the end of 2015, only about 8% of children received a second measles vaccination. Although this figure had increased to 62% by 2022, the WHO target is still far from being met.

In addition to the five-year *cold chain rehabilitation plan* (EPI 2016-2020), which is based on a cold chain assessment from 2013, three cold-storage rooms, 490 refrigerators and transport media for refrigerated vaccines and temperature monitoring instruments were procured through FC support and a study on temperature monitoring was financed. Even though 423 (of 1,611) refrigerators needed to be replaced according to the inventory and there was a need for an additional 80 refrigerators as well as increased capacities at a further 400 locations, the FC was able to make a significant contribution to improving the cold chain. This contributed to the functionality of the EPI – despite difficulties in implementing this component (cf. Efficiency). Capacity requirements are increasing, not only due to population growth, but also due to the new introduction of vaccines requiring refrigeration during the project period. Even though the refrigerators' normal useful life of almost ten years of operation has already expired, according to UNICEF, they are being used for much longer than recommended by the WHO.

It can be assumed that without the support of FC, Malawi would not have been able to finance the measures in view of the withdrawal of several donors at the time due to corruption incidents. As a result, restrictions in the provision of vaccines would have led to significant vaccination gaps and the lack of cold chain infrastructure would also have hugely impaired the EPI during the years that followed.

[9] Vaccine doses procured: 1.1 million measles, 3.8 million polio, 2.7 million tuberculosis, 3.2 million infant tetanus.

[10] Mmanga et al. (2021)

[11] "In 2017, vaccine coverage was 69 percent. When you have such low coverage, there is always a risk of disease outbreaks. We used regular resources for the REC approach in partnership with the Ministry of Health and by 2020, the coverage had improved to 82 percent," says UNICEF Health Specialist Steve Macheso. (Source: Vaccination improves community's livelihoods | UNICEF Malawi accessed 12/10/2023)

9. Quality of implementation

The delegation of implementation responsibility to UNICEF as a long-standing partner in the implementation of vaccination programmes and responsible procurement organisation within the Malawi EPI was fundamental to the successful implementation.

Implementation took place within the established systems of the EPI, whose structures were strengthened as part of the project with training and further education measures. Nevertheless, the implementation via decentralised structures – district health offices and health centres – also poses challenges due to a lack of capacity and high staff turnover. The staff situation in the health care sector was and is generally difficult: the number of vaccination staff is insufficient and therefore staff continue to be overwhelmed. Indeed, staff capacities are currently extremely overwhelmed due to the additional campaigns against cholera and polio. This challenge is being met with temporarily engaged staff that are not financed by the Ministry of Health (up to 3,000) so that the necessary vaccination campaigns can be carried out.

The Ministry of Health or the relevant administrative units at district level, with the support of an international consultant (intermittent assignments over six months) and a local consultant (15 months), were also responsible for the commissioning and maintenance of the equipment for providing the cold chain. The solar panels were not installed adequately in accordance with international standards at the first attempt. 120 solar panels required significant improvements due to the lack of technical capacity.

10. Unintended consequences (positive or negative)

FC financing for solar powered refrigerators successfully addressed the challenges surrounding supply of operating resources (kerosene and gas, as well as a lack of electricity supply). From today's perspective, the "start-up difficulties" during installation are to be assessed as less serious, as solar powered refrigerators were introduced in Malawi with FC financing. These have now established themselves as an essential component for a reliable cold chain. Today, it is planned that in five years' time each health station will be equipped with a solar-powered refrigerator for the vaccines and an electrically powered refrigerator connected to the national power grid for the provision of cooling packs for outreach activities. Even in view of extreme weather events and associated destruction of the energy supply infrastructure, the overall assessment is that there is an increased guarantee of uninterrupted cooling with solar powered refrigerators. In addition, the electricity supply in remote areas is still inadequate[12], which is why the introduction of solar powered refrigerators has contributed in particular to better supply in hard-to-reach areas.

Summary of the rating

The FC project's contribution to the EPI significantly strengthened this with regard to the cold chain infrastructure and improved the proper storage of vaccines. The financing of vaccines has also contributed to maintaining vaccination coverage for the population, even though the indicators were not met or only partially met – in particular due to unforeseeable external factors. Implementation via UNICEF with clear structures ensured good quality, although capacity problems in the decentralised structures of the health system could only be addressed to a limited extent by the project and the EPI. Overall, although the effectiveness of the project was only partially successful at the time of the evaluation, the positive results clearly dominate the overall assessment.

Effectiveness: 3

Efficiency

11. Production efficiency

The pooled procurement of vaccines via the global UNICEF procurement centre has resulted in and continues to result in low prices and cost savings[13]. The same applies to the procurement of cold chain infrastructure – due to

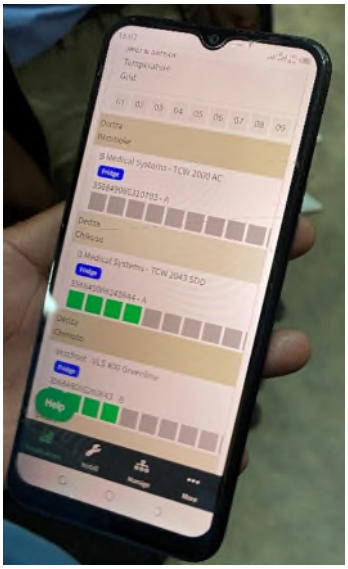
[12] According to World Bank figures for 2020, only 15% of the population has access to electricity supply. In rural areas, this figure stands at as little as below 7%.

[13] The costs of Gavi in procurement can be used as an indication here. Countries supported by Gavi benefit from more cost efficient provision and implementation of national vaccination programmes. For example, full immunisation of a child in Gavi-supported countries costs approximately USD 28, whereas the cost of full immunisation in the USA is estimated at approximately USD 1,300 (GAVI.org, 2023).

the large lot sizes and established procurement mechanisms, reasonable costs and efficient use of the funds to achieve the outputs can be assumed. The prefinancing by UNICEF amounting to EUR 700,000 allowed for timely vaccine provision. There were delays and need for improvement, especially in the procurement of the cold chain infrastructure. For the solar powered refrigerators, there was a considerable need for improvement regarding professional installation (cf. Effectiveness), which took place after the project. UNICEF's one-off implementation fee of 8% appears appropriate.

Figure 6: Trends in the Composition of EPI Spending

There is still room for improvement in the follow-up of the EPI, as the documentation of delivered and used vaccines at the level of the health care facilities is still mainly carried out on a monthly basis and on paper, which leads to considerable delays and inconsistencies when this data is transferred to Excel spreadsheets at higher levels. This in turn makes sound procurement and distribution planning difficult.



Since vaccines account for a significant proportion of the costs of a vaccination programme (see chart[14]), minimising waste rates without jeopardising the vaccination rate is crucial. There is no data available for Malawi regarding this. A study in Senegal by the WHO and PATH in 2012 showed that 22% of the costs of the vaccination programme were attributable to unused vaccines. Solid waste from unopened vials is often caused by supply chain inefficiencies, such as deficiencies in temperature control and cold chain as well as inventory management, in addition to storage and transportation errors. Waste from open vials is often unavoidable and highly dependent on the vaccine, the number of vaccine doses per vial, the vaccination structure (routine vaccinations or vaccination campaigns) and local circumstances. There is no follow-up of waste rates in Malawi, although this is crucial for reducing inventories and surplus supply, selecting the most appropriate vaccine presentation (number of vaccine doses per packaging unit) and dimensioning the supply chain infrastructure. While a 2021 report by UNICEF refers to waste rates of up to 80% at individual health care facility level, Gavi 2015 shows a waste rate for Penta vaccines of only 5% of the total doses purchased. As part of the evaluation, it was explained that according to estimations, the indicative maximum waste rates specified by the WHO are not being met[15]. The partners were critical of follow-up; they did not want there to be a false incentive to not open new vials if not all vaccination doses are able to be administered.

However, the significant improvement in the cold chain infrastructure and the digital temperature monitoring system introduced in recent years with direct transfer to a dashboard for real-time remote supervision (see photo[16]) can be expected to improve efficiency. With consistent application and evaluation, this can increasingly prevent vaccines from having to be destroyed due to incorrect storage.

12. Allocation efficiency

Vaccinations for newborns and children under five years of age are regularly classified as an extremely cost-effective intervention in the health care sector due to the high return on investment (cf. Relevance). Vaccination prevents diseases and associated costs both at the level of the health system and at the level of the affected

[14] Source: UNICEF Health Budget Brief 2023/2024

[15] Cf. WHO, 2019: Revising global indicative waste rates: a WHO initiative for better planning and forecasting of vaccine supply needs. Global indicative waste rates between 5% and 50%.

[16] Source: own information as part of the evaluation mission.

families, with macroeconomic impact. There is no more cost-effective solution against preventable diseases than vaccination.

The co-financing of the EPI via the Malawian government and UNICEF was additional to the partner's own efforts and complemented the contributions of other donors and actors. The total financing was provided by Gavi (62%), FC funds (32%) and the Malawian government's own contribution (6%).

In addition to the procurement of vaccines, the focus on cold chain infrastructure was effective, as without a functioning cold chain infrastructure, the vaccines cannot be adequately stored, distributed and kept ready for administration. In retrospect, solar powered refrigerators have proved to be particularly suitable, as the high initial investment costs quickly pay for themselves. This is due to the fact that solar powered refrigerators enjoy lower operating costs. Particularly the replacement of refrigerators running on kerosene or gas resulted in significant cost savings. In addition, solar powered refrigerators enable vaccines to be supplied in remote areas where there is no connection to the electricity supply or where the electricity supply is unreliable. They are therefore also particularly suitable for reaching vulnerable and particularly poor sections of the population. Complementary measures such as information campaigns in districts with low coverage rates and further training of vaccination staff can also be assumed to ensure a good allocation to the target group.

Summary of the rating

Due to the cooperation with established structures of the EPI and the financing of procurements via UNICEF as a central procurement unit, production efficiency can be assessed as good, even if there is potential for increasing efficiency within the EPI. From an allocative perspective, disease prevention and therefore the efficiency of vaccinations is proven to be very high by science. By preventing disease, vaccines relieve the burden on the health system and, in particular, the predominantly poor families in Malawi. Despite initial challenges, the procurement of solar powered refrigerators can be assessed as a good allocation in retrospect.

Efficiency: 2

Impact

13. Overarching developmental changes (intended)

The impact-level objective adjusted for the evaluation was to contribute to improving the health of the Malawian population, especially that of children under five years of age, and to achieving SDG 3.

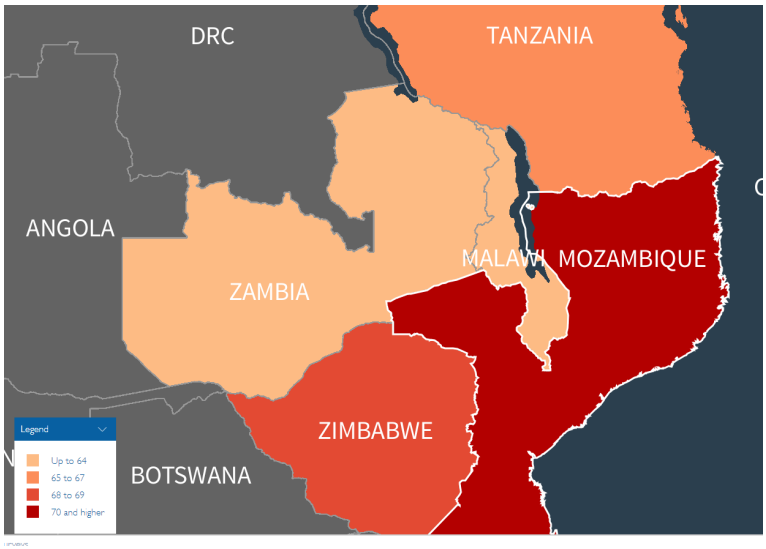
The child mortality rate of under five-year-olds (deaths per 1,000 live births) is used as a proxy indicator for the evaluation, with SDG 3's sub-goal – a mortality rate of a maximum of 25 per 1,000 live births by 2030 – being used as a target orientation. By preventing diseases, a reduction in child mortality can be assumed as an effect of immunisation programmes. In Malawi, the main causes of death in children are malaria, HIV/AIDS or related diseases, diarrhoea, pneumonia and birth complications, according to the MoH. Apart from malaria, for which a new vaccine is being introduced, curative health services and hygiene measures for these diseases are central to reducing child mortality, as prevention by vaccination is not possible.

Target achievement at the impact level can be summarised as follows.

Indicator	PA status	Target value (SDG 3)	Actual value at final inspection	Actual value at EPE
(2) Child mortality rate under five years (deaths per 1,000 live births)*	64.5 (2013)	25 (2030!)	56.6 (2015)	41.9 (2021) 32.6 (2023 – Information provided by UNICEF in evaluation) Achieved: a clearly positive trend can be observed.

*Sources: UNICEF – Malawi Country Profile

In line with the comparatively high vaccination coverage, child mortality in Malawi is also lower than in some neighbouring countries (see also map at the beginning of the report), although other health services are also relevant for other major diseases, as outlined above.



Source: DHS Statcompiler (data is older)

Vaccinations in infancy and childhood significantly reduce child mortality – although vaccination rates in Malawi were already quite high at the time of appraisal, diseases were able to be further reduced in some cases. However, there were also some setbacks:

- In the case of measles, following an outbreak in 2010 (8,065 in 1 million inhabitants), the incidence rate has usually been below 1 from the 2013 appraisal to date, with the exception of the years 2020 and 2022, when the incidence rate stood at 3.9 and 1.4 respectively[17].
- The incidence rate of tuberculosis in Malawi fell from 338 per 100,000 inhabitants in 2010 to 132 per 100,000 inhabitants in 2021 according to WHO figures. Here, too, there is a clear downturn in new infections, not least due to vaccinations.
- Malawi was considered to be “polio-free” since 1990. The 2022 wild virus case has changed the situation here once again and has also led to extensive vaccination campaigns in the surrounding countries.
- Cases of neonatal tetanus infections during birth, which almost always lead to the death of the newborn, are avoided by tetanus vaccination of expectant mothers (MNT) and hygiene measures while the mother is giving birth. The WHO estimates that only 5% of neonatal tetanus cases are registered worldwide, including in developed countries. The reported figures for neonatal tetanus in Malawi have ranged between 0 and 9 cases per year since the appraisal – however, data cannot be assumed to be valid.

14. Contribution to overarching developmental changes (intended)

By financing vaccines, cold chain infrastructure and accompanying training and consulting as well as awareness-raising and communication measures (also in the local languages), a positive impact of the FC project on the health of the population is plausible, but not quantifiable. The vaccine doses procured as part of the already established and well-functioning EPI exceed the FC project’s contribution. Furthermore, only information on the total doses procured, not the doses actually administered, is available. Since no information is available on the exact distribution of the financed components, no statement can be made regarding the extent to which vulnerable or particularly disadvantaged groups have benefited from the measures. It can be assumed that the *Immunisation Days* (collective vaccination campaigns in districts with a low vaccination rate) supported by the project took place in socio-economically weaker districts, which meant that particularly disadvantaged groups benefited from

[17] Source: WHO Immunization Data Portal

the measures. Further training of vaccination staff on the introduction of new vaccines has contributed to the quality of the EPI.

This project did not seek to make structural changes in the organisation of the implementation of the EPI. Overall, the temporary co-financing of the EPI closed a financial gap regarding vaccines and addressed long term structural requirements for the effectiveness of the EPI through the cold chain infrastructure. Insofar as supply is guaranteed, the central change occurs at the level of successfully immunised children and mothers through the reduction of preventable diseases, which would otherwise result in significant costs and a burden of illness at household level with a high risk of these households falling into extreme poverty as well as high subsequent costs for the health system. Avoidance of the burden of illness and restrictions due to disabilities such as polio paralysis also provide the target group with a socio-economic opportunity in that the target group has a greater chance of being able to access productive work. As the care of sick and disabled people is mainly the responsibility of women in Malawi, better health conditions relieve the burden on women in particular.

15. Contribution to (unintended) overarching developmental changes

The introduction of solar powered refrigerators has taken on a model character and has been adopted as standard. Each health station will be equipped with a solar powered vaccine refrigerator and a mains-powered refrigerator for cold packs. Solar powered equipment is crucial for remote, hard-to-reach areas in particular and therefore contributes to equal access to vaccinations, reducing the equity gap. The solar powered refrigerators are important in natural disasters – for example, vaccines were brought to health stations with solar powered refrigerators after Cyclones Ana and Freddy to prevent them from expiring when the electricity supply was interrupted. Currently, 45% of EPI's refrigerators are solar powered, resulting in lower emissions, especially compared to the kerosene- or petroleum-based refrigerators that were used previously.

Additional use of solar panels harbours untapped potential. The eight solar panels installed each offer a capacity that exceeds the requirements of the respective refrigerator and could be used for other functions of the health stations, according to UNICEF. Here, the synergies between the vertically implemented EPI and the decentralised health care facilities do not yet appear to be exhausted.

Summary of the rating

Overall, Malawi's national vaccination programme is considered successful and of great importance for the prevention of communicable diseases. It is plausible that the FC contributed to an improved health of the population and associated socio-economic impacts by financing key elements of the EPI.

Impact: 2

Sustainability

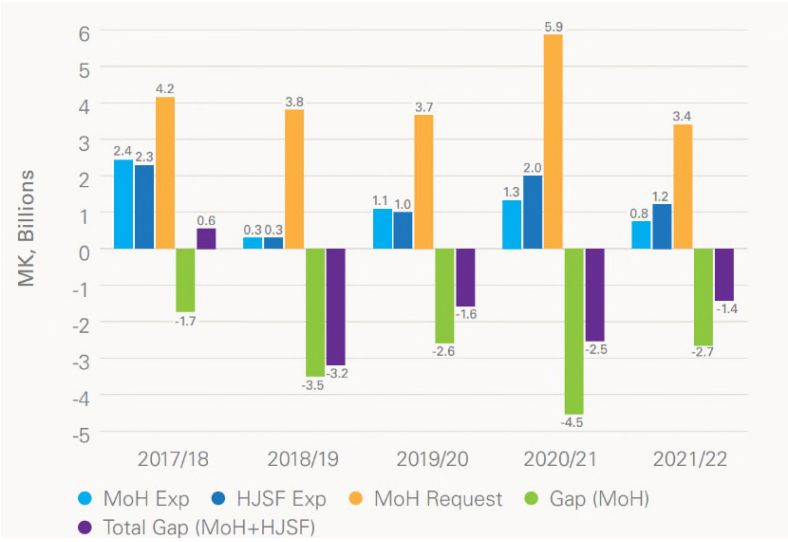
16. Capacities of participants and stakeholders

The **health sector in Malawi** is underfunded. Over the years, the budget allocations for the health sector have been close to 10% of the total budget, significantly below the Abuja target of 15%. Health represents the third largest area of expenditure after agriculture and education (debt service with more than 18% not included as the largest area of expenditure). Government spending on health has stood at 1.5 to 2% of GDP over the years since the appraisal, reaching 2.5% in 2022/2023. Per capita, the Malawian government spent around USD 10 per year on health between 2012/13 and 2017/18[18] (USD 15 in 2022/2023, but still significantly below the USD 86 recommended by the WHO[19]).

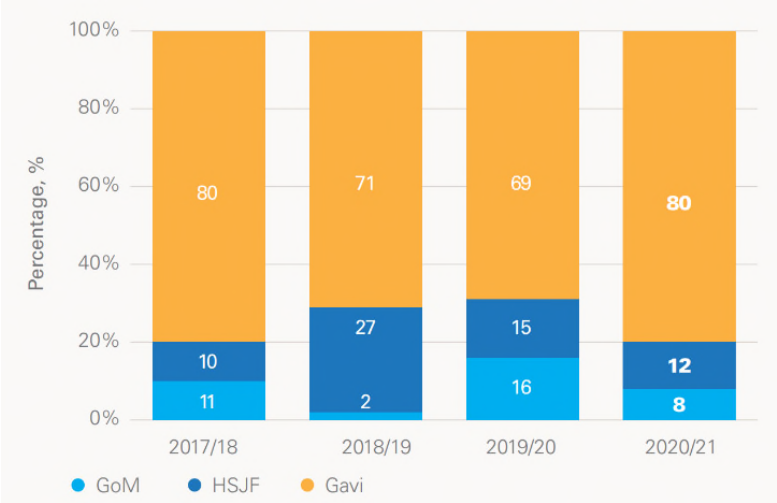
[18] UNICEF, 2021

[19] Source: UNICEF Malawi EPI COVID-19 Budget Letter 2022/23

The **state budget for the EPI** (i.e. for traditional vaccines and the necessary co-financing by the government for Gavi-funded vaccines) was 0.6% of the health budget in 2020/2021, only 0.5% in the following year and only 0.4% in 2022/23. The financing of the EPI was, is and for the foreseeable future will remain extremely donor-dependent, given the donor contribution of an average of 91% of the financing over the years 2016 to 2020 (cMYP period)[20]. To ensure the sustainability of national vaccination programmes, Gavi obliges partner countries to make a defined own contribution (depending on national GDP per capita) to each vaccine dose financed. Depending on the positive development of a country, this contribution is gradually increased on the basis of a so-called *graduation path* until the countries are able to finance the vaccination programme independently. So far, Malawi has only had to contribute the minimum amount of USD 0.20 per vaccine dose (phase 1 country). The total government expenditure on vaccines is consistently lower than the estimated financial needs, as the graph[21] shows.



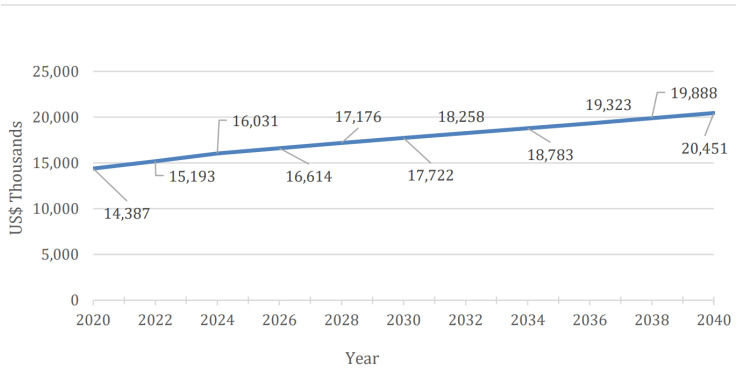
Due to the **high dependence on donor financing**, the long-term financing of the vaccination programme is volatile and susceptible to external shocks. The most important donor for the EPI is Gavi, which provided around 75% of the financing for the EPI on average between 2017 and 2022, followed by the HSJF (16%), which has supported the EPI since 2017/2018, and the Malawian government (9%) (see chart[22]). FC continues to finance the procurement of vaccines (including associated material) by UNICEF and the implementation of vaccination campaigns as part of the EPI via the HSJF. In financial year 2022/2023, a total of approximately USD 25.3 million was used for all HSJF measures (previous year: USD 9.6 million), of which approximately 38% was attributable to the FC, 17% to FCDO and 45% to Norway – around USD 3.5 million went into the EPI. The fund absorption of the HSJF is weak; only approximately 57% of the originally approved budget of USD 44.7 million was used in 2022/2023 (previous year: 35%). However, the HSJF funds are implemented more easily via UN implementation partners, which speaks for further financing of vaccination measures via UNICEF, even if there is a threat of lower donor contributions in the future.



[20] UNICEF: Child Immunisation Budget Brief 2020/2021
[21] Source: UNICEF Malawi EPI COVID-19 Budget Letter 2022/23
[22] Source: UNICEF Malawi EPI COVID-19 Budget Letter 2022/23

The ongoing financing of the EPI is urgently necessary in order not to jeopardise the vaccination coverage and reduction in serious diseases achieved. There is a high risk that the Malawian government will not always make a sufficient own contribution to the EPI, let alone cover increasing shares of the EPI from its own resources. This means that the sustainability of the EPI will continue to depend on ongoing donor contributions. However, it can be assumed that Gavi will continue its support and that the HSJF will continue to co-finance the EPI from today's perspective despite significant challenges. Donor support in the context of the COVID-19 pandemic, the cholera outbreak and also the re-emergence of the polio wild virus and the cholera epidemic has shown that Malawi is always able to find support if needed – also from the FC. The political will of the Malawian government is additionally reflected in the strategic plan for the health sector. However, increasing funds are needed to achieve the goals, as shown by the graph[23].

Annual cost of scaling from current coverage to >90% for all antigens



Source: UNICEF Malawi Vaccines and Nutrition Supply Chain Financing 2020

However, in addition to financial capacities, the capacities in implementation are also limited and the COVID-19 pandemic, the ongoing cholera outbreak and the re-emergence of the polio wild virus have greatly challenged the health care system and the EPI, overstretching staff capacities and technical equipment as well as the delivery system and management.

17. Contribution to supporting sustainable capacities

In order to assess the sustainability of this project, a distinction must be made between the individual components and the sustainability of the vaccination programme itself. **At the individual level of the target group,** vaccinations offer (long-term to) lifelong protection and are inherently sustainable. In addition, the financing of routine vaccines indirectly contributed to protecting the entire population from a risk of infection through a high vaccination rate and to contributing to herd immunity, which also benefits individuals who cannot be vaccinated (e.g. HIV-positive individuals are unable to take live vaccines as they have compromised immune systems) or in whom the defence response to vaccinations is reduced (e.g. HIV-positive individuals, in particular those who are not receiving antiretroviral therapy).

At the EPI level, the financing of infrastructure to safeguard the cold chain as well as training and consulting services has sustainably strengthened the structure of the vaccination programme by reducing avoidable waste and limiting the number of vaccines that can no longer be administered due to deficient storage capacities. During the COVID-19 pandemic and the cholera outbreak, there was a high additional need for cooling capacity, especially at national and district level; four additional cold-storage rooms were installed at national level and two at regional level (in addition, ultra-low freezers were installed for COVID-19 vaccinations). In addition, with the support of Gavi and UNICEF, the EPI has procured and distributed further refrigerators at district level. The project therefore made a decisive contribution to the necessary capacities in the cold chain, even if the replacement investments required for the FC-financed refrigerators will remain dependent on external financing for the foreseeable future. Another challenge is the financing and execution of the maintenance and repair of the equipment, as in many cases there is a lack of technical skill and necessary replacement parts. Especially in view of the limited funds, the refrigerators and cold-storage rooms are used for longer than recommended by the WHO (10 and 20 years respectively), which further increases maintenance costs.

18. Durability of impacts over time

The effects of vaccinations at the individual level are permanent, and the need for (replacement) investment remains high in the area of cold chain infrastructure. Due to staff turnover and additional staffing requirements, the

[23] Source: UNICEF budget mapping

need for training measures also remains. In view of the continued high co-financing of the EPI over the years via Gavi and the HSJF as well as other donors, it can be assumed that the national vaccination programme will be successfully continued and improved. Crises and natural disasters are expected to continue to challenge the EPI's capacities in the future. However, since (basic) immunisation is a highly efficient measure that is also important regionally and globally for the eradication and prevention of diseases (see Polio) and which remains essential from a humanitarian perspective, continued support in pandemic prevention in general can be assumed.

Summary of the rating

The national vaccination programme is and for the foreseeable future will remain fundamentally dependent on external financing, whereby despite the risk of fluctuations in donor contribution, it can be assumed that external financing will continue. The structures are well established, whereby the cooperation between MoH, GAVI and UNICEF also comes into play. Implementation capacities are limited, in particular by staff shortages, but also because of the significant number of crises that have hit Malawi and additional vaccination campaigns as well as the austerity policy to reduce the number of government employees due to IMF requirements. Given these constraints, the sustainability of the EPI is successful, but below expectations. Sustainability at target group level remains unaffected.

Sustainability: 3

Overall rating: 3

The FC co-financing of the national vaccination programme with a focus on vaccines and cold chain infrastructure can be assessed as successful overall in view of the continued relevance, the good coordination between MoH, UNICEF and Gavi, and the vertical implementation. Although the quantitative successes in terms of vaccination coverage rates are lagging behind the original targets, the successes over the years and in comparison with Malawi's neighbouring countries are indisputable. Vaccinations prevent diseases, reduce the burden of disease and contribute to a better health of the population, enabling socio-economic potential to be exploited. The sustainability of the impacts at the level of vaccinated people remains unaffected; however, the sustainable financing of the EPI remains largely dependent on external financing.

Contributions to the 2030 Agenda

The national vaccination programme is being/was implemented in close cooperation with the global partners UNICEF and Gavi along with the support of other donors. Free basic immunisation for everyone – especially children under the age of five and mothers – takes into account the human right to health and increases the chances of healthy development and participation for everyone. Routine vaccinations make a direct contribution to SDG 3 and health is a basic prerequisite for being able to exploit further socio-economic development potential. The fact that vaccines prevent diseases means that a burden is lifted both on the level of individual families (especially for women) and on a macroeconomic level, taking into account the avoided consequential costs of disease.

Project-specific strengths and weaknesses as well as cross-project conclusions and lessons learned

The project's strengths and weaknesses include, in particular, the well structured coordination of the EPI in conjunction with the Ministry of Health and UNICEF as an implementation partner and, from today's perspective, Gavi as the main financier. The vertical implementation, in particular by UNICEF, enables effective and efficient target achievement despite the sometimes serious weaknesses in health care in the country. One weakness remains the low capacity of government financing and structures with ongoing challenges for vaccination staff as well as maintenance and upkeep, especially of the cold chain infrastructure. The strong donor dependence is potentially a weakness, but there is ongoing international support so far and it can be assumed that this will continue.

Conclusions and lessons learned:

- The expanded vaccination programme is implemented vertically with strong structures, but does not promote an integrated approach to basic health care.
- The implementation was delegated to UNICEF by the Ministry of Health and built on the existing cooperation between the Ministry of Health, UNICEF and the Global Vaccine Alliance (Gavi).
- The introduction of solar powered refrigerators has a model character in retrospect despite challenges regarding correct installation. Especially in remote, hard-to-reach areas, the high investment costs quickly pay for themselves due to lower operating costs (kerosene, gas). Solar powered refrigerators have also established themselves as a preferred option in places that are connected to the public power grid as they ensure adequate storage of vaccines also in the event of an interruption or destruction of the electricity supply due to natural disasters.

Evaluation approach and methods

Methodology of the ex-post evaluation

The ex-post evaluation follows the methodology of a rapid appraisal, which is a data-supported qualitative contribution analysis and constitutes an expert judgement. This approach ascribes impacts to the project through plausibility considerations which are based on a careful analysis of documents, data, facts and impressions. This also includes – when possible – the use of digital data sources and the use of modern technologies (e.g. satellite data, online surveys, geocoding). The reasons for any contradicting information are investigated and attempts are made to clarify such issues and base the evaluation on statements that can be confirmed by several sources of information wherever possible (triangulation).

Documents:
Internal project documents, Malawian government strategies and reports, UNICEF and Gavi reports and dates, secondary specialist literature and scientific analysis.

Data sources and analysis tools:
Health data from the WHO, World Bank, UNICEF, Gavi; surveys as part of the on-site evaluation.

Interview partners:
UNICEF, Ministry of Health, health centres, national vaccine warehouse, health and vaccination staff.

The analysis of impacts is based on assumed causal relationships, documented in the results matrix developed during the project appraisal and, if necessary, updated during the ex-post evaluation. The evaluation report sets out arguments as to why the influencing factors in question were identified for the experienced effects and why the project under investigation was likely to make the contribution that it did (contribution analysis). The context of the development measure and its influence on results is taken into account. The conclusions are reported in relation to the availability and quality of the data. An evaluation concept is the frame of reference for the evaluation.

On average, the methods offer a balanced cost-benefit ratio for project evaluations that maintains a balance between the knowledge gained and the evaluation costs, and allows an assessment of the effectiveness of FC projects across all project evaluations. The individual ex post evaluation therefore does not meet the requirements of a scientific assessment in line with a clear causal analysis.

The following aspects limit the evaluation:
There was no disaggregated data by gender or income, and data from different sources is not (always) consistent.

Methods used to evaluate project success

A six-point scale is used to evaluate the project according to OECD DAC criteria. The scale is as follows:

Level 1 very successful: result that clearly exceeds expectations

Level 2 successful: fully in line with expectations and without any significant shortcomings

Level 3 moderately successful: project falls short of expectations but the positive results dominate

Level 4 moderately unsuccessful: significantly below expectations, with negative results dominating despite discernible positive results

Level 5 unsuccessful: despite some positive partial results, the negative results clearly dominate

Level 6 highly unsuccessful: the project has no impact or the situation has actually deteriorated

The overall rating on the six-point scale is compiled from a weighting of all six individual criteria as appropriate to the project in question. Rating levels 1-3 of the overall rating denote a “successful” project while rating levels 4-6 denote an “unsuccessful” project. It should be noted that a project can generally be considered developmentally “successful” only if the achievement of the project objective (“effectiveness”), the impact on the overall objective (“impact”) and the sustainability are rated at least “moderately successful” (level 3).

List of abbreviations:

AK	Final follow-up
GDP	Gross domestic product
BMZ	Federal Ministry for Economic Cooperation and Development
cMYP	Comprehensive Multi-Year Strategic Plan for Immunisation (WHO)
DAC	Development Assistance Committee
EHP	Essential Health Package
EPE	Ex post evaluation
EPI	Expanded Programme on Immunisation
EUR	Euro
DC	Development cooperation
FC	Financial cooperation
FC E	FC evaluation
Gavi	Global Vaccine Alliance
HDI	Human Development Index
HIB	Haemophilus influenzae type B
HSJF	Health Sector Joint Fund
HSSP	Health Sector Strategic Plan
MNT	Maternal and neonatal tetanus
MoH	Ministry of Health
MR	Measles, rubella
OPV	Oral polio vaccine
PCV	Penumococcal conjugate vaccine
PA	Project appraisal
PAR	Project appraisal report
PP	Project proposal
SDG	Sustainable Development Goals
TC	Technical cooperation
UNICEF	United Nations International Children’s Emergency Fund
USD	US dollar
WHO	World Health Organisation

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List of annexes:

Annex 1: Target system and indicators

Project objective at outcome level	Rating of appropriateness (former and current view)
During project appraisal: The aim of the project is to contribute to the fight against tuberculosis, polio, measles and tetanus as well as to the overall effectiveness of the EPI. DC programme objective: The universal access to and use of high quality basic health services (Essential Health Package) in Malawi, in particular in the field of sexual and reproductive health (including the fight against HIV/AIDS), has been improved.	The project purpose at outcome level is appropriate because the use of vaccines combats these diseases. The goal is consistent with the vision of the EPI: "The vision of the Malawi Expanded Programme on Immunisation is to keep Malawian children free from vaccine preventable diseases" (EPI Comprehensive Action Plan, 2016–2020, p. 72). The DC programme objective at outcome level is too broadly formulated for this project, which is why the project purpose defined during the project appraisal should be used.
During EPE (if target modified): see above.	

Indicator	Evaluation of appropriateness (appropriate; partially appropriate; not appropriate)	Rationale of appropriateness (for example, regarding impact level, accuracy of fit, target level, smart criteria)	PA target level Optional: EPE target level	PA status (2013)	Status at final inspection (2015)	Optional: Status at EPE (2022)
Indicator 1 (PA): Proportion of children vaccinated against measles (1st dose) under one year	Partially appropriate.	Vaccination rates are SMART indicators for measuring the effectiveness of vaccination programmes. A disaggregated presentation (gender, age, place of residence) would have been useful to show access restrictions. The indicator only provides information on the 1st dose; the 2nd dose introduced in Malawi in 2015 will be added for the EPE.	90% (2014) 92% (2015)	88% (1st dose)	86% (1st dose) 8% (2nd dose)	1st dose: 82% (WUENIC) and 86% (UNICEF) 2nd dose: 63% and 60% respectively

		Drop-out rates are important indicators of the use of vaccination offers. According to Mmanga et al. (2021), drop-out rates of > 10% equal an *"underutilization of immunisation services".*				
Indicator 2 (PA): Proportion of children under one year of age vaccinated against polio.	Partially appropriate	The basic immunisation for polio included four vaccine doses at the time of the PA – only at the final follow-up will the indicator for the third polio vaccination be specified. A clear specification of the indicator is important, as is the recording of drop-outs in order to address the weaknesses. The data presented here is contradictory, as the vaccination coverage for the third dose is higher for 2022 than for the first dose. This may be due to the fact that the information for the first dose refers only to the inactivated vaccine, which was only introduced in 2019.	93% (2014) 95% (2015)	89% (2013)	89% (2015)	1st dose: 84% (Inactivated polio-containing vaccine) 3. dose: 87% (third dose of polio-containing vaccine – may be either oral or inactivated polio vaccine) Source: WHO immunisation data
Indicator 3 (PA) Proportion of children vaccinated against tuberculosis under one year	Appropriate	Vaccination against tuberculosis takes place by administering one dose immediately after birth. Vaccination rates were already high at the time of the appraisal – a further increase is assessed as very ambitious.	97% 97%	96% (2013)	90% (Final follow-up) 92% (UNICEF)	84% (WUENIC) 89% (UNICEF)

Indicator 4 (PP) Proportion of pregnant women vaccinated against tetanus	Appropriate	This does not measure tetanus vaccinations as part of basic immunisation of children, but rather vaccinations in pregnant women to prevent infection with MNT during birth.	70% (2014 and 2015)	65% (2013)	72% (2015)	67% (2022 – Information from UNICEF as part of the EPE)
NEW: Indicator 5: Vaccination coverage rate 90% at national level (traditional vaccines funded in the project)	Appropriate	First part of the WHO target of a vaccination rate of 90% at national level and of at least 80% in 80% of districts => cf. Indicator 6. These WHO goals are also anchored in Malawi's multi-year plan 2016-2020.	90%	n/a	According to UNICEF as part of the EPE: partially achieved (not achieved for measles and MNT)	According to UNICEF as part of the EPE: Partially achieved => see main section.
NEW: Indicator 6 Vaccination coverage rate of 80% in 80% of districts	Appropriate	See above	80%/80%	n/a	72% See main section	62%

Project objective at impact level	**Evaluation of appropriateness (former and current view)**
During project appraisal: no objective was formulated at impact level for this project. DC programme objective cf. outcome level.	It is not currently appropriate to formulate an objective at impact level.
During EPE (if target modified): Contribution to improving the health of the Malawian population, especially that of children under five years of age, and to achieving SDG 3.	Vaccinations prevent diseases, which improves the health of the population. Vaccinations in children help reduce child mortality. However, it should be noted that the diseases preventable by vaccination are no longer among the most common causes of death among children in Malawi according to the MoH. Nevertheless, the epidemics (cholera and measles) and the re-emergence of polio show how important it is to maintain high vaccination rates.

Indicator	**Evaluation of appropriateness** (appropriate; somewhat appropriate; not appropriate)	**Rationale of appropriateness** (for example, regarding impact level,	**Target level PA / EPE (new)**	**PA status (year)**	**Status at final inspection (year)**	**EPE status (year)**

		accuracy of fit, target level, smart criteria)				
NEW: Indicator 1: Child mortality under the age of five	Appropriate	See above – SDG 3 target	25 out of 1,000 live births in 2030 according to SDG 3	64.5	56.6	41.9 (2021)

Annex 2: Risk analysis

Risk	Relevant OECD-DAC criterion
PA: high risk with regard to the implementation of the EPI given the structural underfunding of the health sector. **Final follow-up:** The risk persisted and had occurred because the agreed own contribution was not provided on time due to economic crisis and natural disasters. **EPE:** there is still a risk that both the donor funds for the overall financing and, in particular, procurements of the EPI will fluctuate or fall, as well as the funds of the Malawian government for the operational costs of implementation (including staff in particular) and that own contributions are not provided as part of the vaccines financed by Gavi.	**Sustainability**
PA: high risk with regard to the effectiveness of the EPI as this depends on the proper logistical handling and administration of vaccines – especially in the context of the weaknesses of the Malawian health system. **Final follow-up:** Risk did not occur, e.g. because staff were further trained in it. **EPE:** No clear indications were found that vaccines were not properly distributed, stored or administered. However, there is also a lack of data.	**Effectiveness**
PA: low risk of insufficient demand for vaccinations, especially among less religious groups. **Final follow-up:** The risk did not occur and attempts to mitigate it included targeted awareness-raising and information campaigns in districts with low vaccination coverage. **EPE:** a lack of demand did not become apparent during the evaluation either.	**Effectiveness**
Final follow-up: The risk of inadequate quality of solar panel installation was new. **EPE:** The installations of all solar panels have been improved, which has solved the problem.	**Effectiveness/efficiency**

Annex 3: Project measures and their results

Component 1: Procurement and distribution of vaccines and injection material

Measles	1.1 million doses
Polio	3.8 million doses
Tuberculosis	2.7 million doses
MNT	3.2 million doses

Injection material: 4 million syringes and 72,000 containers for needle disposal

Component 2: Procurement and distribution of cold chain guarantee equipment

A total of three cold rooms were built and 490 refrigerators and transport media for refrigerated vaccines and temperature monitoring instruments were procured via UNICEF Copenhagen.

Component 3: Communication measures in ten districts with poor vaccination coverage rates to date

This component included radio and television advertising as well as the procurement of 120,000 posters and 100,000 brochures.

Component 4: Training and support for monitoring and evaluation

As part of strengthening the technical skills of the EPI's employees, UNICEF commissioned consultants to carry out additional training. Staff were also trained in the introduction of the second measles vaccination.

Annex 4: Evaluation questions in line with OECD-DAC criteria / ex post evaluation matrix

Relevance

Evaluation question	Specification of the question for the present project	Data source (or rationale if the question is not relevant/applicable)	Rating	Weighting (- / o / +)	Rationale for weighting
Evaluation dimension 1: Policy and priority focus			2	o	
1.1 Are the objectives of the programme aligned with the (global, regional and country-specific) policies and priorities, in particular those of the (development policy) partners involved and affected and the BMZ?	Did the measure align with the objectives of the national health strategy, the global health goals/SDGs and the Federal Ministry for Economic Development and Cooperation's goals in the health sector?	Health Sector Strategic Plan I-III SDGs Gavi and UNICEF goals WHO			
1.2 Do the objectives of the programme take into account the relevant political and institutional framework conditions (e.g. legislation, administrative capacity, actual power structures (including those related to ethnicity, gender, etc.))?	Are the objectives, priorities and institutional cooperation suitable for the implementation of the vaccination programme? Is fair access granted? What are the capacities of the different stakeholders? Can the structures/support from UNICEF and Gavi sufficiently mitigate the weaknesses in the health system? Does corruption jeopardise achievement of the goals?	See above			
Evaluation dimension 2: Focus on needs and capacities of participants and stakeholders			2	o	
2.1 Are the programme objectives focused on the developmental needs and capacities of the target group? Was the core problem identified correctly?	Was the core problem mainly in the lack of financing for vaccines/injection material, cold chain infrastructure? Has the strategy taken into account the weaknesses of the health care system and the challenges of supply, including in hard-to-reach areas?	On-site discussions, field visits			

2.2 Were the needs and capacities of particularly disadvantaged or vulnerable sections of the target group taken into account (possible differentiation according to age, income, gender, ethnicity, etc.)? How was the target group selected?	Was access equal? Which groups have less access to vaccinations (city/rural areas; socio-economic factors, gender)?	Disaggregated data on vaccination coverage from different sources: national data, UNICEF			
2.3 Would the programme (from an ex post perspective) have had the potential to have other significant gender-related impacts if the project had been designed differently? (FC-E-specific question)	Were there alternative ways of supporting the EPI?	On-site discussions			
Evaluation dimension 3: Appropriateness of design			2	o	
3.1 Was the design of the programme appropriate and realistic (technically, organisationally and financially) and in principle suitable for contributing to solving the core problem?	Was the implementation structure via UNICEF suitable? Were the underlying government structures sufficient for implementation and follow-up?	UNICEF HSSP Discussions with MoH, health stations			
3.2 Is the programme design sufficiently precise and plausible (transparency and auditability of the target system and the underlying impact assumptions)?	Assumptions of efficacy with regard to vaccinations scientifically proven. Have the risks been correctly identified?	Literature PA, final follow-up, analyses on the health care sector			
3.3 Were the selected indicators and their value allocation appropriate in their entirety (select one of the following to answer: indicators and values were appropriate / partially appropriate / not appropriate)? The rationale is differentiated according to indicators in Appendix 1. (FC-E-specific question)	Cf. Target system in Annex 1				
3.4 Please describe the results chain, incl. complementary measures, if necessary in the form of a graphical	By supporting the EPI with the financing of vaccinations/injection material and cold chain infrastructure, the adequate storage				

representation. Is this plausible? As well as specifying the original and, if necessary, adjusted target system, taking into account the impact levels (outcome and impact). The (adjusted) target system can also be displayed graphically. (FC-E-specific question)	and distribution of vaccines can be improved and the supply of vaccinations for the target group can increase. Increased numbers of vaccinations available helps to maintain high vaccination rates and increase low ones, which leads to the prevention of diseases and thereby to a reduced burden of disease, which in turn improves the health of the population. As a result, routine vaccinations during childhood benefit them in particular and child mortality can be reduced.				
3.5 To what extent is the design of the programme based on a holistic approach to sustainable development (interplay of the social, environmental and economic dimensions of sustainability)?	Have solar powered refrigerators made sense from an ecological perspective? Did/do social inequalities exist in access to health services and vaccinations? Are there financial barriers to accessing vaccinations (transport costs, opportunity costs)?				
3.6 For projects within the scope of DC programmes: is the programme, based on its design, suitable for achieving the objectives of the DC programme? To what extent is the impact level of the FC module meaningfully linked to the DC programme (e.g. outcome impact or output outcome)? (FC-E-specific question)	Cf. Annex 1 – Target system The FC module contributes directly to DC programme target indicators => fully vaccinated children and reduction in child mortality.	DC programme documentation			
Evaluation dimension 4: Response to changes/adaptability			2	o	
4.1 Has the programme been adapted in the course of its implementation due to changed framework conditions (risks and potential)?	Adjustments in procurement or in the focus between vaccinations and cold chain infrastructure? Would further adjustments have been necessary that were not made?	UNICEF reporting BE, final follow-up On-site interviews			

Coherence

Evaluation question	Specification of the question for the present project	Data source (or rationale if the question is not relevant/applicable)	Rating	Weighting (- / o / +)	Rationale for weighting
Evaluation dimension 5: Internal coherence (division of tasks and synergies within German development cooperation):			2	o	
5.1 To what extent is the programme designed in a complementary and collaborative manner within German DC (e.g. integration into DC programme, country/sector strategy)?	Health is a priority of the Federal Ministry for Economic Development and Cooperation– is there a priority area strategy paper or similar?				
5.2 Do the instruments of German DC dovetail in a conceptually meaningful way, and are synergies put to use?	Are there synergies between the one-off direct co-financing and other FC or TC measures? Is the approach singular or continued in the HSJF?	DC documentation HSJF information Discussions with GIZ			
5.3 Is the programme consistent with international norms and standards to which German development cooperation is committed (e.g. human rights, Paris Climate Agreement, etc.)?	SDGs? Global strategies of WHO, etc.?				
Evaluation dimension 6: External coherence (complementarity and coordination with actors external to German DC):			2	o	
6.1 To what extent does the programme complement and support the partner's own efforts (subsidiarity principle)?	Can co-financing be interpreted as subsidiary as a result of other donors reducing their financial contributions due to corruption incidents? How is the low own contribution to be assessed? What about rising vaccine expenditure?	EPI, UNICEF, Gavi, MoH			

6.2 Is the design of the programme and its implementation coordinated with the activities of other donors?	Coordination with UNICEF, Gavi? Which other donors support the EPI?	On-site discussions Internet research
6.3 Was the programme designed to use the existing systems and structures (of partners/other donors/international organisations) for the implementation of its activities and to what extent are these used?	Vertical implementation via UNICEF ⇔ Field implementation via government structures – are vaccination measures integrated or are they running in parallel at local level?	On-site discussions
6.4 Are common systems (of partners/other donors/international organisations) used for monitoring/evaluation, learning and accountability?	Reporting was performed by UNICEF. To be clarified on site: national follow-up – follow-up by UNICEF/WHO/Gavi	On-site discussions

Effectiveness

Evaluation question	Specification of the question for the present project	Data source (or rationale if the question is not relevant/applicable)	Rating	Weighting (- / o / +)	Rationale for weighting
Evaluation dimension 7: Achievement of (intended) targets			2	o	
7.1 Were the (if necessary, adjusted) objectives of the programme (incl.staff assistance measures) achieved? Table of indicators: Comparison of actual/target	--				
Evaluation dimension 8: Contribution to achieving targets:			2	o	
8.1 To what extent were the outputs of the programme delivered as planned (or adapted to new developments)? *(Learning/help question)*	Were the vaccines and injection materials procured? Was the cold chain infrastructure procured? Have procurements been distributed?	Reports			

	Have awareness-raising and training measures been carried out?	
8.2 Are the outputs provided and the capacities created used?	Use of cold chain infrastructure? Vaccinations administered?	Reports On-site
8.3 To what extent is equal access to the outputs provided and the capacities created guaranteed (e.g. non-discriminatory, physically accessible, financially affordable, qualitatively, socially and culturally acceptable)?	What is the country-wide coverage, taking outreach activities into account? Is access equally guaranteed for everyone from a demand perspective?	On-site
8.4 To what extent did the programme contribute to achieving the objectives?	Have the purchased vaccines been distributed and administered? Cold chain used?	On-site
8.5 To what extent did the programme contribute to achieving the objectives at the level of the intended beneficiaries?	Vaccinations accepted by target group? Better supply even in areas without connection to the power grid with solar powered refrigerators?	
8.6 Did the programme contribute to the achievement of objectives at the level of the particularly disadvantaged or vulnerable groups involved and affected (potential differentiation according to age, income, gender, ethnicity, etc.)?	To be asked	On-site – also target group UNICEF Final Proposal “Bridging gaps in immunisation”
8.7 Were there measures that specifically addressed gender impact potential (e.g. through the involvement of women in project committees, water committees, use of social workers for women, etc.)? (FC-E-specific question)	To ask on site?	
8.8 Which project-internal factors (technical, organisational or financial) were decisive for the achievement or non-achievement of the programme's	Existing cooperation? Implementation via MoH and downstream structures? Staff capacities?	Documentation and on-site interviews

intended objectives? *(Learning/help question)*					
8.9 Which external factors were decisive for the achievement or non-achievement of the programme's intended objectives (also taking into account the risks anticipated beforehand)? *(Learning/help question)*	Provision of own contribution? Natural disasters/extreme weather events				
Evaluation dimension 9: Quality of implementation			2	o	
9.1 How is the quality of the management and implementation of the programme to be evaluated with regard to the achievement of objectives?	Implementation structure? Consultants? Management by UNICEF ⇔ MoH ⇔ Gavi ⇔other?	Documentation On-site interviews			
9.2 How is the quality of the management, implementation and participation in the programme by the partners/executing agencies to be evaluated?	See above				
9.3 Were gender results and relevant risks in/through the project (gender-based violence, e.g. in the context of infrastructure or empowerment projects) regularly monitored or otherwise taken into account during implementation? Have corresponding measures (e.g. as part of a CM) been implemented in a timely manner? (FC-E-specific question)	Not relevant				
Evaluation dimension 10: Unintended consequences (positive or negative)	Note: if there are **no** unintended effects: ➔ No weighting ➔ No evaluation		2	o	
10.1 Can unintended positive/negative direct impacts (social, economic, ecological and, where applicable, those	Solar powered refrigerators: reduced operating costs (kerosene and gas)?	On-site discussions			

affecting vulnerable groups) be seen (or are they predicted)?	Reduced CO2 emissions Better coverage nationwide?	
10.2 What potential/risks arise from the positive/negative unintended effects and how should they be evaluated?	Potential for using solar panels for other applications, in particular at the health station level?	
10.3 How did the programme respond to the potential/risks of the positive/negative unintended effects?	No specification required	

Efficiency

Evaluation question	Specification of the question for the present project	Data source (or rationale if the question is not relevant/applicable)	Rating	Weighting (- / o / +)	Rationale for weighting
Evaluation dimension 11: Production efficiency			2	o	
11.1 How are the programme's inputs (financial and material resources) distributed (e.g. by instruments, sectors, sub-measures, also taking into account the cost contributions of the partners/executing agencies/other participants and affected parties, etc.)? (Learning and help question)	No specification required	Reporting			
11.2 To what extent were the programme's inputs used sparingly in relation to the outputs produced (products, capital goods and services; if possible in a comparison with data from other evaluations of a region, sector, etc.)? For example, comparison of specific costs.	Central procurement? Efficient distribution? Conventional vs solar powered refrigerators?	Documentation			
11.3 If necessary, as a complementary perspective: To what extent could the outputs of the programme have been	No specification required				

increased by an alternative use of inputs (if possible in a comparison with data from other evaluations of a region, sector, etc.)?					
11.4 Were the outputs produced on time and within the planned period?	Were there any delays?	Reporting			
11.5 Were the coordination and management costs reasonable (e.g. implementation consultant's cost component)? (FC-E-specific question)	Is 8% appropriate for UNICEF as an implementation partner?	Documentation and comparison with other UN projects and vaccination projects			
Evaluation dimension 12: Allocation efficiency			2	o	
12.1 In what other ways and at what costs could the effects achieved (outcome/impact) have been attained? *(Learning/help question)*	There is no more efficient health intervention than routine vaccinations. Was the focus on cold chain infrastructure also appropriate/sufficient?	Scientific evidence			
12.2 To what extent could the effects achieved have been attained in a more cost-effective manner, compared with an alternatively designed programme?	Good question	Discussion on site			
12.3 If necessary, as a complementary perspective: To what extent could the positive effects have been increased with the resources available, compared to an alternatively designed programme?	n/a				
Note: If the internal identifier PSP (Private Sector Participation; see Inpro under 1.11) was issued for the project or there is generally cooperation with private actors (commercial banks, companies, professional NGOs) in the implementation of FC (private sector as an instrument), the following evaluation question must be taken into account:					
12.4 In what respect were public funds used to supplement the provision of finances?	No specification necessary				

Impact

Evaluation question	Specification of the question for the present project	Data source (or rationale if the question is not relevant/applicable)	Rating	Weighting (- / o / +)	Rationale for weighting
Evaluation dimension 13: Overarching developmental changes (intended)			2	0	
13.1 Is it possible to identify overarching developmental changes to which the programme is set to contribute? (Or if such changes are to be anticipated in the future, please be as specific as possible in terms of time.)	Changes in vaccination coverage and vaccination rates, as well as disease and mortality rates?	Documentation Monitoring data Literature			
13.2 Is it possible to identify overarching developmental changes (social, economic, environmental and their interactions) at the level of the intended beneficiaries? (Or if such changes are to be anticipated in the future, please be as specific as possible in terms of time)	How do the vaccinations affect the health of the target group? Are there socio-economic effects resulting from lower burdens?				
13.3 To what extent can overarching developmental changes be identified at the level of particularly disadvantaged or vulnerable sections of the target group to which the programme is set to support? (Or if such changes are to be anticipated in the future, please be as specific as possible in terms of time)	Access to vaccination services for: Women? Ethnic minorities? Religious groups? People in poverty?				
Evaluation dimension 14: Contribution to overarching developmental changes (intended)			2	o	
14.1 To what extent did the programme actually contribute to the identified or forseeable overarching developmental	Is it possible to deduce a contribution to higher vaccination coverage and therefore prevention of diseases, an alleviation of the				

changes (also taking into account the political stability) to which the programme was intended to contribute?	burden of disease on families and the health system as well as a reduction in child mortality?	
14.2 To what extent did the programme achieve its intended (possibly adjusted) developmental objectives? In other words, are the project impacts sufficiently tangible not only at outcome level, but at impact level? (e.g. drinking water supply/health effects)	Contribution to health situation?	
14.3 Did the programme contribute to achieving its (possibly adjusted) developmental objectives at the level of the intended beneficiaries?	See above	
14.4 Has the programme contributed to overarching developmental changes or changes in life situations for particularly disadvantaged or vulnerable sections of the target group (potential differentiation according to age, income, gender, ethnicity, etc.) that the programme was intended to support?	Are there any observable effects on the socio-economic situation of the population due to a lower burden of illness, avoided disabilities?	On-site discussions Literature
14.5 Which project-internal factors (technical, organisational or financial) were decisive for the achievement or non-achievement of the programme's intended developmental objectives? *(Learning/help question)*	No specification necessary	
14.6 Which external factors were decisive for the achievement or non-achievement of the programme's intended developmental objectives? *(Learning/help question)*	No specification necessary	
14.7 Does the project have a broad-based impact?	Wide-ranging effect through the introduction of solar powered refrigerators with solar	

- To what extent has the programme led to structural or institutional changes (e.g.in organisations, systems and regulations)? (Structure formation) - Was the programme exemplary and/or broadly effective and is it reproducible? (Model character)	panels? Effect on further use of solar energy in the field?				
14.8 How would the development have gone without the programme (developmental additionality)?	Can it be assumed that without FC support there would have been interruptions in the supply of vaccinations for the population? How would the state of the cold chain infrastructure have developed – would other donors have taken over the investments? Would further EPI measures have suffered as a result, as there would have been even fewer adequate storage capacities?	Discussion on site			
Evaluation dimension 15: Contribution to (unintended) overarching developmental changes	Note: if there are **no** unintended effects: ➔ No weighting ➔ No evaluation		1	0	
15.1 To what extent can unintended overarching developmental changes (also taking into account political stability) be identified (or, if changes can be anticipated for the future, please be as specific as possible in terms of time)?	See also Effectiveness – Effects of the introduction of solar powered cold chain infrastructure?				
15.2 Did the programme noticeably contribute to unintended (positive and/or negative) overarching developmental impacts or is the programme predicted to contribute to such impacts?	See above				
15.3 Did the programme noticeably (or is the programme predicted to) contribute to unintended (positive or negative)	See above				

overarching developmental changes at the level of particularly disadvantaged or vulnerable groups (within or outside the target group; do no harm, e.g. no exacerbation of inequality (gender/ethnicity))?		

Sustainability

Evaluation question	Specification of the question for the present project	Data source (or rationale if the question is not relevant/applicable)	Rating	Weighting (- / o / +)	Rationale for weighting
Evaluation dimension 16: Capacities of participants and stakeholders			3	0	
16.1 Are the target group, executing agencies and partners institutionally, personally and financially able and willing (ownership) to continue producing the positive effects of the programme over time (after the end of the promotion)?	At MoH level and local level in the health care system? UNICEF?	Documentation over the years Discussion on site			
16.2 To what extent do the target group, executing agencies and partners demonstrate resilience against future risks that could jeopardise the impact of the programme?		Discussion on site			
Evaluation dimension 17: Contribution to supporting sustainable capacities:			2	o	
17.1 Did the programme contribute to the target group, executing agencies and partners being institutionally, personally and financially able and willing (ownership) to continue producing the	Contribution of training and awareness-raising measures?				

positive effects of the programme over time and, where necessary, to curb negative effects?					
17.2 Did the programme contribute to increasing the resilience of the target group, executing agencies and partners against risks that could jeopardise the effects of the programme?	Effect of vaccinations on resilience?				
17.3 Did the programme contribute to increasing the resilience of particularly disadvantaged groups against risks that could jeopardise the effects of the programme?	Effect of vaccinations on resilience?				
Other evaluation question 1	What is the current condition of the cold chains/cooling equipment?	Site visits			
Other evaluation question 2	Proposals to sustainably improve the efficiency of the vaccination programme include the introduction of an electronic vaccination register, which will allow for improved monitoring of both vaccination appointments and individual vaccinations. (Mmanga et al., 2021) - is this now the case?	On-site discussions			
Evaluation dimension 18: Durability of impacts over time			3	0	
18.1 How stable is the context of the programme (e.g. social justice, economic performance, political stability, environmental balance)? (*Learning/help question*)	Durability of the effect of vaccinations is undisputed, when courses of routine vaccinations are completed. Financial and staff situation in the health care system?	MoH and expert assessments			
18.2 To what extent is the durability of the positive effects of the programme influenced by the context? *(Learning/help question)*	Vaccination programmes should be continued without interruption so that incidence of disease can be reduced or eliminated entirely – how realistic is continuous financing?	Documentation Discussion on site			

18.3 To what extent can the positive and, where applicable, negative effects of the programme be considered long lasting?	Vaccinations have a lasting effect Support for the EPI had a long term effect with regard to cold chain infrastructure – but are necessary replacement investments being made?	
18.4 To what extent can the gender results of the programme be considered long lasting (ownership, capacities, etc.)? (FC e-specific question		Not relevant