

Ex post evaluation – China

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Sector: Medical services (CRS code 12191)

Project:

- (a) Health programme/HIV prevention – BMZ No. 2002 65 504
- (b) Health programme/HIV prevention I – BMZ No. 2002 65 801**
- (c) Health programme for the western provinces – BMZ Nr. 2003 65 957* – Hospital component; BMZ No. 2003 65 957 – CDC/HIV components
- (d) Modernisation of health care in the western provinces – BMZ No. 2005 65 382
- (e) Modernisation of health care in the western provinces – BMZ No. 2007 65 776*
- (f) HIV/AIDS prevention in border regions – BMZ No. 2005 65 416
- (g) HIV/AIDS prevention in border regions – BMZ No. 2006 65 760

Implementing agency: Ministry of Finance



Ex post evaluation report: 2018

		Total (Planned)	Total (Actual)
Investment costs (total)	EUR million	244.10	241.11
Counterpart contribution	EUR million	64.87	61.32
Funding	EUR million	179.23	179.79
of which BMZ budget funds	EUR million	179.23	179.79

*) Random sample 2016 **) Random sample 2017

Summary: The FC-funded projects comprised infrastructure measures to improve the monitoring, control, preventive and therapeutic capacities for HIV/AIDS and other diseases relevant for the population (including the safety of blood and blood products, consumer health protection, biosafety and environmental hygiene). The FC-financed hospital projects comprised measures to provide modern technical equipment, especially in the poorer western provinces of China. Funding was provided for installation and maintenance contracts for medical and building engineering equipment, and to a lesser extent, for construction measures and consulting support for procurement procedures. In addition, the HIV components included financing for installation and maintenance contracts for medical and IT equipment, educational measures, and (to a lesser extent) construction measures and consulting support for procurement procedures, along with the implementation of HIV prevention campaigns.

Objectives: The objective of the FC measures (outcome) was to improve the quantity and quality of medical/technical services offered by the supported public hospitals and public health services, as well as to bring about behavioural changes and reduce the pathogen habitat for schistosomiasis. This was intended to contribute towards improving the health situation of the population in the target provinces, and preventing local, national and global epidemics (impact).

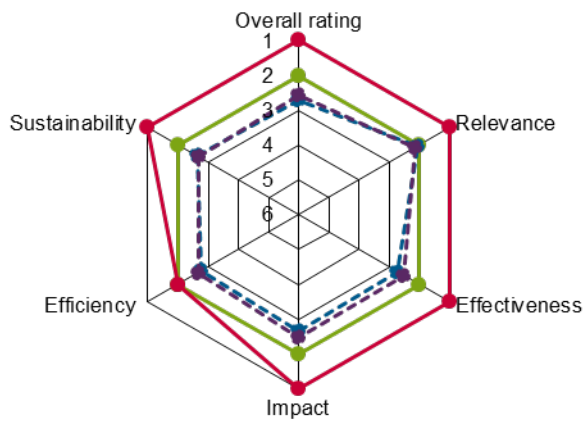
Target group: The target group was the roughly 11 million inhabitants in the catchment area of a total of 56 hospitals supported by the projects in 14 provinces of China. By giving preference to district hospitals and rural clinics, the aim was for the poor population to also benefit from the FC measures – indeed, particularly so.

Overall rating: 1 (Project (b) and (e)) 2 (Project (a), (c), (d), (f) and (g))

Rationale: The projects were an integrated part of the government investment programmes to meet the rapidly increasing demands on medical care as a result of industrialisation, socio-economic change and urbanisation with an appropriate range of prevention, diagnosis and therapy (high relevance), and to adapt the health system to the rapidly increasing prevention and control requirements (including coping with new epidemics such as SARS and HIV/AIDS). The projects created a modern clinical technology platform that made a structural contribution to the high efficiency of the Chinese health care system. The impacts at the developmental level are plausible. The effectiveness is in line with expectations at the planning stage and partially exceeds them.

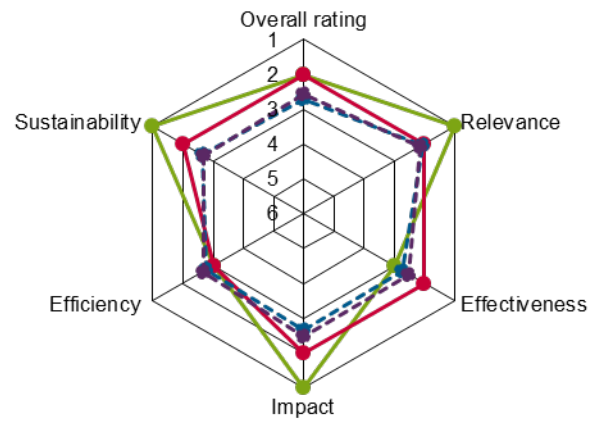
Highlights: The complete embeddedness of the project in an overarching reform programme is worthy of note, as is the consistently decentralised organisation of the projects and the technological leap brought about by the projects, which made effective contributions to modernising the supply landscape in the target regions.

Projects a), b), c) and e)



- Project a) and c)
- Project b) and e)
- - -●- - - Average rating for sector (from 2007)
- - -●- - - Average rating for region (from 2007)

Projects d), f) and g)



- Project f) and g)
- Project d)
- - -●- - - Average rating for sector (from 2007)
- - -●- - - Average rating for region (from 2007)

Rating according to DAC criteria

Overall rating: Ratings

BMZ No.	200265504	200265801	200365957	200565382	200765776	200565416	200665760
	a)	b)	c)	d)	e)	f)	g)
Rating	2	1	2	2	1	2	2

The evaluation was carried out jointly for all projects, as the individual programmes were partly based on each other, had the same priorities or were implemented at the same time in the same region, and some impacts could not be viewed in isolation and attributed to financing from the individual programmes.

Ratings:

BMZ No.	a)	b)	c)	d)	e)	f)	g)
Relevance	2	1	2	2	1	1	1
Effectiveness	2	1	2	2	1	3	3
Efficiency	2	2	2	3	2	3	3
Impact	2	1	2	2	1	1	1
Sustainability	2	1	2	2	1	1	1

General conditions and classification of the project

FC has been active in the Chinese health sector since 2001. The seven major individual programmes comprise 29 components in 22 western and northern provinces. The health programme under evaluation was the first German FC commitment in the health sector, as well as the first German HIV/AIDS prevention programme in the People's Republic of China. With the exception of the Rural Health project (BMZ No. 2005 65 416; project completion report planned for 2019 and thus not part of this evaluation), the PCR was carried out for all projects. This will put an end to traditional development cooperation with China in this sector. Future investments in Chinese health infrastructure will now only be financed through promotional loans.

The seven individual projects were carried out in a decade during which China attempted to meet the rapidly growing challenges facing the health sector by means of fundamental sectoral reforms. The individual components of the FC projects (improvement of the hospital system, prevention and control of communicable diseases including HIV/AIDS and schistosomiasis, safety of blood and blood products, and consumer health protection) reflect the intervention priorities of the reforms.

Investment priorities	Measures						
	a)	b)	c)	d)	e)	f)	g)
Hospital investments	✓		✓	✓			
CDCs ¹		✓	✓		✓	✓	✓
Blood and blood products		✓					
HIV/AIDS		✓	✓		✓	✓	✓
Combating schistosomiasis					✓		

Specific investments for all CDC functions (Centres for Disease Control) in the field of public health were made in particular through programme (c). Programmes (b), (e), (f) and (g) provided funding for disease-specific investments, both for the CDCs and for other public health services (including blood banks and reference laboratories).

¹ Centres for Disease Control and Prevention

Given (i) the size of the projects (more than half of the country's provinces, a target population of over 800 million people and hundreds of health facilities promoted), (ii) the lack of data availability and (iii) a limited timeframe for the field mission, this EPE focuses mainly on cross-project general conditions, outcomes and structural impacts. Individual evaluations were submitted for each component, which were summarised into an overall evaluation per priority area (component) for all projects. In addition, an overall rating was issued for each BMZ number.

Breakdown of total costs

		200265504	200265504	200265801	200265801	200365957	200365957
		(a)	(a)	(b)	(b)	(c)	(c)
		(Planned)	(Actual)	(Planned)	(Actual)	(Planned)	(Actual)
Investment costs	EUR million	50.52	50.10	6.37	5.00	132.24	129.36
Counterpart contribution	EUR million	-	1.02	1.37	-	42.50	42.50
Funding	EUR million	50.52	49.08	5.00	5.00	89.74	86.87
of which BMZ budget funds	EUR million	50.52*	49.08*	5.00	5.00	89.74*	86.87*

		200565382	200565382	200765776	200765776	200565416	200565416
		(d)	(d)	(e)	(e)	(f)	(f)
		(Planned)	(Actual)	(Planned)	(Actual)	(Planned)	(Actual)
Investment costs	EUR million	20.50	19.88	20.50	22.81	1.47	1.47
Counterpart contribution	EUR million	2.70	0.00	10.50	10.00	0.30	0.30
Funding	EUR million	17.80	19.86	10.00	12.81	1.17	1.17
of which BMZ budget funds	EUR million	17.80*	19.86*	10.00	12.81	1.17	1.17

		200665760	200665760
		(g)	(g)
		(Planned)	(Actual)
Investment costs	EUR million	12.50	12.50
Counterpart contribution	EUR million	7.50	7.50
Funding	EUR million	5.00	5.00
of which BMZ budget funds	EUR million	5.00	5.00

* Development loans: (integrated) composite financing (loans); otherwise grants or budget loans

Relevance

China's exceptionally successful economic development over the past 30 years has had significant and positive impacts on poverty alleviation, the general improvement of living conditions and the availability of social services. Demographic, disease and mortality indicators have improved dramatically. Despite this impressive progress in health and health care, China's health sector suffered in the face of complex challenges during the programme appraisals between 2002 and 2008:

(i) Significant inequalities in income, health and mortality between regions of the country, between socio-economic groups and between the urban and rural populations. These factors, coupled with continuously rising prices for services, led to a declining affordability of health care for the lower income groups. A large number of studies showed that rising out of pocket (OOP) payments were a major barrier to accessing health care and a cause of poverty.

(ii) Since the 1980s, the importance of primary care (once a key factor for positive health development after the revolution) has declined considerably. This was particularly the case for community-based prevention and health care. The vulnerability to and morbidity rates of diseases of modern society rose sharply, and increasingly burdened the Chinese health care system and social systems. This led to a high average annual increase in health spending of 8.4%, well above the forecast economic growth. Approximately 54% of this expenditure is spent on inpatient care (the OECD average is 38%).²

(iii) Limited capacity of health services to solve problems: The epidemiological transition to chronic diseases and new epidemics required very different and much more complex diagnostic, therapeutic and management capacities, which were not available in sufficient quantity in either the care system or the public health system.³ Responsiveness to public health emergencies dropped. The outbreak of SARS in 2003 revealed these weaknesses bluntly. At the same time, there was a great need to adapt the public health system to the challenges of the HIV epidemic, to ensure the safety of blood and blood products, and to develop modern control and prevention strategies.

(iv) Growing inefficiencies in the health care system, burdens on hospitals and the increasing importance of secondary and tertiary care: between 2005 and 2012, for example, the use of outpatient health services for primary hospitals increased by 60%, for secondary hospitals by 95% and for tertiary hospitals by 190%. For inpatient admissions, the corresponding figures were 213%, 172% and 233% respectively. The reasons for this development were the persistently low appeal and performance capacity of primary care and the lower hospital levels since the 1990s. There was essentially no effective referral system in place. “Gatekeeper functions” for the efficient control of patient flows were also lacking. As part of the self-financing policy, public hospitals had strong incentives to expand profitable, high-priced services and the sale of medicines to wealthy patients, to the detriment of access for poorer sections of the population. This situation was exacerbated by weak state control over all public hospital spending and a lack of incentives for efficiency and rational, evidence-based services. As a result, this financing mix led to uneven growth and an uneven distribution of hospital facilities, at the expense of basic and outpatient care and with competing urban and large district hospitals dominating. Rural regions and regions with low incomes or weak structures were particularly affected by this development.

Since the early 2000s, The Chinese government has responded to these challenges with far-reaching reforms to improve access to health services for all population groups. The focus was placed on expanding the state health insurance systems, improving infrastructure and substantially increasing human and financial resources to implement reforms and run the facilities. Between 2000 and 2011, China’s total health expenditure rose from USD 51 to USD 305 per person, an average annual increase of 17.4%.⁴ Given the inability of public health services to cope with the problems of SARS, HIV/AIDS and diseases such as tuberculosis and schistosomiasis, public health services were reshaped and expanded from 2003. Between 2003 and 2006, a new and comprehensive disease prevention and control system was introduced along with a public health emergency medical care system. The preventive and control measures were aligned with international standards. Funds for investment and capacity development were provided by the central and provincial governments as well as a number of international donors. At the same time, the funds for running the services were significantly increased (by an average of 20% per year from 2002 to 2012).⁵

The Financial Cooperation (FC) programmes covered by this EPE supported the above-mentioned reforms by financing necessary investments. The core problems outlined above were correctly identified at the time of the project appraisals. The design of the programmes was particularly focused on challenges (i), (iii) and (iv) above.

² Deepening Health Reform In China. Policy Summary. China Joint Study Partnership. World Bank Group, World Health Organization, Ministry of Finance, National Health and Family Planning Commission, Ministry of Human Resources and Social Security. 2016.

³ The term “public health” is used within this EPE (synonymous with the German definition) for facilities and services that deal with observing and protecting the health concerns of the population as a whole. It includes medical advice to institutions and public bodies on health planning, health security and health protection, health promotion and health care, as well as disease prevention and control and health monitoring.

⁴ Long et al.: Changes in health expenditures in China in 2000s: has the health system reform improved affordability. *International Journal for Equity in Health* 2013 12:40.

⁵ Chengyue et al. The Centers for Disease Control and Prevention System in China: Trends From 2002–2012. *Am J Public Health*. 2016 Dec; 106(12): 2093–2102.

The target regions of all the FC programmes were disadvantaged provinces in Western and Central China. In terms of the life expectancy of the population, for example, these regions find themselves considerably lower than the other Chinese provinces⁶ and are burdened by high morbidity levels. The EPE carried out comparative calculations for the years 1990, 2000 and 2010 for all provinces, confirming these findings. Other indicators such as per capita expenditure on health or the availability of health infrastructure and human resources reflect the inequality pattern.

There are also significant differences within the provinces in terms of income level, the allocation of health resources or health status. However, there was no specific targeting by the programme below provincial level. By focusing on rural regions and hospitals at lower care levels though, it can be assumed that reducing poverty was a determining factor in the selection of the target institutions. Selecting locations for HIV/AIDS and CDC components, the schistosomiasis component and priorities to improve the safety of blood and blood products equally focused on problem areas. Western and central provinces with a high risk of transmission or high disease burden (Henan and Yunnan among others) were selected.

The selection principles confirm the high relevance of the project design with regard to reducing care inequalities between locations and the improving prevention, control and therapy in high-risk areas. The programmes with all their components were aimed at improving the responsiveness, quality and efficiency of services as well as the biosafety of diagnostic procedures, personal and consumer protection. Extensive equipment financing was to enable hospitals and public health services to strengthen their preventive, diagnostic, curative and control capacities and thus contribute to achieving the objectives of all the projects, which focused on increasing the use of good quality preventive, diagnostic and curative health services by the target groups in the programme regions. This was intended to help achieve the overall objective of all the projects: to “improve the health situation in the relevant provinces of China”. This results chain appears logical and consistent, with some reservations in the area of quality (see below). The introduction of health insurance was a necessary condition.

All public health improvement programmes supported the implementation of new health strategies. Expanding the diagnostic capacities of the CDCs and blood banks provided support for both implementation of national strategies to decentralise preventive services and stronger involvement of local government structures. The investments were highly relevant to creating a well-structured, decentralised network of public health services to control, prevent and treat communicable diseases, including HIV/AIDS and the safety of blood and blood products. FC-financed capacity development and advisory support measures during the planning and implementation phases of the projects thereby enhanced the implementation of the national strategies.

The impact of the SARS outbreak in China highlighted the risks of global epidemics that arise when national health care systems are inadequate. From southern China, the epidemic spread to 37 countries with 8,500 cases and 916 deaths worldwide from 2003 onwards (Kleinman and Watson 2006).⁷ The project investments were aimed at reducing the risks of global epidemics and implementing global prevention priorities (WHO 2014).⁸ FC investments are also highly relevant in this respect.

The rapid spread of HIV infection via contaminated blood and blood products since the mid-1990s and fast-spreading infections among risk groups such as drug addicts, prostitutes or homosexuals were “game changers” in the Chinese response to the epidemic. The planning of the FC-financed programmes was integrated into reforming the prevention, control and therapy landscape and was highly relevant for its successful implementation. The blood safety legislation passed in 1998 laid the foundations for decommercialising blood donations, systematically applying safety measures and promoting voluntary blood donations. This law was supplemented in 2006 by the regulation of blood transfusion services and blood banks, making systematic testing for HIV and other infections mandatory standards. The FC projects were highly relevant for the institutionalisation and implementation of these rules and regulations by creating and consolidating control networks. The highly relevant programme design of the schistosomiasis compo-

⁶ See “Impact” chapter

⁷ Alain Guilloux, “Arthur Kleinman and James L. Watson (eds), SARS in China”, China Perspectives [Online], 2007. URL: <http://journals.openedition.org/chin perspectives/1923>

⁸ including WHO SARS Risk Assessment and Preparedness Framework October 2004

ment (E), which combined holistic, state-of-the-art prevention and control measures, deserves particular mention.

There were close links with the national development plans as well as related sectoral strategies and reform programmes.⁹ The projects were in line with the BMZ's health policy objectives to provide effective and efficient preventive, curative and rehabilitative health care that is accessible to all and fairly financed, as well as being geared towards the needs of the people's most important health problems.

Factors impairing the relevance of the projects included:

(i) The asymmetry of investments between primary care and the hospital sector. While the inadequate primary care was addressed in the programme appraisals, this was not taken into further account in the programme designs. The programmes focused exclusively on hospital investments, which was justified by their continued accessibility for poorer sections of the population. No consideration was given to alternatives such as investing to a limited extent in primary care (e.g. in World Bank programmes).

(ii) Incentives to systemically overuse diagnostic and therapeutic equipment to improve hospital revenues. The prices for medical services, surgery and other services provided by public hospitals in China are fixed centrally. At the same time, however, the provision of drugs, diagnostic tests or complex therapeutic services followed a market model. The budgets and insurance benefits provided by the government were and are insufficient overall to finance the hospitals. Clinics had (and largely continue to have) strong incentives to maximise the number of patients and their length of stay. As a result, complex diagnostic and therapeutic equipment was used intensively and often unjustifiably in cases, selling expensive branded pharmaceuticals (instead of generic drugs). Apart from the cost implications, this practice has significant consequences for the affordability of health services by poor rural populations, especially in rural regions that are structurally weak, for the efficiency of hospital operations, and for the quality of care.

(iii) Insufficient consideration of quality aspects in designing measures and selecting indicators. None of the indicators used for the projects reflects quality objectives. Although the personnel and system-related quality problems, particularly in hospitals, were identified during the programme appraisal, they were not taken into sufficient account in the results chains. Quality problems occur to a far lesser extent in the re-designed CDCs, in HIV/AIDS prevention and control institutions, in blood banks or in the schistosomiasis field.

The need for more intensive capacity development over and above the operation and maintenance training for new equipment was identified during the appraisals. However, the Chinese partners were not inclined to devote more extensive programme funds to capacity development.

(iv) Inadequate coordination between institutional actors in the sector is seen as a major obstacle to innovation and sustainable reform implementation in China's health sector.¹⁰ A large number of government organisations were involved in investment, operational and financing decisions. The absence of a common understanding among the participants about the reform content, a certain competition among donors and the limited sector dialogue and knowledge exchange hindered the implementation of the reforms. It was not possible to seize the opportunity to bring the far-reaching experience of German DC to bear in the sectoral reform dialogue in China. By contrast, the World Bank and DFID¹¹ have demonstrated that influencing sectoral reforms in China is both possible and welcome.

Relevance rating: Hospital components of the projects a), c), d): 2
Components of the projects b), e), f), g): 1

Effectiveness

There are major challenges in assessing the effectiveness of the programmes. Complete baseline and endline data for the indicators is not available for any of the seven programmes. The same applies to the

⁹ Including the 11th and 12th Five-Year Plan, the regional development plans for Western China and the programmes for sectoral reforms and Universal Health Coverage since 2001.

¹⁰ World Bank. CHINA: Health Reform Program for Results. PROGRAM-FOR-RESULTS INFORMATION DOCUMENT (PID). AP-PRAISAL STAGE. PIDA0106846.2017

¹¹ DFID Influencing in the Health Sector. A Preliminary Assessment of Cost Effectiveness. Working Paper 33. 2009.

availability of monitoring data. In view of the long periods between the start and completion of the projects as well as the incomplete or inaccessible use data (HIV/AIDS), the ex post collection of data proved to be unfeasible in most cases. Instead, indicators at provincial or national level were used for this EPE. The consistently positive developments in all regions with regard to access to and demand for health care make this seem appropriate, which was also largely confirmed by the PCR sand the EPE teams during the field visits.

With the exception of the schistosomiasis component of programme e), the defined objectives and indicators are quantitatively defined and relate to the utilisation rates of the equipment. With regard to the considerable challenges in developing the Chinese health care system (especially for the hospital components), we do not believe that indicators related to the use of equipment alone are sufficient to assess the effectiveness of the projects. For example, the systemic overuse of equipment to generate additional hospital revenue significantly reduces the meaningfulness of indicators on equipment use and service usage. Indicators to measure the use of hospital services should be complemented by indicators on the quality of care services as well as fair care and access (see Relevance chapter).¹²

As part of this EPE, the programme objective for all programmes is adjusted as follows: **Increasing use preventive, diagnostic and curative health services of good quality by the target groups in the programme regions.**

Health programme/HIV prevention – hospital component a)

The programme objective was to ensure proper use of state-of-the-art technical equipment to improve the diagnostic, treatment and prevention capacities of the target hospitals. The following target achievement indicators were defined: utilisation rates for selected equipment (especially computer tomography, X-ray, ultrasound) as well as the number of laboratory analyses performed.

The ex post collection of data for these indicators for the 35 hospitals in nine provinces was not possible during either the final review of November 2013 or during this EPE. The final review confirmed the adequate use of the supplied equipment for four programme hospitals that were visited.

The indicators are summarised in the following table. The data sources are the statistical yearbooks of China from 2002 to 2016 along with other data published by the government. Where no data was available for outpatients in the programme provinces, the data for the whole of China was used.

The target achievement can be summarised as follows:

Indicator	Status at ex post evaluation
User rates for selected devices (especially computer tomography equipment, X-ray devices, ultrasound devices) increase by at least one-third	No baseline and endline data defined or collected; no systematic monitoring ¹³
<u>EPE recommendation</u>	
Increase in number of inpatients by 30% (2004–2014) for the six programme provinces agreed on at the project appraisal ¹⁴	Achieved Programme provinces: 119% China (2005–2012): 149%

¹² Examples of income-based indicators on access, quality and user satisfaction can be found, for example, in the impact matrix of the World Bank project CHINA: Health Reform Program for Results. P154984. <http://projects.worldbank.org/P154984?lang=en>

¹³ No data was collected during the final review

¹⁴ Anhui, Gansu, Guangxi, Hebei, Hubei, Inner Mongolia, Xinjiang

Increase in number of outpatients by 30% (2003–2013)	Achieved Programme provinces: no consistent data available China (2005–2012) 86%
Increase in patient numbers for specific diagnostic and therapeutic procedures	
Increase in treatment rates for high blood pressure ¹⁵ by 30% (2002 – 2012) ¹⁶	Achieved
Urban Chinese regions	36%
Rural Chinese regions	92%

A wealth of data shows that the changing demographic profile and disease patterns over the last two decades have constantly increased the complexity of diagnostic and therapeutic processes and thus the demand for hospital treatment. The enormous increase in the use of outpatient services in the programme provinces corresponds to the demand trend for China as a whole, which could only be met effectively by expanding capacity. Between 2003 and 2013, the large number of corresponding investments throughout the country led to a highly significant increase in hospital beds. In the six original target provinces (total population 332 million in 2010) the number of hospital beds increased by 384,000 from 801,000, which corresponds to an increase in the bed rate from 2.41 to 3.57 beds per 1,000 inhabitants.

The programme investments made a significant contribution to improving the diagnostic and therapeutic capacities of the target hospitals. At the same time, the problem-solving capacity of the hospitals was increased to cope with the constantly growing number of non-communicable chronic disease cases.

Based on the PCR assessment of the use of programme hospitals and the quantitative data mentioned above, we can conclude that the adjusted indicators were achieved.

Effectiveness rating of programme a): 2

HIV prevention project b)

The programme objective was the proper use of state-of-the-art technical equipment to improve the diagnostic, treatment and prevention capacities of the target facilities. There were six CDCs and 190 blood banks and blood stations in two provinces (Anhui and Hubei). The following target achievement indicators were defined: “utilisation rates for selected equipment as well as the number of laboratory analyses performed”. No systematic monitoring of this data is documented. Baseline data and endline data was not collected. An ex post survey of the indicators was not feasible either during the November 2013 PCR or during the EPE. The PCR confirmed the extended and appropriate use and maintenance of the equipment provided for the CDCs and blood laboratories. The effectiveness of the investments was thus considered positive.

Besides the increased use of HIV and confirmation tests, state-of-the-art indicators would include the number of blood donations tested for HIV and other pathogens. Such data was not available in China until 2009. It is only since 2010 that UN AIDS and the Chinese government have regularly provided quantitative data on the number of HIV tests. Data collected during the EPE for the provinces of Yunnan and Henan were used as proxy indicators for the use of HIV studies. The results confirm the rapid increase in HIV testing nationwide. In Henan province, the number of tests increased fourfold between 2005 and 2015. In Yunnan Province, the number of HIV tests increased steadily from less than 500,000 in 2004 to 10 million annually in 2015.

¹⁵ In China as a whole the prevalence of high blood pressure rose by 26% from 18.8% in 2002 to 26.3% in 2012. China Statistical Yearbook 2015 Health and Family Planning

¹⁶ Own calculations based on “China Statistical Yearbook 2015 Health and Family Planning”

Regular viral load tests as prognostic markers of disease progression are essential in measuring the efficacy of treatment for patients receiving antiretroviral (ARV) treatment and the risk of transmission. For AIDS patients under ARV therapy, morbidity and mortality can be better predicted if viral load tests are regularly performed. By supporting the introduction and province-wide extension of this test programme, ARV treatment quality was improved.

Effectiveness rating of programme b): 1

Health programme for Western Provinces c)

The programme objectives included improving the diagnostic, treatment and prevention capacities in programme hospitals, improving the capacities of CDCs for the diagnosis, prevention and control of diseases, and the capacities of HIV test laboratories to diagnose and combat HIV/AIDS. The programme was divided into three components: the hospital component comprised 18 hospitals in five provinces; the CDC component 109 CDCs in eight provinces, and the HIV/AIDS component more than 200 laboratories in four provinces as well as at the central level (national reference laboratory).

There is no documentation on the systematic results monitoring of agreed indicators. However, selected information such as bed occupancy, the number of operations or newly introduced procedures, diagnostic and laboratory tests in hospitals are available and were used to assess target achievement. In addition, selected indicators for the provincial levels were used for the EPE. The EPE confirmed the results of the 2016 final review regarding the functional rate of delivered equipment being over 90% and in a generally good functional condition. The equipment is used intensively. There was a leap in innovation for many hospitals and CDCs, both in terms of quantity and in the availability of improved diagnostic and therapeutic services.

Hospital component:

Increase of selected equipment-related performance indicators of hospitals by one third, 3 years after project completion	No baseline and endline data available Achieved according to 2016 PCR
Recommendation of 2016 PCR for verified hospital component; ¹⁷ confirmed by EPE.	
Increase of laboratory tests and imaging procedures by one third, four years after installation	Achieved. Laboratory tests: 50%; Imaging procedures: 60%.
Increase in inpatient numbers by one third, four years after installation	Achieved. 86%.
Increase in bed occupancy rate by one third, four years after installation	Achieved. 54%.
Increase in hospital revenue by one third, at least four years after installation	Achieved. 153%.

For the hospital component, there was significant expansion in the use of imaging procedures, laboratory tests, surgery, bed occupancy rates and hospital income. These results are consistent with data from other programmes in this EPE, as well as information during hospital visits and national data on hospital performance results and use. The programme investments made a significant contribution to increasing the diagnostic and therapeutic capacity of the target hospitals, including their problem-solving capacity to cope adequately with the ever-increasing number of non-communicable diseases.

The hospital investments also supported the introduction of new technologies and procedures, with the result that a significant number of patients are no longer referred to higher care levels (such as endoscopic surgery, radiotherapy and others). This reduces direct and opportunity costs for patients. New therapeutic

¹⁷ Based on a non-representative impact assessment by the consultant for selected hospitals in 2015, in which usage data of equipment (laboratory, imaging procedures), patient numbers, business management data and data on introducing new therapy methods was collected

tic procedures introduced by the programme (e.g. endoscopic surgery) lower patient stress by reducing post-operative pain as well as shortening recovery times and people’s inability to work. The effectiveness was limited by the fact that the medical briefing of the staff was not sufficient to exploit the full potential of the complex equipment.

Effectiveness rating of the hospital component of programme c): 2

CDC system and HIV/AIDS:

Increase in test capacity, number of available test procedures, quality of tests; emergency response; biosafety.	Achieved. Cannot be verified in terms of the investment as the results are not quantified.
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China’s CDCs were fundamentally restructured after the system proved incapable of handling the SARS outbreak in 2003. The health authorities at the highest level responded by restoring population-based health targets, drastically increasing funding for infrastructure and personnel, and restructuring all prevention and control structures. The investments under this programme were not only aimed at improving HIV prevention and control. A significant part of the funds supported improvements in all other essential tasks of the CDCs. These include consumer health protection functions (food safety, drinking water protection, monitoring of food businesses, hospital hygiene controls, schools, nurseries, radiation safety and environmental hygiene). The FC programme also made a financial contribution to introduce a “real time” electronic disease surveillance system for communicable diseases.

CDCs and HIV laboratories recorded a significant increase in the total number of HIV tests and other laboratory tests. In Yunnan, the number of HIV testing facilities increased from 32 in 2004 to 2,600 in 2015, and the number of HIV tests from less than 500,000 to 10 million in 2015. Antiretroviral treatments increased in an almost straight-line fashion from 1,050 cases in 2005 to 60,500 in 2015. Parallel to this, HIV mortality decreased from 25% in 2005 to less than 5% in 2015, and the rate of mother-to-child transmission of HIV decreased from around 8% in 2006 to 4% in 2015. As confirmed in the PCR, similar figures were reported from other programme provinces. While these results must also be attributed to complementary measures and sources of funding, the programmes’ substantial investments made marked contributions to the rapid improvement of HIV prevention and control capacities as well as consumer health protection. At the same time, the biosafety of laboratory operations and the responsiveness of CDCs were strengthened.

The conclusions under programme b) in this report concerning rapid increases in HIV testing capacities, including the introduction of viral load testing, are equally transferable to the CDC and HIV components of this programme.

Effectiveness rating of the CDC and the HIV component of c): 1

Effectiveness rating of c) overall: 2

Modernisation of health care in the western provinces d)

The programme objective was to improve the quality and scope of health services, in particular the diagnostic and treatment capacities in selected hospitals in the programme region (Anhui and Hubei provinces).

Indicators were defined: Increase in equipment-related performance data by one third; three years after completion of projects. Six individual indicators were defined in the financing agreement. In the absence of baseline data and systematic monitoring, data was compiled for three of the six indicators during the 2013 PCR. For the others – average length of stay, utilisation rate for key equipment and budget for staff, operations and maintenance – no data could be obtained.

Increase in inpatient numbers by one third; 2011–2013	Achieved. Increase of 81%
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Increase in number of outpatients by one third; 2011–2013	Achieved.
Increase in bed occupancy rates by one third (from 72% to 96%) 2011–2013	Not achieved. Increase of 12.5% (from 72% to 81%)

The bed occupancy target of 96% was not achieved. However, the target seems unreasonably high for this level of care. The figure achieved of 81% reflects satisfactory performance standards for hospitals at this care level.

Available usage data collected during the PCR for larger devices, such as X-ray, MRE or ultrasound equipment, points towards intensive use.

The conclusions drawn for programmes (a) and (c) in this report concerning the positive and problematic impacts of infrastructure modernisation, problem-solving capacity, usage trends, the uneven growth of different service levels as well as the systemic challenges of Chinese hospital financing and fair access are equally valid for this programme. Overall the programme investments made a significant contribution to improving the diagnostic and therapeutic capacities of the target hospitals. At the same time, the problem-solving capacity of the hospitals was increased to cope with the constantly growing number of non-communicable chronic disease cases.

Effectiveness rating of programme d): 2

Modernisation of health care in the western provinces e)

The programme objectives were (1) to improve the qualifications of CDC health-care personnel; (2) to strengthen HIV prevention and control networks in the urban region of Kunming and in Henan province, and to promote nationwide HIV/AIDS education for health professionals and managers; (3) to develop an exemplary infection control system for schistosomiasis in the affected endemic area of Yueyang. Indicators at output/outcome level were defined and corresponding baseline and endline data were partially collected. With the exception of the schistosomiasis component, no systematic indicator monitoring was documented.

(1) Three years after equipping of laboratory, the number of HIV tests performed has increased by at least two-thirds.	Achieved. Multiple increase in HIV tests
(2) Three years after completion, the number using the consultation and examination units has increased by at least 50%.	Achieved. Henan: sevenfold increase Yunnan: not quantified at PCR; estimate: twofold rise
(3) Five years after completion of the component, the number of tests at the schistosomiasis control stations in Yueyang has increased by one-third.	The indicator is not measurable and not specific to the implementation of project measures.
(4) The intermediate host of schistosomiasis is eliminated in the water bodies redesigned with FC measures.	Achieved.
Additional indicators: reduction of schistosomiasis incidence ¹⁸ in humans and animals by at least 80%	Achieved for both humans and animals. ¹⁹

¹⁸ Annual number of people and animals newly infected with schistosomiasis

¹⁹ An additional indicator for schistosomiasis control was proposed by the final review: reduction in the incidence of schistosomiasis in humans and animals by at least 80%. This indicator was fulfilled according to the final review, but no baseline data could be retrieved. Data regarding the evolving incidence for the whole of China between 2005 and 2012 reveals a reduction from 564 to 12 newly infected people; this corresponds to a decrease in new infections of 98%. (Source: Reduction Patterns of Acute Schistosomiasis in the People's Republic of China. PLOS Neglected Tropical Diseases. May 2014. Volume 8. Issue 5).

For the HIV/AIDS component, there has been a highly significant increase in the number of tests carried out in all test centres. A total of 18 cities, 159 counties and 178 townships were supported in Henan Province. As a result, 615 HIV/AIDS screening laboratories and 38 confirmation laboratories were established. By the end of the programme (2012), 93% of all HIV-infected people in the province had access to antiretroviral therapy (ARV) and 100% had access to other services.

In Yunnan Province, visited during the EPE, the number of institutions carrying out HIV testing increased steadily from 32 in 2004 to 2,608 in 2015, covering 98% of the urban and rural communities. The number of HIV tests rose from less than 500,000 (2003) to 2 million (2008) and then 10 million (2015). The number of ARV treatments increased in an almost straight-line fashion from 1,050 cases in 2005 to 8,052 cases in 2008 and 60,489 cases in 2015, with HIV mortality dropping as a result from 25% in 2005 to 8% in 2008 and below 5% in 2015, while mother-to-child transmission fell from around 8% in 2006 to 4% in 2015.

The consulting services provided under the HIV/AIDS programme strengthened the prevention network through a variety of information and education measures, focusing in particular on high-risk groups and community-based organisations. Parallel to this, funded syringe-exchange programmes and methadone-substitution programmes (173 clinics in 2016) contributed to a significant reduction in HIV infection among intravenous drug users.

Effective and sustainable schistosomiasis control is a systemic multi-sectoral bundle of integrated measures involving a variety of sectors: running and standing water management, agriculture, forestry, health, education and others. The programme implemented these principles very well and included construction measures, provision of medical and other equipment, information technology, equipment for health services and schools as well as landscape modification measures to control snail habitats. The measures were implemented as planned. The clinical training of medical staff, provision of information material and training of 360 teachers and 520 “cross route activists” completed the infrastructure measures. This holistic approach, which was implemented alongside other measures by the government and other development partners, led to a drastic reduction in snail habitats. The prevalence of the pathogen in humans was significantly reduced and new infections were eliminated. The integrated measures thus proved their effectiveness.

Effectiveness rating of the three components and overall project e): 1

HIV-prevention programme in border regions f) and g)

The programme objectives of both projects were (i) to strengthen the capacities of HIV laboratories and other measures to prevent and control HIV and (ii) to improve knowledge, attitudes and practices regarding HIV prevention.

The “high quality” characteristic indicated in the description of the indicators depends on a number of factors (internal and external quality assurance systems, compliance with national protocols, competence of staff, etc.), the existence of which was not documented during the implementation. The country has a well-structured HIV laboratory network and national and provincial quality assurance systems to ensure a high quality of testing. The national technical guidelines on HIV/AIDS testing were published in 2004 and revised in 2009 to reflect recent methodological changes and international recommendations. However, there is no information available on the implementation of quality systems in the target services, so a corresponding assessment cannot be carried out.

Given that the major part of the programme budget was spent on laboratory equipment, it would have been better to validate compliance with the prevailing quality standards or to make supporting contributions to help achieve them. Such programmes in the future should take this into account.

HIV/AIDS prevention in border regions f)

Indicators at output/outcome level were defined: the corresponding baseline and endline data were **partially** collected in the project.

Xinjiang: number of AIDS patients treated	Achieved. Target of 1,400 people exceeded sixfold.
Xinjiang: Access to high-quality HIV laboratory testing	Not achieved. One-third of the target value of 12 million people.
Xinjiang: Number of Voluntary Counselling and Testing (VCT) consultations	Achieved. 32% above the target of 60,000 people.
Heilongjiang: 40,000 prostitutes and 20,000 homosexual men receive support from social workers	Achieved for both target groups: both target groups are at twice the target value of 40,000 and 20,000 people respectively.
Heilongjiang: Increasing knowledge about HIV prevention among (i) government employees and media representatives, (ii) medical personnel, (iii) commercial sex workers and (iv) men having sex with men	Data not collected for (i). Achieved for (ii), (iii) and (iv). Target values: (ii) 95%, (iii) 92% and (iv) 80%. Result values: (ii) 96%; (iii) 92.2% and (iv) 94.5%.
Heilongjiang: Number of VCT consultations rising	Achieved. Target of 40,000 exceeded threefold.

The target value for the indicator “Access to good quality HIV laboratory testing” appears to be defined too ambitiously when compared with test volumes in high-prevalence provinces (e.g. Yunnan).

In Heilongjiang Province, the project focused on information campaigns to change the knowledge, attitudes and behaviour of risk groups, as well as on improving the standard of medical and counselling staff along with diagnostic and curative processes. Some indicators show improvements. The share of the population reached with HIV/AIDS awareness measures increased to 92.5%. There is no information available on qualitative studies that measure behavioural changes, such as KAP²⁰ studies. The target for the use of voluntary HIV tests (VCT²¹) was significantly exceeded (125,000 in 2012 compared to the planned figure of 40,000).

In the Xinjiang region, the programme focused on procuring laboratory equipment and vehicles as well as promoting preventive measures, including training. Data is not available on the quality and results of the training measures.

As confirmed by the quantitative data collected during the PCR, the programme effectively strengthened the laboratory capacity for HIV prevention and control, and implemented HIV/AIDS prevention measures in both provinces. Unfortunately, no data is available on the quality of diagnostic testing or on the results of behavioural change measures in this province.

Effectiveness rating of programme f): 3

HIV/AIDS prevention in border regions g)

Guangxi: Establishment of an information centre	Achieved. The centre is in operation.
Guangxi: Access to high-quality HIV laboratory testing	Achieved. 120% above target of 6,000 people.
Guangxi: Access to high-quality HIV testing	Achieved. Target of 30,000 people exceeded fourfold.
Guangxi: Access to high-quality viral load testing	Achieved. Target of 8,000 people exceeded fivefold.
Guangxi: Access to drug resistance testing	Achieved. 60% above target of 500 people.

²⁰ Knowledge, Attitude and Practice Studies

²¹ Voluntary Counselling and Testing

In Guangxi, the laboratory equipment supplied improved the capacity of 37 HIV laboratories. Four other laboratories are now able to conduct viral load tests.

Overall, the programme effectively strengthened laboratory capacities for HIV prevention, control, diagnosis and treatment, as well as HIV/AIDS education in the programme provinces. The above-mentioned limitations on the quality of laboratory testing and the effectiveness of educational measures also apply to this programme.

Effectiveness rating of programme g): 3

Efficiency

The programmes for rehabilitating or expanding health infrastructure can only be evaluated to a limited extent in terms of their production efficiency. The reason for this is the individuality of the components, for which there are no standard costs revealing whether or not the investment, measures and goods are within the usual price range.

In view of the open programme approach, the total costs of several programmes estimated in advance had to be revised in the course of the implementation. As a result, the original planning and financing frameworks were flexibly adjusted.

Programme	Start (date of financing/loan contract)	Date of final review report	Planned duration (months)	Installation of equipment completed (months)	Formal duration (months)
Health programme/HIV prevention I, hospital component (a) BMZ No. 2002 65 504	19.12.2002	20.05.2015	30	30–36	148
Health programme/HIV Prevention I, HIV/ AIDS component (b) BMZ No. 2002 65 801	19.12.2002	20.05.2015	30	30–36	148
Health programme for the western provinces (c) BMZ No. 2003 65 957	1.12.2004 (29.11.2004, 30.08.2007, 30.08.2007)	29.07.2016	27	30–108	140
Modernisation of health care in the western provinces (d) BMZ No. 2005 65 382	19.12.2002 (19.09.2008, 23.06.2010)	20.05.2015	30	12–79	79
Modernisation of health care in the western provinces (e) (BMZ No. 2007 65 776)	23.11.2007, 18.12.2007, 29.10.2008	29.07.2016	36	36–60	104
HIV/AIDS prevention in border regions (f) BMZ No. 2005 65 416	23.2.2010	29.07.2016	36	48	76
HIV/AIDS prevention in border regions (g) BMZ No. 2006 65 760	23.2.2010	29.07.2016	36	48	76

In all the projects, the main items procured were medical and other devices and equipment, vehicles and information technology. The majority of these purchases were used to replace obsolete or outdated equipment. Where necessary, new acquisitions were also approved (e.g. endoscopy equipment and computer tomography devices or therapeutic equipment for a variety of medical specialties: surgery, gynecology, internal medicine, ENT, ophthalmology, urology, nephrology and traditional Chinese medicine). The

acquisition of large-scale equipment and particularly expensive new acquisitions was subject to a special needs test in some cases. The goods acquired for the hospital components of the individual projects were selected on the basis of local needs analyses. Standard equipment was procured for the CDCs, blood banks and HIV hospital laboratories in accordance with current Chinese guidelines, which are considered appropriate. Overall, we believe these planning and procurement approaches enhance efficiency. The vast majority of the equipment was of good quality, which is confirmed by the very long running times.

According to the PCR assessments and our own analysis, the costs for these are in line with international and/or national standards for comparable procurements. This positive assessment of efficiency is limited by the reported lack of transparency in a number of cases regarding the expected operating and maintenance costs when selecting equipment. Here, future projects should insist on determining lifetime costs for complex equipment. The planned implementation times were exceeded for all projects, in some cases considerably (see table).

Delays were caused by the complex decentralised implementation structures, changes in the number and location of planned sites, planning changes to improve the structural conditions and media supply (electricity, water) for the equipment installations, changes in the technical specifications during implementation as well as coordination on the final selection of the equipment to be procured. The requirement of partially limiting supplies to Germany for projects a) and b) increased the need for coordination and adjustment.

The overall coordination of the projects by the Chinese Ministry of Finance at central and provincial level facilitated procurement procedures and procurement management in a number of cases. In view of the strong decentralisation in the Chinese health system, there seems to be no alternative to organising implementation planning and control at the provincial level. This made additional coordination loops necessary. However, it meant it could be largely ensured that the equipment actually met local needs. That said, for some of the projects the hospitals were no longer involved in the final selection and the technical specifications, which in individual cases led to additional costs or delays in commissioning.

It is questionable though to what extent donor and project-specific planning as well as coordination structures at provincial and institutional level are (still) up-to-date and efficient. This holds particularly true for facilities such as most hospitals and CDCs, which handle infrastructure investments from multiple sources in parallel. Leaner planning and efficient implementation procedures would require the existence or creation of business and development plans specific to health services. Unfortunately, only very few of the hospitals and CDCs visited by the EPE had approaches which coherently combine forward-looking infrastructure and capacity-development planning, positioning in the supply system and business planning. The fact that such planning processes are at all possible became clear during the EPE for hospitals that want to raise the level of care attributed to them and must therefore undergo an accreditation-like process.

For the CDC/HIV components it was necessary (in particular with project c) to adapt the structural design of the CDCs to modern operating requirements and biosafety conditions. This required some considerable structural changes and thus years of delays in implementation, which could not be estimated at the time of the project appraisal. It should be noted that the FC-funded restructuring of the CDC authorities, HIV/AIDS prevention and control as well as blood donations was new territory for the Chinese health planners, who had no previous experience. However, we believe that a number of such implementation delays could have been avoided if the preliminary studies had been properly designed.

By our assessment, consulting services for advisory support in the design and procurement planning of all projects made a significant contribution to the good equipment quality and process handling overall. However, in some projects the local partners did not consider the scope of these services sufficient for monitoring implementation (see below). This applies in particular to the phases of delivery and commissioning as well as communication with the suppliers regarding warranty claims, maintenance issues and spare parts. Compared to FC projects in other countries, the overall consulting costs appear moderate or low. We can assume that more intensive monitoring of the projects by international consultants would have led to time gains and better quality as well as lower costs overall. This was recognised in the course of the programme planning, but was not feasible because the Chinese project-executing agency sought to keep the consulting costs as low as possible.

The allocation efficiency of the project, i.e. the impact achieved per euro, as well as the production efficiency can only be assessed quantitatively to a limited extent because the benefits arising from the project cannot be monetised. A health system with efficient allocation provides resources between sectors such

as prevention, primary care, hospital care and long-term care to ensure the maximum level of health outcomes in line with social preferences.²² In view of the significantly different service provision costs depending on the level of care (primary, secondary, tertiary), in relation to the hospital components it must be questioned to what extent focusing solely on hospitals impaired the allocation efficiency. However, in view of the poor state of primary care and the government prioritising the rapid expansion of hospital care, the project-executing agency had clear preferences and specifications for investments in hospital care during the planning period.

Fragmentation of the health care system, the focus on hospitals and the problematic incentive systems are major causes of the systemic inefficiencies affecting the Chinese health care system. The higher the level of care, the better its efficiency and technical quality.²³ The inefficiencies described also reduce the allocation efficiency of the potentials created by the project, despite the high use described below.

The target hospitals were selected according to needs and the economic capacity to repay the loans. This was a positive selection in advance with regard to the profitability of hospital operation and thus the ability of the hospitals to repay the loans.

The selection of non-clinical public health facilities (CDCs, blood banks, HIV laboratories) was needs-based with the aim of consolidating the state network of high-quality prevention and control facilities. The vast majority of the equipment supplied was used very well, most of it well beyond the intended capacity and normal lifetime of the equipment. However, the high use of equipment to increase hospital income for the indication in question (see Relevance) reduces the allocation efficiency.

The maintenance of equipment is largely carried out by in-house maintenance technicians with very good overall results, as shown by the good functional condition documented for most of the equipment. A small part of the complex equipment is maintained by the manufacturer, for which the facilities have concluded individual maintenance contracts. The given maintenance budgets, usually about 5% of the acquisition costs p.a., generally appear sufficient. The same applies for the working capital provided. All in all, these factors suggest that the funds used are highly efficient. A lack of consulting capacities resulted in individual devices not being used to their full extent because the doctors' medical knowledge was inadequate. This applies, for example, to the field of endoscopic therapy. Thus the innovation and efficiency potential of such equipment remains partially untapped.

One striking feature of the CDC and laboratory components is the insufficient cooperation and division of tasks for individual diagnostic procedures. It was noticed during the EPE that some expensive laboratory equipment is only used very rarely, but at the same time is available everywhere in all CDCs. For the districts of Zhengzhou or Kunming, for example, this means that three CDCs maintain the same underused devices within a radius of 20 km. For examinations where time is not critical, such silo thinking is no longer contemporary, it is uneconomical, and implies quality risks with the excellent Chinese traffic and communication infrastructure.

Individual observations during the EPE suggest that small-scale examinations (e.g. x-rays, special laboratory examinations) are not outsourced to neighbouring hospitals with a comparably high number of examinations, despite this generally being cheaper. Here too, we can assume there is considerable efficiency potential.

Project a)

Thanks to savings made through compromises in equipment quality, it was possible to include additional hospitals in the programme. The implementation was delayed due to the need for a second tendering phase. The hospitals' involvement in the final design decisions was limited. Maintenance is carried out in accordance with the rules. The use of diagnostic/therapeutic equipment was much higher than originally estimated. The fact that a large part of the equipment was still functional at the stage of the PCR, ten years after installation, must be looked on positively with regard to the skill and performance of the

²² Cylus J, Papanicolas I, Smith PC, editors. Health system efficiency: How to make measurement matter for policy and management [Internet]. Copenhagen (Denmark): European Observatory on Health Systems and Policies; 2016. (Health Policy Series, No. 46.)

²³ World Bank. Joint Study Partnership 2016, p. 74; 100 et seq.

maintenance services. Recurring costs for operating and maintaining complex equipment were not taken into sufficient account in the selection.

Efficiency rating a): 2

Project b)

Deliveries and installations mainly ensued within the planned timeframe, with only some equipment delivered late. The high quality of equipment was emphasised by all the facilities. The lack of support in the final selection of the equipment and the related specifications was criticised. The insufficient amount of training and the lack of recipient institutions involved in the final selection were also criticised. All services reported a continuous increase in laboratory analyses of approximately 10% per year. A large part of the equipment was still in use at the PCR (10 years after commissioning), which confirms its proper use and maintenance.

Efficiency rating b): 2

Project c) – Hospital component

For the hospital component, a longer than expected planning phase led to delays compared to the original schedule. While the majority of the deliveries are rated good in terms of quality, the long preparation time means some equipment was delivered which was no longer state of the art. In this project too, the hospitals were not consistently involved in the final selection and specification process, which led to usage problems or failures with some purchases. The consultant's limited involvement in procurement management led to problems and efficiency shortcomings with the processing here as well.

At project completion, 90% of the equipment was still in use and regularly serviced. Maintenance and operating budgets as well as staffing levels were generally sufficient. The use of equipment and the utilisation rates of hospitals were in some cases considerably higher than originally expected, which, apart from the disincentives for overuse described above, could also indicate a high overall allocation efficiency. The introduction of new techniques and therapeutic procedures reduces referrals to higher care levels. This makes it possible to provide patients with care close to their homes, reducing their opportunity costs.

Efficiency rating of the hospital component of project c): 2

Project c) – CDC/HIV component

The CDC component experienced considerable delays due to the planning adjustments needed to meet the requirements of functional and safe laboratory operations along with adequate media supply, and the resulting construction measures necessary. The fact these problems only became known during the implementation highlights certain planning weaknesses in the preparatory phase. Instead of a planned duration of 19 months, the last equipment was delivered more than eight years after the start of the implementation. The consulting services had to be expanded considerably as a result.

The HIV component was handled with only minor delays. Maintenance services for all equipment for the CDC and HIV/AIDS component are carried out professionally, with sufficient maintenance budgets and personnel. The technical briefings were good, and overall there was a high level of satisfaction with the equipment supplied. The expansion of the consulting services and the intensive involvement of the consultant in the redesign of the CDCs had significant positive effects on developing the capacity of the technical and medical personnel, and thus on the quality and efficiency of laboratory operations.

Overall, the equipment supplied was adequately used and maintained on a regular basis, with a continuously increasing number of tests and inspections as well as sufficient working capital and maintenance budgets.

Efficiency rating of project c): CDC component: 3, HIV/AIDS component: 2

Efficiency rating of project c) overall: 2

Project d)

The significant delays in implementation were caused by lengthy approval and coordination processes, planning processes and delivery delays, and affected the three partner hospitals differently. Two of the three hospitals demonstrated intensive use of equipment and good capacity utilisation at the 2016 PCR. In the third hospital in Yanglou, only part of the supplied equipment was in operation. At project completion, this hospital still lacked key operational prerequisites, in particular a sufficient number of specialist staff. Up-to-date information on the status was not available at the time of the EPE. According to the assessment at the PCR, the delays have no impact on long-term operations.

Efficiency rating of project d): 3

Project e)

This project comprised two components (combating and preventing HIV/AIDS and schistosomiasis) with very different investment priorities. Here as well, implementation delays occurred due to lengthy planning and coordination processes and the necessary rescheduling of deliveries. A sub-component of the schistosomiasis component (extension of the monitoring and surveillance network) could not be implemented due to a lack of capacity at the programme executing agency and complicated responsibilities, and was later implemented from public funds. The FC funds released were used for another component.

According to the PCR assessment and the EPE evaluation in Yunnan and Hennan, the delays did not impair the long-term effects of the project. The equipment procured and the structural measures implemented are of good quality. The budget for HIV components seems reasonable. No comparative figures are available to evaluate efficiency for the complex and innovative measures of the schistosomiasis component. The total costs were not exceeded overall and can be deemed appropriate given the impacts achieved.

Adequate personnel and funds for operation and maintenance were made available for all components. The maintenance condition of the equipment is very good. The high and continuously increasing numbers of laboratory tests, treatments and consultations confirm the high usage level of the purchased equipment. The availability of HIV-testing capacities at the lower care levels enables services to be used close to people's homes, reduces opportunity costs for patients and relieves the burden on services at higher levels.

Efficiency rating of project e): 2

Projects f) and g)

The detailed needs analysis and final definition of procurements, interventions with target groups and staff-training measures for this project were postponed in full to the implementation phase. Combined with necessary rescheduling and delivery problems, this led to some considerable delays with implementation. In two of the three target provinces, the delivered equipment was commissioned three to three and a half years after the planning workshop was held. Sufficient staff and resources are available for operation and maintenance in all provinces. The equipment is in a good state of repair. The costs seem reasonable given the good quality of the supplied equipment.

The consulting services provided to support the programme executing agency were limited to reviewing the tender lists and tender documents as well as providing support with evaluating bids. With this project too, the consulting services appear to be inadequately designed. Further support during the delivery and installation process would also have been useful here to speed up the completion of the projects.

The almost continuous increase in laboratory examinations and tests confirms the high capacity utilisation of the supplied equipment. In view of the costs involved, the number of people reached through education and training measures appears relatively high, which suggests that the funds are being used efficiently.

Efficiency rating of projects f) and g): 3

Impact

The development objective (impact) of all programmes was to improve the health situation in the relevant provinces of China. No indicators were defined for this development objective at the project appraisal. It is plausible that the investments in the promoted health services have positive effects on the health of the target population, but they cannot be quantified.

Indicator	China baseline	China endline	Provinces' baseline	Provinces' endline
General life expectancy at birth (years)	See following table			
Maternal mortality (deaths per 100,000 live births)	2002 47.7	2015 22.1(-53%)		
Child mortality (per 1,000 live births)	2002 34.9	2015 10.7 (-69%)		
Infant mortality (per 1,000 live births)	2002 29.2	2015 8.1 (-72%)		
Newborns – Mortality (per 1,000 live births)	2005 20.7	2015 5.4 (-74%)		
Treatment rate of patients with high blood pressure (HBP) % of all patients diagnosed with HBP ²⁴	2002 24.7	2012 41.1 (+66%)		
5-year standardised survival rate; all types of cancer combined in % (rural regions) ²⁵	2003–2005 24.6	2012–2015 34.5		
5-year standardised survival rate; all cancer types combined in % (urban regions)	2003–2005 34.8	2012–2015 38.1		
5 years after the start of the programme, the prevalence of schistosomiasis in the Yueyang region has fallen below 1%.				2015 0.32 Indicator achieved
Schistosomiasis cases	2005 564	2012 3 ²⁷ (-99%)		
Schistosomiasis incidence ²⁶	0.331	0.007(-98%)		

Demographic and epidemiological developments reveal a positive trend across China. Data on life expectancy, morbidity and mortality (at national and provincial level) were used as proxy indicators. In the case of selective interventions in individual diagnostic and therapeutic areas for all components (with the exception of schistosomiasis), the significance of such indicators is limited. During the continuously strong economic development and improvement in living conditions between 2000 and 2015, the demographic, epidemiological and usage indicators applied in the non-project provinces developed positively throughout as well.

²⁴ Source: “China Statistical Yearbook 2015 Health and Family Planning”

²⁵ Source: Hongmei Zeng et al. Changing cancer survival in China during 2003–15: a pooled analysis of 17 population-based cancer registries. *Lancet Glob Health* 2018; 6: e555–67. <https://goo.gl/LYQPc4>

²⁶ Source: PLOS Neglected Tropical Diseases. May 2014. Volume 8. Issue 5. Retrieved from <https://goo.gl/E8dMrh>

²⁷ Total reported cases = 13, out of which 10 are confirmed as imported

Particularly sensitive indicators²⁸ for the results of improved health care include newborn mortality, the proportion of treated high blood pressure cases or changes in standardised survival rates after cancer diagnosis.²⁹ All these indicators reveal continuous, positive improvements for China as a whole. The FC project made an effective contribution to bettering the health situation by means of the quantitative and qualitative improvements in provincial and district services and their increased utilisation.

The consistent implementation of the regulations on the safety of blood and blood products created since 1998 led to the closure of a number of non-compliant manufacturers and services, the rapid consolidation and expansion of transfusion and test networks, and to the stringent application of blood safety standards. Infrastructure investments made a significant contribution to implementing these standards. Consequently they supported the creation of provincial services and quality networks for the systematic serological testing of blood and blood products. The clinical use of voluntary blood donations in China increased from 5.5% (50,000 donations) in 1998 to 95% (12.2 million donations) in 2007. Following the closure of illegal plasma and whole blood collection centres after 1998, and the introduction of systematic tests also supported by the FC project, the number of HIV infections transmitted via transfusions drastically decreased. However, no official data is available on the current transmission number. In the charts published by the government and other organisations, no HIV infections are transmitted by blood and blood products. All blood donations are now fully tested by highly specific nucleic acid tests that have recently been introduced in all blood stations, which makes this number seem plausible.³⁰

The systematic improvement of the CDCs in the target provinces contributed not only to diagnostic and therapeutic progress through the introduction of effective monitoring systems financed by FC, but also to the reduction of risks for national and global epidemics and the implementation of global prevention priorities (WHO 2014). Information technology equipment was provided for this purpose within the framework of FC contributions. China has thus set up a highly effective and the world's largest real-time online reporting system for notifiable infectious diseases and emergencies in the health sector.³¹

According to current knowledge, the International Health Regulations (IHR) Core Capacity Index is a good indicator for measuring the impact of the CDC components of all projects.³² China is now considered one of the world's leading countries in implementing the IHR, and for 2010-2015 is on a par with Germany with a score of 99 out of a 100 points.³³

In the area of HIV/AIDS, FC projects made substantial contributions to improving test capacities, reducing the transfusion risk with regard to HIV, and improving knowledge about the infection status of those affected. Free counselling and testing, free ARV treatment and free access to prevention of mother-to-child transmission (PMTCT) programmes as well as health education, monitoring and behavioural interventions were significantly expanded. At the same time, the government implemented nationwide programmes that systematically included ARV therapy and social complementary measures as legal entitlements, and aimed to reduce social stigmas.

²⁸ Another noteworthy aspect of this indicator is the significant reduction in urban-rural disparities during the observation period, which points towards a targeted improvement in rural supply networks.

²⁹ The survival of cancer patients (measured at population level) is closely linked to access to and quality of cancer treatment as well as the funding of such services. In line with the country's rapid economic development, the Chinese government has devoted more resources to health care. It is likely that the Chinese government's substantial investments in health care since 2003 have contributed to these improvements in survival.

³⁰ China's Progress Report on Implementation of the 2030 Agenda for Sustainable Development. Ministry of Foreign Affairs of the People's Republic of China. 2017. http://www.fmprc.gov.cn/web/ziliao_674904/zt_674979/dnzt_674981/qtzt/2030kcxzyc_686343/P020170824650025885740.pdf

³¹ The simultaneous online reporting of notifiable infectious diseases was made possible for all CDCs, 98% of district health facilities and more than 94% of primary health facilities. Thanks to the new system, the average reporting time for notifiable cases of infectious diseases was reduced from five days to four hours. A total of 3486 national surveillance points were established to constantly monitor the epidemic situation of 28 priority infectious diseases.

³² This index measures the ability of a (national) health care system to respond adequately to public health emergencies such as SARS. It is a complex composite indicator that includes health care system elements and functions such as human resource capacity, risk communication, laboratory capacity, coordination and surveillance systems.

³³ World Health Statistics. WHO 2016. p. 83. <https://bit.ly/2JUXbLU>

This created the structural and legal prerequisites for the comprehensive expansion of effective prevention measures and therapies. Between 2005 and 2015, the infection rates for all high-risk groups (prostitutes, drug addicts) steadily declined, with the exception of homosexual men (a global trend). The proportion of HIV-positive drug addicts undergoing methadone maintenance therapy drastically increased nationwide. Almost 80% of the high-risk population groups were reached through intervention measures. Mother-child transmission was significantly reduced, and the lethality rate of AIDS drastically lowered. The financial burden on people living with HIV/AIDS was markedly reduced, while quality of life improved significantly. Comprehensive social marketing programmes by the government aim to gradually reduce social discrimination and stigmatisation.

These positive national trends can also be verified for the FC programme provinces. In Yunnan province, for example, the number of ARV treatments increased in an almost straight-line fashion from 1,050 cases in 2005 to 8,052 cases in 2008 and 60,489 cases in 2015, with HIV mortality dropping from 25% in 2005 to 8% in 2008 and below 5% in 2015, while mother-to-child transmission fell from around 8% in 2006 to 4% in 2015.

The improvements cannot be attributed solely to the programmes, however. The rapid economic upturn, the impressive reduction in the poverty rate, the political reforms, the continuous expansion and adaptation of social health insurance, the implementation of sectoral reforms, the drastic increase in public spending on health as well as international donor investments played a large part in the positive developments in the health sector.

Impact: Hospital component rating – projects a), c), d): 2
Rating of other components – projects b), e), f), g): 1

Sustainability

In terms of the projects' sustainability, the EPE distinguishes between financial and institutional sustainability. The financial sustainability of the projects is closely linked to the useful life of the purchased medical technology, so its maintenance plays a decisive role here. Preventive maintenance is rarely practised in Chinese hospitals and public health facilities. "Reactive maintenance" dominates in many cases, which is limited to repairs if a device breaks down. Among other things, the resulting loss of capacity causes delays in patient care or in the operation of the laboratories. In everyday care, however, such losses are comparatively rare. In addition, the revenues associated with using the equipment are an important factor for the economically efficient operation of the hospitals, meaning the clinics have a direct economic interest in high utilisation of the equipment with the lowest possible downtime.

The organisation of the maintenance varies. A large part of the maintenance is carried out by in-house technicians, for some equipment there are full or partial maintenance contracts and warranty extensions. Maintenance personnel and the funds for maintenance are available to a sufficient extent. This is confirmed by the very good operating and maintenance condition of the equipment inspected on site during the final review and the EPE. Individual maintenance problems are more likely to result from inadequate maintenance management.

With regard to the institutional sustainability of the rehabilitated facilities, it is assessed whether the management and staff of the health facilities are competent enough to manage the facilities profitably and at the same time provide a satisfactory quality of service. The majority of the clinics is run successfully and generates surpluses from equipment usage revenues and drug sales. It appears the hospitals can be operated sustainably as long as their business model continues. However, this is deemed to be a big problem³⁴ since the hospitals have to cover higher costs by means of – partly irrational – increases in volume. Despite the steadily increasing allocations from public funds and health insurance, this situation increases the burden on users. Although the share of out-of-pocket payments in total health care expenditure has fallen steadily over the past decade, real expenditure has remained stable or even increased. In particular, the incidence of catastrophic spending at the budgetary level has also remained stable.³⁵

³⁴ The World Bank. Fixing the Public Hospital System in China. 2010

³⁵ Liu, Kai, Qiaobing Wu, and Junqiang Liu. 2014. "Examining the Association between Social Health Insurance Participation and Patients' Out-of-pocket Payments in China: The Role of Institutional arrangement." *Social Science & Medicine* 113:95–103.

Without significant cost limitations, China's health expenditure will rise from 5.6% of GDP in 2015 to more than 9% of GDP in 2035. The forthcoming reforms will have to change the business conditions of hospitals in order to keep health care affordable and accessible overall.³⁶

The current reforms, supported at the highest level of government³⁷, envisage countering the systemic misdevelopments in hospital financing. The drug delivery system in particular is to be modified, which has been a major source of revenue for hospitals so far. Primary care, gatekeeper functions and referral systems are to be strengthened, diagnostic and therapeutic procedures standardised, insurance cover extended and strategic purchasing functions introduced. The promotion of operator diversity (coordinated and effectively regulated private sector), the strengthening of management capacities and the reorganisation of remuneration and incentive systems are also part of the reform. If these measures are implemented consistently, it can be assumed that the Chinese state will create a stable basis for the hospitals to operate.

Public health facilities such as CDCs, blood banks and test laboratories are financed almost entirely from national and municipal public funds. The Chinese government still has a strong interest in improving disease prevention, control and treatment. Between 2004 and 2014, government allocations to the public health system increased twelvefold, and now amount to approximately USD 20 billion annually. This appears to guarantee the sustainable operation of these facilities.

Environmentally relevant aspects were not analysed in depth during the PCR and the EPE. No negative project impacts were observed. The relevant Chinese regulations for the disposal of hospital waste are sufficient to ensure disposals are environmentally friendly, and the rules are complied with. Regulations on the operational safety and biosafety of the laboratories comply with WHO standards and are strictly monitored.

Sustainability rating: Hospital components of the projects a), c), d): 2
Other components of the projects b), e), f), g): 1

³⁶ Health Reform in China. World Bank Partnership. 2016

³⁷ Xi Jinping's roadmap for China prioritises health. *The Lancet*, Volume 390, Issue 10106. 2017

Notes on the methods used to evaluate project success (project rating)

Projects (and programmes) are evaluated on a six-point scale, the criteria being **relevance, effectiveness, efficiency** and **overarching developmental impact**. The ratings are also used to arrive at a **final assessment** of a project's overall developmental efficacy. The scale is as follows:

Level 1	Very good result that clearly exceeds expectations
Level 2	Good result, fully in line with expectations and without any significant shortcomings
Level 3	Satisfactory result – project falls short of expectations but the positive results dominate
Level 4	Unsatisfactory result – significantly below expectations, with negative results dominating despite discernible positive results
Level 5	Clearly inadequate result – despite some positive partial results, the negative results clearly dominate
Level 6	The project has no impact or the situation has actually deteriorated

Rating levels 1-3 denote a positive assessment or successful project while rating levels 4-6 denote a negative assessment.

Sustainability is evaluated according to the following four-point scale:

Sustainability level 1 (very good sustainability): The developmental efficacy of the project (positive to date) is very likely to continue undiminished or even increase.

Sustainability level 2 (good sustainability): The developmental efficacy of the project (positive to date) is very likely to decline only minimally but remain positive overall. (This is what can normally be expected).

Sustainability level 3 (satisfactory sustainability): The developmental efficacy of the project (positive to date) is very likely to decline significantly but remain positive overall. This rating is also assigned if the sustainability of a project is considered inadequate up to the time of the ex post evaluation but is very likely to evolve positively so that the project will ultimately achieve positive developmental efficacy.

Sustainability level 4 (inadequate sustainability): The developmental efficacy of the project is inadequate up to the time of the ex post evaluation and is very unlikely to improve. This rating is also assigned if the sustainability that has been positively evaluated to date is very likely to deteriorate severely and no longer meet the level 3 criteria.

The **overall rating** on the six-point scale is compiled from a weighting of all five 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 ("overarching developmental impact") and the sustainability are rated at least "satisfactory" (level 3).