National Basic Public Health Services Programme in China

Case study

Qian Long, Yufei Jia, Jiuling Li, Zhexun Lou and Yunguo Liu
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Abbreviations

BPHS      Basic Public Health Services
CDC       Center for Disease Control and Prevention
GDP       gross domestic product
NBPHSP    National Basic Public Health Services Programme
NCDs      noncommunicable diseases
NHC       National Health Commission
TB        tuberculosis
Executive summary

The Government of China established and funded the National Basic Public Health Services Programme in 2009 to ensure equal access to basic public health services. The scope of the package increased from 9 categories in 2009 to 14 categories in 2017, and includes hypertension, type 2 diabetes, severe mental disorders and tuberculosis. This study aims to explore the impact of purchasing arrangements for the National Basic Public Health Services Programme on the quality of care for chronic illnesses and analyse the factors that facilitate or inhibit its impact.

The central government sets the minimum per capita funding level based on standardized costs for each service; the amount rose in real terms from US$ 3.10 in 2009 to US$ 13.00 in 2022. Contributions to Programme funding are made by the central, provincial, municipal and county governments. The central government covers up to 80% of total funding for 12 low-income mainland provinces, 60% for 10 lower-middle-income provinces and 50% for three middle-income provinces. The central government also provides 30% of funding to four higher-middle-income provinces and only 10% for two high-income areas: Beijing and Shanghai.

The remaining funding is provided by provincial-, municipal- and county-level governments. The amount contributed by each level is based on the area’s level of socioeconomic development. In less-developed areas, the provincial government contributes a higher share of funding to support municipal and county governments in meeting the per capita funding standard. The minimum can also be increased, primarily subject to local fiscal capacity. In 2021, seven of the 31 provinces in mainland China had a higher per capita funding standard (ranging from US$ 13.00 to US$ 16.40) than the national threshold (US$ 12.20).

At the beginning of the fiscal year, the central and provincial governments prospectively allocate around 90% of their contributions to the municipal and county governments. The municipal and county governments then allocate more than half of the capitation payment to primary care facilities. At the end of the fiscal year, the second installment is paid. The central government had recommended that at least 5% of the total capitation payment should be performance based, although this recommendation was recently withdrawn, leading to variations in the share used for performance-based pay. Overall, the performance-based payment from the central government accounted for only a small share of the total capitation payment. By 2022, 0.5% of the total payment was used for performance-based pay.
For the performance-based share of the payment, the central government set forth a 100-point grading system based on an assessment of organizational and financial management (30%), the volume of services delivered (45%) and Programme outputs (25%), with variations in the weighting of the assessment criteria by province. Using performance rankings, in 2022, the central government deducted its contribution from 14 mainland provinces because of lower-than-expected performance and reallocated the central funds to 17 other provinces with higher scores (e.g. scores >80). Performance assessments are carried out at each administrative level to determine the amount of the second installment.

The impact of the purchasing arrangement on the quality of care for patients with chronic illness and on patients' outcomes is difficult to disentangle, and no formal evaluation has been conducted. Based on data routinely collected by the Programme, there were positive trends in the proportions of patients with hypertension and diabetes receiving standardized management at primary care facilities, and a reduction in disparities in access across regions. The same data show an increase in the proportion of patients with hypertension and diabetes having controlled blood pressure and blood glucose, rising from 50.9% to 67.7% and from 38.9% to 63.6%, respectively. However, with no formal evaluation, it is difficult to determine whether these trends were affected by the National Basic Public Health Services Programme, other ongoing health system reform efforts or external factors.

Moreover, a 2018 national population-based survey found that only 11.0% of patients with hypertension had controlled blood pressure, and 31.5% of patients with diabetes had controlled blood glucose levels at any level of care. Therefore, access to services remained low and quality of care was suboptimal. This suggests that the purchasing mechanisms for the Programme were insufficient to address access and quality challenges, and overcome structural constraints at the primary care level, including insufficient budgets, low salaries and weak incentives for primary care providers to improve the quality of care.

This case study provided information to the WHO and OECD joint publication *Purchasing for quality chronic care: summary report.*
1

Programme overview
In 2009, China launched the National Basic Public Health Services Programme (NBPHSP) as one of the five priorities for action in the new round of comprehensive health system reforms (Annex 1). Basic public health services (BPHS) are fully purchased by the government through performance-based capitation payments made in two instalments in each fiscal year. The goal of establishing the NBPHSP is to achieve universal coverage of BPHS.

Before 2009, in China these services focused on improving maternal and child health and preventing and controlling infectious diseases. With the government’s commitment to increase funds for primary care, the package of BPHS was expanded to tackle emerging challenges from chronic noncommunicable diseases (NCDs) (1). The package of services increased from 9 service categories in 2009 to 14 categories in 2017 and included establishing health records; reporting and treating infectious diseases; providing care for older people; improving reproductive, maternal and child health; improving health management for hypertension, type 2 diabetes, severe mental disorders and tuberculosis (TB), an infectious chronic disease that requires adherence to long-term therapies; and expanding health education and smoking cessation programmes.

The National Health Commission (NHC) issues service standards and guidelines for each category of health care service and has introduced key performance indicators to measure the quality of services. For chronic diseases, primary care providers are responsible for screening, referring and following up with patients with hypertension, type 2 diabetes, severe mental disorders and TB. Referral hospitals at the county or municipal level are required to inform primary care facilities in their catchment area and refer patients back to the primary care facility for continued care when hospital treatment is complete. Public health agencies, such as the Center for Disease Control and Prevention (CDC) at the provincial or lower levels, often provide training and technical support in patient management, public health reporting, health education and involvement in assessment programmes. Indicators of care quality focus on assessing the standard management and treatment of each chronic condition.

This study aims to explore the impact of NBPHSP purchasing arrangements on the quality of care provided to patients with chronic illness and analyse the factors that facilitate or inhibit making improvements to the quality of care in the context of China’s efforts at health system reform.

We referred to several quality of care frameworks, including the framework for high-quality health systems (2) and the World Health Organization’s framework for the quality of maternal and newborn health care (3). We then developed a framework for this study to analyse the quality of care based on inputs (i.e. NBPHSP purchasing
arrangements and management of the Programme), processes (i.e. the funding and capacity of primary care facilities to deliver the BPHS package and Programme monitoring and evaluation) and outputs (i.e. the Programme’s impact) (Fig. 1).

Multiple sources of data were used in this study and the details of the methods are presented in Annex 2. First, we conducted a scoping review to summarize the NBPHSP’s design, implementation and evaluations of the Programme, with a focus on the health care management of hypertension, type 2 diabetes, severe mental disorders and TB. We searched PubMed, the Web of Science, Embase and two Chinese databases (CNKI and Wanfang Data) using a combination of core search terms – basic public health services, financing, payment method, incentives and quality of care – to identify peer-reviewed journal articles in English and Chinese published between 1 January 2010 and 30 October 2022. The search yielded 3446 citations after removal of duplicates. Studies were considered relevant if they included information about an evaluation of the NBPHSP, the quality of primary care or an overview of health system reform during the past decade in China. We also screened the references of all identified studies and contacted experts in relevant fields to achieve a comprehensive literature search. A total of 53 studies were included. In addition, we screened the websites of national and provincial governments and the official website of the NBPHSP to collect policy documents and practical guidance about the Programme’s implementation.

Between August and September 2022 to explore good practices in and challenges to improving the quality of care for chronic illness across regions with different levels of socioeconomic development, we conducted qualitative interviews with 30 policy-makers and health professionals in two provinces: Jiangsu (gross domestic product [GDP] per capita in 2021: US$ 21,246), the second largest economy in China, and Henan (GDP per capita in 2021: US$ 9,210), a lower-middle-income province. All participants gave permission to have their interviews recorded, and interviews were transcribed in Chinese for analysis. We adopted a framework approach for qualitative data analysis. All data were coded, charted and summarized to allow interpretations to be drawn about the impact of the purchasing arrangements on the quality of care provided for patients with chronic conditions. We used NVivo v. 12 (Lumivero, Denver, CO, USA) for qualitative data management.
Fig. 1. Quality of care analysis framework used to assess the National Basic Public Health Services Programme, China, 2022

**Input**

- Purchasing arrangement
  - Government funding
    - First payment: capitation
    - Second payment: performance-based

- Management
  - Regulations and service standards

- Service delivery
  - Primary care based integrated care

**Process**

- Funding to primary care facilities
  - Salary
  - Incentive
  - Physical resources available

- Capacity building for primary care facilities
  - Competent and motivated primary care providers
  - Health information system

- Monitoring and evaluation

**Output**

- Coverage of service standards
- Patient satisfaction

Health outcomes
Design features of the Programme
2.1 Sources of funding

The government of China funds the NBPHSP and decides the minimum per capita funding standard by using standardized overall costs for each service item. Per capita funding increased from US$ 3.10 in 2009 to US$ 13.00 in 2022, adjusted for inflation (Table 1). The budget is calculated based on the number of residents within a region and the per capita funding standard.

<table>
<thead>
<tr>
<th>Year</th>
<th>Per capita funding Minimum funding (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>3.10</td>
</tr>
<tr>
<td>2010</td>
<td>3.00</td>
</tr>
<tr>
<td>2011</td>
<td>4.80</td>
</tr>
<tr>
<td>2012</td>
<td>4.70</td>
</tr>
<tr>
<td>2013</td>
<td>5.40</td>
</tr>
<tr>
<td>2014</td>
<td>6.20</td>
</tr>
<tr>
<td>2015</td>
<td>7.00</td>
</tr>
<tr>
<td>2016</td>
<td>7.70</td>
</tr>
<tr>
<td>2017</td>
<td>8.40</td>
</tr>
<tr>
<td>2018</td>
<td>9.10</td>
</tr>
<tr>
<td>2019</td>
<td>11.10</td>
</tr>
<tr>
<td>2020</td>
<td>11.60</td>
</tr>
<tr>
<td>2021</td>
<td>12.20</td>
</tr>
<tr>
<td>2022</td>
<td>13.00</td>
</tr>
</tbody>
</table>

*US$ 1.00 = ¥6.4.

*Source: Data from the National Health Commission (4-10).*

The responsibility for funding the NBPHSP is shared among the central, provincial, municipal and county governments. The government classifies provinces into five categories according to their level of socioeconomic development (11). The central government covers up to 80% of total Programme funding for 12
Design features of the Programme

low-income mainland provinces and 60% for 10 lower-middle-income provinces. The central government provides 30% of funding to higher-middle-income areas and only 10% for the two most well-off areas, Beijing and Shanghai (Table 2). The remaining funding should be matched by local governments at the provincial, municipal and county levels.

Table 2. Proportion of central government funding allocated for the National Basic Public Health Services Programme, by province or city, China

<table>
<thead>
<tr>
<th>Proportion of the Programme funded by the central government</th>
<th>Provinces and cities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1: 80% for regions with low socioeconomic development</td>
<td>Chongqing, Gansu, Guangxi, Guizhou, Inner Mongolia, Ningxia, Qinghai, Shaanxi, Sichuan, Tibet, Xinjiang, Yunnan</td>
</tr>
<tr>
<td>Category 2: 60% for regions with lower-middle-income socioeconomic development</td>
<td>Anhui, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangxi, Jilin, Shanxi</td>
</tr>
<tr>
<td>Category 3: 50% for regions with middle-level socioeconomic development</td>
<td>Fujian, Liaoning, Shandong</td>
</tr>
<tr>
<td>Category 4: 30% for regions with higher-middle-income socioeconomic development</td>
<td>Dalian,^a^ Guangdong, Jiangsu, Ningbo,^a^ Qingdao,^a^ Shenzhen^a^ Tianjin, Xiamen,^a^ Zhejiang</td>
</tr>
<tr>
<td>Category 5: 10% for regions with high socioeconomic development</td>
<td>Beijing, Shanghai</td>
</tr>
</tbody>
</table>

^a City with independent planning status.

Source: Data from the General Office of the State Council, 2018 (11).

The provincial government must meet the minimum per capita funding standard and can increase the funding standard, primarily subject to local fiscal capacity. The provincial government determines how the funds are allocated among the provincial, municipal and county governments, and this allocation is also based on local levels of socioeconomic development. The provincial government contributes a higher share of funding to less-developed areas, and the remaining funding is matched by municipal and county governments to meet the per capita funding standard. Table 3 shows how these funding policies are applied in Henan and Jiangsu provinces.
Table 3. How funding for the National Basic Public Health Services Programme is shared by the provincial governments of Henan and Jiangsu provinces, China, 2020 and 2021

<table>
<thead>
<tr>
<th>Province</th>
<th>Fund-sharing mechanism</th>
<th>Fund share from provincial government (%)</th>
</tr>
</thead>
</table>
| Henan (Lower-middle income province; receives 60% of its Programme funding from the central government) | 17 municipalities Classified into 3 categories according to the level of socioeconomic development (I: low; II: middle; III: high) | I: 40  
II: 30  
III: 20 |
|                                 | 102 counties and one subprefecture-level city Classified into 4 categories according to the level of socioeconomic development (I: lowest; II lower-middle; III: middle; IV: high) | I: 60  
II: 50  
III: 40  
IV: 30 |
| Jiangsu (Better-off province; receives 30% of its Programme funding from the central government) | 54 municipalities and counties Classified into six categories according to the level of socioeconomic development (I: lowest; II lower-middle; III: middle; IV: upper-middle; V: high; VI: highest) | I: 70  
II: 60  
III: 50  
IV: 40  
V: 30  
VI: 20 |

Source: Data from the General Office of Jiangsu Provincial Government (2020) and Henan Provincial Government (2021) (12, 13).
2.2 Payment arrangements

Payments are made in two instalments annually. The funding flows from the central Ministry of Finance to provincial, municipal and county financial bureaus (14). Central and provincial governments often allocate around 90% of the capitation payment to municipal and county governments at the beginning of the fiscal year. The amount is allocated according to the Programme’s budget (minimum per capita funding standard × number of local residents) and also includes the proportion of the payment that the central or provincial government is entitled to. In 2019, national policy recommended that at least 5% of the total capitation payment should be based on performance and linked to assessments at the provincial, municipal and county levels; these assessments can result in additional resources for good performance or deductions for poor performance. As these are only recommendations, decisions about the share of the payment subject to performance assessments vary by province. When the policy was updated in 2022, it was emphasized that provincial, municipal and county governments should furnish matching funds to ensure the fulfilment of the minimum per capita funding requirement if the central government deducts funds as a result of the performance assessment. The fund allocation continues to be awarded according to the performance-based capitation payment, but the suggestion that 5% of the total capitation payment should be dedicated to performance was removed from the policy (15). As such, the allocation varies by province.

At the beginning of the fiscal year, the central and provincial governments allocate around 90% of their contributions to the municipal and county governments. Then, the municipal and county governments allocate more than half of the capitation payment to primary care facilities as a first payment for delivery of BPHS. The second payment is linked to the management of the Programme, the volume of services delivered and a quality assessment, which correspond to the practical guidelines and services standards issued by the NHC (see Section 2.3).

Health commissions at each level lead performance evaluations. Performance assessments are conducted at each administrative level, and often occur twice a year: in the middle of and by the end of the year (4). The central government proposed a 100-point grading scale constructed of four components: organizational management (15%), financial management (15%), the volume of BPHS services delivered (45%) and outputs of the Programme (25%). The assessments of organizational management and financial management often involve qualitative measures, such as development of a guideline for BPHS implementation, establishment of a leadership team, strengthening of fund management, timely
allocation of payments, among others. The output measures focus on effective case management (e.g. proportions of patients with blood pressure and glucose levels under control, proportions of patients with severe mental disorders whose condition is stable, and among patients with TB, the proportion of patients regularly taking their medicine), the population’s knowledge about the BPHS and patients’ satisfaction \((16)\).

Provincial, municipal and county governments often follow the national evaluation plan and also gain the authority to adjust the weight of each component according to the Programme’s implementation, for example, by putting more emphasis on the delivery of BPHS, which then may account for 55% of the overall assessment.

At each administrative level, the management and implementation of the NBPHSP is ranked according to the assessment scores. An additional payment is made to provinces or prefectures having high assessment scores (e.g. >80), and the share of the second payment allocated for good performance is deducted from the share for the provinces or prefectures with low scores. The amount allocated is based on the performance score, number of local residents and volume of services. The central government releases the performance-based payment to provincial governments by the end of the fiscal year. Similarly, provincial governments decide the share of the second performance-based payment allocated to municipal and county governments. The county governments make decisions about the allocation of performance-based payments to primary care facilities according to the assessments of the volume of services delivered and the standards of care.

Since China’s comprehensive health system reform launched in 2009, primary care facilities mainly rely on government funding. Primary care facilities provide basic medical services, including outpatient and inpatient care, which are financed through health insurance schemes and user fees. Additionally, primary care facilities are responsible for delivering BPHS at no cost to users. Funding for BPHS contributes to the revenue of primary care facilities (Fig. 2) and is integrated with other government compensation and medical revenue from the facilities to cover providers’ salaries, which include a basic salary and a bonus. Based on Programme assessments of primary care facilities, primary care providers often receive a payment once a year according to the volume of BPHS services that they deliver (e.g. the number of patients with chronic illness that they manage) and the performance indicators required by the service standards \((17)\).

In 2013, the contract service policy was issued to expand the number of and motivate village doctors to provide BPHS in rural areas \((18)\). It requires each township health centre to allocate at
Design features of the Programme

least 40% of the funding for these services to village clinics in two instalments. The prospective payment accounts for around 70% of the township centre’s funding, and the remaining 30% is performance-based capitation, paid according to the volume of services delivered and an assessment of whether standards for BPHS delivery have been met by village doctors, as assessed by the township health centres.

Fig. 2. Financing for primary care facilities, China, since 2009

Source: Figure adapted with permission from Yang et al. (14).
2.3 Service standards for chronic conditions

The NHC has introduced service standards and practical guidelines to guide service delivery and performance assessments. Table 4 summarizes the target populations and service standards for hypertension, type 2 diabetes, severe mental disorders and TB.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Target population</th>
<th>Standards</th>
</tr>
</thead>
</table>
| Hypertension         | Patients with hypertension aged ≥ 35 years in the jurisdiction                    | – Screening: free blood pressure measurement once each year for residents aged ≥ 35 years  
– Follow-up visits and health checks: at least four follow-up visits and one physical examination each year for this group of patients  
– Referral: patients referred to a higher-level hospital for abnormal results on screening or follow up  
– Intervention: provide individualized health education about diet and lifestyle, and provide appropriate medication management |
| Type 2 diabetes      | Patients with type 2 diabetes aged ≥ 35 years in the jurisdiction                 | – Screening: targeted health education for people at high risk of type 2 diabetes who were screened at their workplace; people identified through this screening are encouraged to have their fasting blood glucose measured at least once each year  
– Follow-up visits and health checks: patients diagnosed with type 2 diabetes should have four blood glucose tests and at least four face-to-face follow-up visits each year  
– Referral: patients referred to higher-level hospitals for abnormal results on screening or follow up  
– Intervention: provide individualized health education about diet and lifestyle, and provide appropriate medication management |
<table>
<thead>
<tr>
<th>Disease</th>
<th>Target population</th>
<th>Standards</th>
</tr>
</thead>
</table>
| Severe mental disorders | Home-based patients with a diagnosed severe mental disorder among residents of all ages in the jurisdiction | - Establish health records for patients with severe mental disorders: family members or the specialist hospital should provide records about diagnosis and treatment as the basis for establishing health management records as part of a comprehensive assessment of a patient’s status  
- Follow-up visits and health checks: diagnosed patients should be followed up at least four times each year; each follow-up visit assesses a patient’s threat level, social functioning, mental symptoms, insight and judgment, and use of medications, among other areas  
- Referral: patients referred to higher-level hospital if their condition seems unstable (e.g. posing a high level of threat, obvious symptoms, lack of insight, serious adverse reactions to medications or physical diseases)  
- Intervention: provide individualized health education and living skills training; provide appropriate medication management; seek technical guidance from a psychiatrist about treating unstable patients |
| TB                   | Patients diagnosed with or suspected of having pulmonary TB among residents in the jurisdiction | - Screening: refer suspected cases of TB to designated medical institutions for examination  
- Follow-up visits: conduct follow-up visits for patients diagnosed with TB within 72 hours of being notified by a higher-level hospital, then follow up at least once each month  
- Referral: patients referred to a higher-level hospital for abnormal results on screening or follow up  
- Intervention: provide individualized health education; remind patients to return for follow-up visit to the designated TB hospital |

TB: tuberculosis.  
Source: Adapted from guidance from the National Health Commission (19).  

The NHC also established indicators for each chronic condition to assess the quality of health care management of patients with a chronic disease, including the proportions of patients being managed according to standards and the proportion whose condition is stable (Table 5). Each province determines the target for each indicator for performance evaluations. In 2021, Jiangsu
province required that 60% of patients with hypertension were managed according to the NHC standards, with the same proportion applying to patients with type 2 diabetes; the proportion for patients with mental disorders was 85%, and for patients with TB, it was 90% (20). Moreover, Jiangsu province also required that 40% of patients with hypertension have controlled blood pressure and 40% of patients with diabetes have controlled blood glucose levels; the standard for TB patients was that 90% should be taking their medication regularly.

Table 5 Indicators measuring the quality of care provided for management of chronic diseases according to the National Basic Public Health Services Programme standards, China, 2017

<table>
<thead>
<tr>
<th>Disease</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>- Management according to NHC standards: the number of hypertension patients managed according to service standards in a year/the number of hypertension patients this year × 100</td>
</tr>
<tr>
<td></td>
<td>- Blood pressure control: the number of people with normal blood pressure results during their most recent follow-up visit this year/the number of hypertension patients this year × 100</td>
</tr>
<tr>
<td>Type 2 diabetes</td>
<td>- Management according to NHC standards: the number of patients with type 2 diabetes managed according to service standards in a year/the number of patients with type 2 diabetes this year × 100</td>
</tr>
<tr>
<td></td>
<td>- Blood glucose control: the number of people with normal fasting blood glucose results during their most recent follow-up visit this year/the number of patients with type 2 diabetes this year × 100</td>
</tr>
<tr>
<td>Severe mental disorders</td>
<td>- Management according to NHC standards: the number of patients with a severe mental disorder managed according to service standards in a year/the number of registered patients with a severe mental disorder this year × 100</td>
</tr>
<tr>
<td>TB</td>
<td>- Management according to NHC standards: the number of TB patients managed according to service standards/the number of TB patients diagnosed at a designated TB hospital whose information was shared with primary care facilities during the same period × 100</td>
</tr>
<tr>
<td></td>
<td>- Regularly taking medication: the number of TB patients taking their medication regularly/the number of TB patients completing treatment during the same period × 100</td>
</tr>
</tbody>
</table>

Source: Information from the National Health Commission (19).
3 Implementation
3.1 Funding

The NBPHSP has been implemented nationwide since 2009. In 2021, 7 of the 31 provinces in mainland China had a higher per capita funding standard (ranging from US$ 13.00 to US$ 16.40) than the national threshold (US$ 12.20), and the other provinces met the minimum funding standard (21-26). Consistent with the design of the policy, we found that in the two study provinces, provincial governments determined their allocation of funding by considering each region’s level of socioeconomic development, its demographic structure (e.g. the number of older persons) and disease burden (Box 1). However, provincial governments often provided no instruction about allocating funding for each service category, which was consistent with findings from other studies (27, 28). Health practitioners interviewed in the two study provinces indicated that funding for management of patients with hypertension and type 2 diabetes accounted for a relatively large proportion of total Programme funding, given the large number of tasks involved (Box 1).

Box 1. Findings from interviews with practitioners about funding for the National Basic Public Health Services Programme, China, 2022

“We calculate and distribute basic public health services according to the local demographic structure, such as the proportion of elderly people. Sometimes the proportion of elderly people varies in different cities because some cities may have a large migrant population....Since basic public health services are supposed to be equally distributed, the government allocates basic public health funds and tasks based on local economic development status and demographic structure.”

Department Chief, Provincial Health Commission, Jiangsu

“There are 12 million people in city X; our national per capita standard this year is ¥84 [US$ 13.00], so the amount of funds is 12 million times ¥84. At the provincial level, funds will be budgeted just based on this math....For the funding [the budget], the total funding [amount] is determined by population, the per capita standard and performance outcomes....As for how much each item of the service costs, it is not considered at the provincial level.”

Department Chief, Provincial Health Commission, Henan

“Management for elderly people and [people with] chronic diseases are the biggest part [of the basic public health services], so the fund correlates to this ratio.”

Director, community health centre, Jiangsu
3.2 Primary care facilities and providers of basic health services

All public primary care facilities and contracted village clinics provide BPHS and are paid according to the purchasing arrangement. As part of efforts to implement comprehensive health system reform in China, the government has increased inputs for building primary care infrastructure and for training primary care providers, particularly in rural areas (27). From 2009 to 2020, in urban areas, the number of community health centres doubled. In rural areas, the number of township health centres and village clinics decreased moderately, which is probably due to rapid urbanization. The percentage of villages that have village clinics increased from 90.4% in 2009 to 93.3% in 2015. In the less-developed Central and Western regions, almost all villages had a village clinic in 2015.

The total number of primary care providers and village doctors (with and without licenses) increased almost 1.4 times between 2010 (from 2.5 million) and 2020 (to 3.4 million). The ratio of physicians and registered nurses working in primary care facilities per 1000 population increased from 0.80 in 2015 to 1.09 in 2020, particularly in the less-developed Western region. However, the ratio of village doctors per 1000 population slightly decreased across all regions to 1.56 in 2020.

The proportion of primary care providers who had received college training increased from 58.9% in 2010 to 81.4% in 2020 in urban community health centres and from 39.6% in 2010 to 65.0% in 2020 in rural township health centres (29-32).

Strategies to address the inequitable distribution of the health care workforce include waiving tuition fees for medical students who are willing to work at primary care facilities in rural areas for at least 3 years after graduation and providing in-service training and encouraging experienced doctors to rotate from tertiary hospitals to lower-level health facilities and serve as medical trainers (27). In Jiangsu province, a public health physician from a community health centre said, “Our District Health Commission has recruited high school students who have taken the GaoKao [college admission test] and would like to practice at the primary care level. Selected students can be exempted from tuition fees or the required college admission score will be adjusted to some extent. We had three people in the previous 2 years, and they are going to be put in the village clinics this year....Nonlocals might not understand the local dialect, especially in rural areas. Therefore, we prefer local people to be trained as village doctors.”
3.3 Performance assessments

3.3.1 Basic public health services

In the two study provinces, our semi-structured interviews to elicit qualitative information found that the Provincial Health Commission led assessments and issued guidelines for performance assessments at each administrative level, in keeping with the terms of the national evaluation plan (see Section 2.2). Each higher-level administrative unit assesses the performance of the unit below. For example, a township health centre is responsible for assessing the performance of village clinics in its catchment area, and the county health bureau is in charge of assessing the townships.

The data primarily come from routine records. Establishing health records for residents is one of the components of the BPHS that documents the medical history and treatment of NCDs at the individual level. In addition, China’s CDC has developed information systems known as the Infectious Diseases and Public Health Emergencies Report and the Health Management for Psychosis report, and these have been deployed to all community and township health centres (33). In Jiangsu and Henan provinces, decision-makers who are in charge of BPHS at the provincial level mentioned that the evaluation team often consisted of clinical and public health experts, and assessments included a combination of record-checking and random sampling of counties and townships to verify service delivery. A general practitioner in a township health centre in Henan province said, “[The County] CDC first checks the total volume of work based on computer records, then conducts household surveys. For example, residents are asked if they have gone to the health centre, had a doctor visit their home for a blood pressure check or [if they were asked] about their medication use.”

3.3.2 Performance-based payment

The performance-based payment for delivering BPHS at each administrative level is allocated at the end of the fiscal year. Table 6 details the payments made from the central government to the provincial governments in the 31 mainland provinces of China in 2022. The annual budget contributed by the central government was estimated as: the per capita funding standard × the number of residents × the proportion of the central government’s contributions. Based on performance rankings, the central government deducted funds from 14 provinces and one independent provincial unit, ranging from US$ 34,375 to US$ 1.12 million, and resulting in slightly lower per capita allocations.
Of these 14 provinces and one independent provincial unit, eight are low-income provinces, where 80% of funding is received from the central government, and five of the remaining provinces are considered to be lower-middle-income provinces, where 60% of total funding comes from the central government. The total amount deducted was allocated to the other 17 provinces, with additional resources ranging from US$ 1562 to US$ 2.42 million. Overall, the performance-based payment from the central government was only a small share of the total capitation payment, 0.5% in 2022. Data on performance-based funding at the provincial, municipal and county levels are not publicly available, and thus the actual per capita payment by province cannot be calculated.
## Table 6. Central government payments for basic public health services to the provincial governments of 31 mainland provinces, China, 2022

<table>
<thead>
<tr>
<th>Province or region</th>
<th>No. of permanent residents (by million population)</th>
<th>Annual budget from central government (US$ 1 million)</th>
<th>Per capita budget (US$)</th>
<th>Performance-based funding (US$ 1 million)</th>
<th>Actual payment (US$ 1 million)</th>
<th>Per capita payment (US$)</th>
<th>No. of primary care facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liaoning&lt;sup&gt;c&lt;/sup&gt;</td>
<td>42.59</td>
<td>262.69</td>
<td>6.2</td>
<td>−1.12</td>
<td>261.56</td>
<td>6.1</td>
<td>1,418</td>
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<tr>
<td>Heilongjiang&lt;sup&gt;c&lt;/sup&gt;</td>
<td>31.85</td>
<td>250.82</td>
<td>7.9</td>
<td>−0.98</td>
<td>249.84</td>
<td>7.8</td>
<td>1,435</td>
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<td>Guangdong&lt;sup&gt;d&lt;/sup&gt;</td>
<td>126.01</td>
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<td>−0.67</td>
<td>495.49</td>
<td>3.9</td>
<td>2,397</td>
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<td>Guizhou&lt;sup&gt;e&lt;/sup&gt;</td>
<td>38.56</td>
<td>404.88</td>
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<td>−0.63</td>
<td>404.25</td>
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<tr>
<td>Guangxi&lt;sup&gt;e&lt;/sup&gt;</td>
<td>50.13</td>
<td>526.37</td>
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<td>525.82</td>
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<td>Inner Mongolia&lt;sup&gt;e&lt;/sup&gt;</td>
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<td>Hainan&lt;sup&gt;c&lt;/sup&gt;</td>
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<td>Bingtuan&lt;sup&gt;c, f&lt;/sup&gt;</td>
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<td>685</td>
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<td>75.54</td>
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<td>243</td>
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<td>Qinghai&lt;sup&gt;e&lt;/sup&gt;</td>
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<td>62.16</td>
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<td><strong>Subtotal: 14 (+1)</strong></td>
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<td><strong>3876.90</strong></td>
<td><strong>7.8</strong></td>
<td><strong>−5.81</strong></td>
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### Provinces with performance payments allocated

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<tr>
<th>Province or region</th>
<th>No. of permanent residents (by million population)</th>
<th>Annual budget from central government (US$ 1 million)</th>
<th>Per capita budget (US$)</th>
<th>Performance-based funding (US$ 1 million)</th>
<th>Actual payment (US$ 1 million)</th>
<th>Per capita payment (US$)</th>
<th>No. of primary care facilities</th>
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<td>415.07</td>
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<td>0.00</td>
<td>415.07</td>
<td>10.5</td>
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<td>Gansu&lt;sup&gt;e&lt;/sup&gt;</td>
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<td>0.00</td>
<td>262.71</td>
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<td>Province or region</td>
<td>No. of permanent residents (by million population)</td>
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<td>Per capita budget (US$)</td>
<td>Performance-based funding (US$ 1 million)</td>
<td>Actual payment (US$ 1 million)</td>
<td>Per capita payment (US$)</td>
<td>No. of primary care facilities b</td>
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<td>-------------------</td>
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<td>------------------------------------------</td>
<td>--------------------------------</td>
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<td>-----------------------------</td>
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<tr>
<td>Beijing d</td>
<td>21.89</td>
<td>28.73</td>
<td>1.3</td>
<td>0.01</td>
<td>28.74</td>
<td>1.3</td>
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<td>Fujian c</td>
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<td>259.06</td>
<td>6.2</td>
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<td>259.08</td>
<td>6.2</td>
<td>1 123</td>
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<tr>
<td>Shanghai d</td>
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<td>1.3</td>
<td>0.02</td>
<td>32.66</td>
<td>1.3</td>
<td>335</td>
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<tr>
<td>Henan c</td>
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<td>880.08</td>
<td>8.9</td>
<td>0.04</td>
<td>880.12</td>
<td>8.9</td>
<td>2 560</td>
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<tr>
<td>Xinjiang e</td>
<td>22.49</td>
<td>236.15</td>
<td>10.5</td>
<td>0.04</td>
<td>236.18</td>
<td>10.5</td>
<td>1 111 f</td>
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<td>10.5</td>
<td>0.04</td>
<td>336.57</td>
<td>10.5</td>
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<td>8.6</td>
<td>0.05</td>
<td>497.46</td>
<td>8.6</td>
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<td>Hebei c</td>
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<td>587.55</td>
<td>7.9</td>
<td>0.05</td>
<td>587.61</td>
<td>7.9</td>
<td>2 312</td>
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<tr>
<td>Tianjin d</td>
<td>13.87</td>
<td>54.61</td>
<td>3.9</td>
<td>0.12</td>
<td>54.73</td>
<td>3.9</td>
<td>262</td>
</tr>
<tr>
<td>Anhui c</td>
<td>61.03</td>
<td>540.44</td>
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<td>0.15</td>
<td>540.59</td>
<td>8.9</td>
<td>1 715</td>
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<td>0.77</td>
<td>334.47</td>
<td>3.9</td>
<td>1 548</td>
</tr>
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<td>Hunan c</td>
<td>66.44</td>
<td>581.15</td>
<td>8.7</td>
<td>0.98</td>
<td>582.13</td>
<td>8.8</td>
<td>2 515</td>
</tr>
<tr>
<td>Zhejiang d</td>
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<td>254.24</td>
<td>3.9</td>
<td>1.09</td>
<td>255.33</td>
<td>4.0</td>
<td>1 544</td>
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<tr>
<td>Shandong c</td>
<td>101.53</td>
<td>639.86</td>
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<td>2.42</td>
<td>642.28</td>
<td>6.3</td>
<td>2 086</td>
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<tr>
<td><strong>Subtotal: 17</strong></td>
<td><strong>914.98</strong></td>
<td><strong>6818.46</strong></td>
<td><strong>7.5</strong></td>
<td><strong>5.81</strong></td>
<td></td>
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</tr>
</tbody>
</table>

a The annual budget from the central government = national per capita standard funding in 2022 (US$ 13.00) × the number of provincial residents × the proportion of the funding share from the central government.

b The number of primary care facilities = the number of community health centres + the number of township health centres.

c These provinces receive 50% or 60% of their total Programme funding from the central government.
d These provinces receive 10% or 30% of their total Programme funding from the central government.
e These provinces receive 80% of their total Programme funding from the central government.
f Bingtuan is an independent provincial unit located within Xinjiang province.
g The total number of primary care facilities in Bingtuan and Xinjiang province is 1111.

*Source: Information from the National Health Commission and Ministry of Finance of China (62).*
At primary care facilities, the fund for BPHS is pooled into facility revenue and is mainly used to pay providers’ salaries. The average annual salary of a primary care provider increased from US$ 5059 in 2009 to US$ 11 926 in 2021, after adjusting for inflation (29). However, primary care providers’ salaries remained low and were only half the average salary of health care providers at hospitals (29). In Jiangsu and Henan provinces, each county decides the total amount of the performance-based payment that is made to primary care facilities. Often, there are no clear criteria about how this amount is decided. For example, a county in Henan province allocated US$ 1562 to the two primary care facilities with the top assessment scores (i.e. US$ 781 for each), which was deducted from the two primary care facilities that had the lowest assessment scores. The amount of subsidy to primary care providers is also small (34); according to a director at a county hospital, “Rewards could be up to ¥1000 [US$ 156] per year for township health care providers”.

In rural areas, village doctors support township health centres in providing the BPHS. One study conducted in six provinces across different regions with different levels of socioeconomic development reported in 2017 that township health centres allocated an average of 35.8% of the funding for BPHS to village clinics, with allocations ranging from 16.4% to 61.0%, by province (35).

According to our interviews conducted to seek qualitative information, in Jiangsu province, the township health centre allocated 40% of its funding to village clinics, and Henan province allocated 50% of its funding to village clinics; these amounts were based on estimates of the workload at the village level. Village doctors are private practitioners and do not receive a basic salary. They are contracted by the government to promote the use of essential medicines and deliver BPHS and medical services at the village level. The fund for BPHS pays village doctors based on the volume of services they provide, which is determined by, for example, the frequency of follow-up visits and the number of patients managed; according to a director of a county health bureau in Henan, village doctors are paid about “Two thousand Chinese yuan [US$ 310] when 1000 people are managed, but this is not enough to support [a village doctor]”. The township health centre is responsible for assessing the performance of village clinics. The payment to village doctors is based only on “the quantity of service but is not linked to the quality”, according to a hospital manager in Henan province.
Evidence of impact
Assessments of the NBPHSP’s impact focus on Programme indicators, particularly on the management of patients with chronic conditions and their treatment status.

4.1 Hypertension and type 2 diabetes

Establishing health records, ensuring at least four follow-up visits in a year to monitor blood pressure and blood glucose levels, and providing health education to prevent NCDs are major components of the standards for BPHS for patients with hypertension or diabetes. Monitoring data from the NBPHSP from all provinces in mainland China showed that in 2009 48.8% of patients had health records established and used for primary care management and this increased to 88.3% in 2019 (36). In a study conducted in three provinces from the Eastern, Central and Western regions in 2019, Jiang and colleagues reported that around 90% of patients with hypertension or diabetes who were seeking care at primary care facilities had health records established (37).

Five studies reported on the frequency of follow-up visits for patients with hypertension or diabetes (38-42). The four studies recruited participants based on their health records at primary care facilities or interviewed patients who were seeking care at primary care facilities sampled in several provinces across the Eastern and Western regions; these studies reported that the proportions of patients having four or more follow-up visits for hypertension or diabetes ranged from 80% to 90% (39-42). The China National Household Health Services survey found that lower proportions of patients with hypertension or diabetes had had at least four follow-up visits (38) compared with the studies that recruited patients seeking care at primary care facilities, which may imply there is a gap in coverage at the population level. Additionally, no longitudinal studies have been conducted, so changes in follow-up services over time have not been tracked.

Four studies reported the proportions of patients with hypertension or diabetes that had standard management (36, 43-45). Two studies used data from BPHS health records (36, 43). According to nationwide Programme monitoring data, between 2009 and 2019 the proportions of patients with hypertension or diabetes who had standard management for their disease increased from 45.2% to 74.5% for hypertension and from 46.3% to 73.6% for diabetes; also, disparities across regions narrowed (Fig. 3 and Fig. 4). Two other studies recruited participants based on their established health records in two Western provinces, and the reported proportions of patients who had standard management for these two diseases were moderately lower than the national averages (44, 45). However, there is lack of population-based evidence.
In addition, Song and Zhang (46) used data from China’s 2017 dynamic monitoring survey of the internal migrant population and found that only 36.4% of migrants with hypertension or diabetes accessed BPHS in the place where they moved. Among them, females, patients older than 55 years and patients with both hypertension and diabetes were more likely to access these services.
The proportions of patients with controlled blood pressure and blood glucose levels among those with hypertension or type 2 diabetes are the key performance indicators according to service standards. From 10 population-based studies (47-56), the proportions of patients with controlled blood pressure or blood glucose levels were generally low. The 2020 Chinese Residents’ Chronic Diseases and Nutrition report found that in 2018 only 11.0% of patients with hypertension and 33.1% of patients with diabetes had their blood pressure or blood glucose levels under control. In addition, nine studies used data from BPHS records or recruited patients who had established health records at primary care facilities (36, 39, 40, 42-45, 57, 58). According to NBPHSP monitoring data from 2019, the proportion of patients who had controlled blood pressure was 67.7% and for controlled blood glucose levels it was 63.6% (36).

Programme monitoring data reported higher proportions of patients with controlled blood pressure and blood glucose levels compared with results from population-based studies, which implies gaps in service coverage at the population level.

### 4.2 Severe mental disorders

Local primary care providers are responsible for establishing health records for patients with mental disorders and assessing their risks. According to our interviews, primary care providers in Jiangsu and Henan provinces perceived that managing patients with mental disorders was their biggest challenge due to their own lack of professional knowledge and an insufficient number of psychiatric specialists, which is consistent with findings by Li and colleagues (59).

Few studies have reported on whether patients received standard management for severe mental disorders in China, and all studies used routinely collected Programme data (36, 43, 59, 60). There is also a lack of evidence about health care management for people with severe mental disorders at the population level. According to nationwide NBPHSP monitoring data, the proportion of patients with severe mental disorders who had standard management was around 80%, and it reached 89.2% in 2019 (36) One study was based on BPHS records from six provinces across different regions and found that 87.6% of patients with a severe mental disorder were considered stable (43).
4.3 Tuberculosis

China has shifted from a vertical TB control model led by the China CDC to an integrated care model in which there is collaboration among the CDC, designated TB hospitals and primary care facilities. Under the framework of the TB control network, the CDC is responsible for TB surveillance and monitoring and for coordinating TB services delivered by the designated hospitals and primary care facilities. Designated TB hospitals are often part of infectious disease hospitals or general hospitals, and in this setting TB clinics provide diagnosis and treatment. Primary care providers are tasked with referring patients suspected of having TB and with managing patients at the community level (27), which was included in the BPHS package in 2015.

According to nationwide NBPHSP monitoring data, the proportion of TB patients who were managed according to BPHS standard has remained above 96% since 2015 and reached 98% in 2019 (36). The proportion of TB patients who regularly took medication was also around 96% during the same period (36).
Facilitating factors for and challenges to improving the quality of care for chronic illness
We used the quality of care analysis framework (Fig. 1) to evaluate how purchasing arrangements, Programme management and BPHS delivery (both inputs and processes) affected the quality of care delivered to patients with chronic illness (the output).

### 5.1 Purchasing arrangements

#### 5.1.1 Financing for the National Basic Public Health Services Programme

The government of China committed to expanding the package of BPHS to address the emerging challenges of chronic diseases and to move towards universal health coverage, which was reflected in the fund inputs and the guarantees associated with developing service standards and evaluating performance. After adjusting for inflation, the minimum per capita funding standard in the NBPHSP increased by an average of 13.2% annually between 2009 and 2021, which is greater than the average annual increase in total health expenditure during the same period (i.e. 10.4%) (61, 62). Funding for the Programme is proportionally shared by the central, provincial, municipal and county governments, with greater contributions being made by the central government to low-income provinces (11). Provincial governments also shoulder greater funding responsibility in low-income areas to ensure that funding supports BPHS delivery.

The management of chronic conditions has been improved nationwide, with more patients receiving care that meets programme standards, and the disparities across regions with different levels of socioeconomic development have narrowed.

The allocation of funds, however, was insufficient to cover the costs of delivering the BPHS and could not compensate for variations in service delivery capacity across the country. Several studies that estimated the actual costs of the services covered by the NBPHSP in cities and provinces concluded that Programme funding was insufficient compensation for the services provided (63-65). In 2022, the central government deducted performance-based payments from 14 provinces due to their suboptimal performance in implementing the Programme, and the majority of these provinces are low- or lower-middle-income (62). Our interviews found that low-income provinces shouldered the increased pressure of providing matching funds and the increase in the minimum per capita funding standard over the years, particularly when economic growth slowed in China (Box 2). Thus, the funding gap and insufficient capacity for service delivery created a vicious circle in less-developed areas, thereby adversely impacting the quality of care.
Box 2. Findings from interviews about challenges in funding the National Basic Public Health Services Programme, China, 2022

“[The central government provides 60% of the funding]. The provincial-level government gives 24% [of the funding], and the remaining 16% is jointly shared by the city-level [30%] and county-level governments [70%])....The fund allocation ratio for different administrative levels has not changed [over time]. The total amount of funding has increased [over time]. This is increasing pressure on our local government, particularly when the economy has not been very good in recent years.”

Department Chief, Municipal Health Commission, Henan

“Basic public health services include free follow-up visits, a fasting blood sugar test or a physical examination. No additional tests or services can be provided for free because of limited funding. We can’t ask service providers to give unlimited services for free. Our current per capita funding standard of ¥93 (US$ 13.00) in Jiangsu is good [i.e. higher than the national standard]; however, it remains extremely insufficient if the local government relies on this funding for personnel costs, equipment costs and operational costs [in primary care facilities].”

Department Chief, official at the Provincial Center for Disease Control, Jiangsu

5.1.2 Payments and incentives

Insufficient budgets for primary care facilities hinders improvements to the quality of care. Since comprehensive health system reform, primary care facilities largely rely on government funding for their operations (66). In 2009, the national government issued the zero-mark-up medicine policy, aiming to remove incentives for primary care providers to overprescribe, and introduced a performance-based salary system, split into a basic salary (60–70% of the total salary) and a performance-based bonus (30–40%) (17, 67, 68). National policy suggests that public primary care facilities should send their revenue from services to the local government, and the government should then cover all their expenses, including the costs of required equipment (69). Despite the government increasing the subsidies to primary care facilities, they remain inadequate (Box 3) (33, 70). Our interviews in the two study provinces found that local governments did not have funds to purchase equipment to diagnose hypertension, diabetes and their complications, which was perceived as being one of the barriers to improving the quality of care for patients with chronic illness (Box 3).
Box 3. Findings from interviews about funding for primary care facilities, China, 2022

“The fundamental reason [for the poor quality of care] is that the total funds allocated from above [the local government] are not enough, and that is because the local fiscal sector has no money.”
Director, community health centre, Jiangsu

“We mixed all fund sources. Honestly, there is actually only a limited amount of money. It is limited.”
Director, County Health Commission, Henan

“There are lists of personnel, materials and equipment, according to the national guidelines. For example, when screening for retinopathy [a complication of diabetes], you need to use an ophthalmoscope....This should be purchased by the local government...But the local government does not have funds for equipment procurement.”
Department Chief, Provincial Center for Disease Control, Jiangsu

“We talked about ambulatory blood pressure [monitoring], but primary care centres still can’t conduct the related work after [staff] are trained and [pass the] exam. Why? Because [primary care centres] do not have the equipment at all. [Primary care centres] say that they have no money to buy equipment.”
Clinical expert, cardiovascular hospital, Henan

Funding for the package of BPHS makes up part of primary care facilities’ revenue. Our interviews found that primary care facilities pooled the various government funds (e.g. compensation for essential medicines, funding for the package of services) to guarantee a basic salary for primary care providers (Box 4). The performance-based part of the salary was often determined by the volume of services provided rather than the quality of care. In Henan province, decision-makers indicated that the performance-based salary system was not functioning, partly due to limited funds and partly to a lack of financial accounting and management capacity at primary care facilities. Studies have reported delays in allocating BPHS funding in remote areas and in providing salaries to primary care providers (71-73). In addition, the amount of the BPHS subsidy is too little to motivate village doctors to make changes in patient management. A hospital manager in Henan province said, “The village doctors are the breadwinners. They have no basic salary. If they rely entirely on basic public health subsidies, it is far from enough for their life. Village doctors complain and would like to provide medical services to compensate [for their lack of income]. It is understandable. Often, the subsidy [for basic public health services that is paid] to the village doctor is based on the quantity of services, but it is not linked to the quality.”
Box 4. Findings from interviews about payments for primary care providers and village doctors, China, 2022

“We would [like to] introduce performance-based payment: better work, better pay and vice versa. However, the existing payment scheme is [that] doing more or less work, it [pays] the same; doing better or worse work, it [pays] the same...because funding is limited and most [of it] is used to cover salaries.”

Department Chief, Provincial Health Commission, Henan

“If the local government fully covers the basic salary of primary care providers, then the basic public health services fund can be used as an additional reward to motivate services delivery. At present, it is difficult to achieve.”

Department Chief, Provincial Center for Disease Control, Jiangsu

“The current problem is that the finance staff at primary care facilities have insufficient accounting capacity. Some of the finance staff don’t have an accounting or finance background. For example, some of the finance staff used to be drivers. It is hard for them to carry out complex accounting....So they are only able to pay individual salaries for simplicity’s sake.”

Department Chief, Provincial Health Commission, Henan

“Village doctors receive the subsidy by providing basic public health services, and it is relatively low, about ¥2000 [US$ 313]. We have to allocate the funds to them in a timely manner and organize meetings to raise their motivation.”

Director, township health centre, Henan

In 2011, the national government issued a guideline that established the general practitioner system and highlighted a career development pathway for primary care providers (17). In the two study provinces, we found that the provincial governments instituted a programme to provide an annual payment for outstanding primary care providers (Box 5). However, low salaries and weak incentives lead to poor retention of qualified health professionals, and this has a negative impact on the quality of care, particularly in rural and less-developed areas. In the two study provinces, almost all key informants (n = 6) talked about brain drain at the grassroots level (Box 5). They mentioned that well-trained primary care providers were often recruited and offered better salaries by higher-level hospitals or health facilities in areas with more socioeconomic development. In addition, only a few positions at primary care facilities are fully funded by the government. Many primary care providers are contracted for a fixed term without a social benefits package and are responsible for generating revenue to support part of their salary. When new positions are created, several government sectors must be involved in order to coordinate
funding and social security schemes, including the human resources, social security, finance and health sectors. “Without enough money [government funding], who dares to decide to create new positions,” asked a decision-maker in Henan province. In addition, a lack of opportunity for career development is another barrier to retaining primary care providers (Box 5). Young people are not motivated and are unwilling to serve at the community and village levels. Our interviews found that most village doctors were older than 50 years and some were still practising at age 70, which is consistent with findings in other studies (34).

Box 5. Findings from interviews about incentives for and retention of primary care providers, China, 2022

“We have a ‘gugan’ [outstanding] grassroots health programme, which is part of the provincial government’s Livelihood Project. There is an additional reward of ¥10 000 to ¥20 000 [US$ 1563–3125] per year.”

Department Chief, Provincial Health Commission, Jiangsu

“We have created a special position for general practitioners. Each person will be awarded an additional ¥60 000 [US$ 9375] per year, which is equivalent to an additional ¥5000 [US$ 781] a month.”

Department Chief, Provincial Health Commission, Henan

“Developing health care personnel’s abilities can’t be achieved in the short term, and it requires a lot of financial investment. We are also facing a very cruel reality. Well-trained health professionals at primary level are recruited by high-level hospitals....Primary care facilities can’t keep talented people due to low salaries, limited career development and other unfavourable conditions.”

Department Chief, Provincial Health Commission, Henan

“Primary care personnel cannot be retained. This is a common phenomenon. The salary is too low. When we conducted research [at the primary level], we found that the income of primary care personnel is lower than that of a waiter. The value of primary care personnel is not reflected [in their salaries].”

Department Chief, Provincial Center for Disease Control, Jiangsu

“There are very few fully government-funded positions. Some positions are partly covered by government funding that provides 30% of the salary, and the remaining part needs to be earned by [personnel] themselves. This is a reason why people left.”

Department Chief, Municipal Health Commission, Henan
5.2 Programme management

5.2.1 Capacity building

To ensure standard delivery of the package of BPHS, the central government issues practical guidelines for the NBPHSP and allocates around US$ 12.5 million annually for training (74). According to our interviews (Box 6), national and provincial governments established online training platforms to provide a series of courses aimed at improving the quality of care.

In Jiangsu province, it was estimated that around 80–90% of primary care providers passed the training in hypertension management, and they were granted a certificate by the national centre for cardiovascular diseases. In addition to online training, the Provincial Health Commissions of the two study provinces each established a technical committee that included clinical and public health experts to provide on-site training periodically at the city, county or township levels. In addition, some primary care facilities also assigned a couple of physicians to receive short-term intensive in-service training at tertiary hospitals. In Henan province, clinical experts from a cardiovascular specialist hospital organized more than 60 trainings for village doctors about diagnosing and managing patients with hypertension, including training in the safe administration of medication and identification of hypertension-related danger signs and complications. One clinical expert told us that, “Many village doctors said it was not that they were unwilling to deliver basic public health services, but no one had taught them how to [deliver them] properly before. After the training, the village doctors’ knowledge of and ability to diagnose and treat diseases improved, but there are still two deficits: the lack of medication and lack of equipment [at the primary care level]".
"In recent years, we have been using online platforms for training due to the COVID-19 epidemic. We have online training at the national and provincial levels. A series of courses is designed every year, and we have recently held on-site courses."

**Department Chief, Provincial Center for Disease Control, Jiangsu**

[The rate for meeting standards for managing] hypertension is really low. When primary care providers made a call to follow up, they did not know what they should ask. This is a big issue. I primarily train [village doctors] from a clinical perspective...This 1-day course involves topics from screening to diagnosis and prescribing medication to patient management."

**Clinical expert, cardiovascular hospital, Henan**

The defined function of the primary care facility impacts the effect of training. For example, all primary care facilities are allowed to stock and prescribe medicines only from the National Essential Medicines List (66), which limits the capacity to administer medications at the primary care level to some extent. In Henan province, clinical experts provided training on treating hypertension with a combination of five different medicines. However, only one or two types of medicines were available at the primary care facility, and thus providers were not able to offer care according to the training. In addition, the shortage of qualified primary care providers is a barrier to improving the quality of care. It is estimated that more than 20% of physicians practising in primary care facilities are unlicensed because there is an insufficient number of trained health care workers (33). A city decision-maker from Henan province said, “There are only one or two doctors in township health centres. Even if there is a training, they may not be able to attend because they have to provide health care [at the health centre] due to a shortage of practitioners.” In 2012, one study recruited 406 primary care providers from 8 provinces who cared for patients with hypertension or diabetes (75). This study found that the average number of hours worked was 20.4 ± 14.7 hours per week, and 63% of providers thought they were overworked, which was consistent with our qualitative findings (65, 76-78).

### 5.2.2 Monitoring and evaluation

Since 2012, the central government has provided US$ 10.2 million every year for Programme evaluations (74). In the two study provinces for this case study, health care managers thought performance assessments were important to help improve the quality of care. In Jiangsu, the provincial government highlighted the “accuracy” of the assessments in considering both the volume and
quality of services. In Jiangsu, the evaluation team examined weaknesses in delivering the package of BPHS and analysed the barriers and challenges to delivery, after which they offered feedback and suggestions for quality improvement, with official support from the local health authority. Moreover, as a decision-maker in Jiangsu emphasized, “Jiangsu is the first province in China that has passed a by-law for primary care to ensure implementation of the package of basic public health services”.

According to the design of the NBPHSP, assessment of the management of chronic conditions centres on process indicators, such as the frequency of follow-up visits, the proportions of patients with chronic illness receiving standard management, and the treatment of chronic conditions; however, these are not linked to health outcomes. In the two study provinces, health policy-makers and health care practitioners perceived that implementation of the NBPHSP contributed to an increase in knowledge about and awareness of patients with chronic conditions, but current services could not meet the population’s health needs and demands, such as for slowing of the progression of chronic diseases, mitigating complications and improving the quality of life (Box 7).

Our interviews also indicated that an absence of synergies between the package of BPHS and basic medical services at the primary level compromised the quality of care for people with chronic conditions. A clinical expert from a cardiovascular hospital in Henan province said, “Follow-up visits [for hypertension as part of the basic package of services] and prescribing medicines [i.e. basic medical services] are not carried out by the same person. Therefore, the prescription for the medication is completely inconsistent with the records of medication in the basic public health information system.”

Additionally, patients often do not trust the quality of care at the primary level (33). Also, a department chief in the Jiangsu Provincial CDC mentioned that many actions to prevent and control chronic diseases were disease-directed rather than patient-centred and were often supervised by different departments in the health authorities. Thus, this limited coordination and cooperation within the health sector led to inefficiencies in the allocation and use of health care resources. The population was also unsatisfied with the fragmented or repeated care for chronic disease control.
Box 7. Findings from interviews about the quality of care for patients with chronic illness, China, 2022

“The quality of work [in the basic public health services] is definitely much higher than before, but as for how much impact it has on population health, it is difficult to say.”
Department Chief, Provincial Center for Disease Control, Jiangsu

“It’s not enough to simply ask people whether they have taken their medicine during follow-up visits. This level of service can no longer meet the needs of population....To improve the management of chronic diseases, you [primary care providers] must have the basic medical ability....If this ability is not improved, it will be difficult to meet the needs of population.”
Department Chief, Provincial Health Commission, Henan

“The department that assigns the number of tasks [for basic public health services] does not know or care about how many doctors there are, which inevitably means the number of tasks does not match [the amount doctors can handle], and the quality of management is compromised....There are many chronic disease projects and some overlap; however, since different health administrative departments lead the projects, some public funds have not been effectively integrated, resulting in an inefficient use of the funds. I think this is still a big problem. At the level of health administration, designing medical services or health care management should [focus on] patient-centred care rather than disease-based care.”
Department Chief, Provincial Center for Disease Control, Jiangsu

5.2.3 Health information systems

Some districts and counties have tried to integrate various health information systems by using big data for their NBPHSP evaluations and decision-making. For example, in 2019 Longhua District Health Commission in Shenzhen led the design and development of a data platform to integrate stand-alone information from the BPHS, including personal health records, with records of health management for NCDs (e.g. hypertension and diabetes), TB, psychosis and other diseases (79). It showed that the workload associated with starting and updating records was reduced and the efficiency of delivery improved. In 2019, after the integrated information platform was launched, the proportions of patients who had standard treatment increased by 40.8% for hypertension and 42.6% for diabetes compared with 2018 (80).

There are several challenges to developing health information systems. First, developing electronic health information systems at primary care facilities is highly decentralized. Often, data structures,
terms or data protocols are not standardized (33, 81). Moreover, many different information technology vendors are involved, and their systems are largely not interoperable. Thus, it is hard to link health information systems across health facilities. Second, health information systems for basic medical services and the BPHS are separate (33). During our interviews, a clinical expert thought that the fragmentation of information about basic medical services and public health hampered their integration. In addition, the quality of data collected at primary care facilities is of concern, partly attributable to the heavy workload and partly due to the low motivation of primary care providers to document properly (81-83). The development of health information systems in China remains at an early stage. Health professionals in Jiangsu province indicated it would be important to have a national plan to develop high-quality and integrated information systems.
Conclusions
The NBPHS has a broad scope and, therefore, it is difficult to precisely assess the effects of the Programme’s purchasing arrangements on the quality of care for chronic conditions. In addition, no formal external evaluation of the Programme has been conducted. However, the management of chronic conditions is one of the main components of the package of BPHS. Generally, since the establishment of the NBPHS, coverage of BPHS for chronic conditions has increased across the country’s different socioeconomic regions, but the quality of care has remained suboptimal. We cannot draw conclusions about the impact on the NBPHS on access and quality.

In the context of comprehensive health system reform, the government funded the NBPHSP with the aim to promote universal coverage of BPHS, and in particular cope with the emerging challenges of NCDs and the control of infectious diseases. We believe that higher levels of funding from central and provincial governments allocated to less-developed regions and areas has improved coverage of the prevention and management of chronic conditions (e.g. hypertension, type 2 diabetes, severe mental disorders and TB) and mitigated the disparities across the different regions. However, despite the minimum per capita funding standard having increased during the past decade, the Programme’s funding has not sufficiently compensated for the need to deliver services that meet certain standards. In addition, local governments in less-developed areas are facing increased fiscal pressure to provide matching funds, especially when economic growth slows in China.

Municipal and county governments prospectively pay more than half of their Programme capitation payment to primary care facilities providing the package of BPHS. The second performance-based capitation payment is linked to an assessment that evaluates organizational and financial management, and the volume and standard of services delivered. The performance-based funding payment at each administrative level is reallocated based on the performance assessments at the end of the fiscal year. The health management of chronic conditions accounts for around 40–50% of funding, due to the substantial number of patients with hypertension or type 2 diabetes. However, the incentive design may not sufficiently take into account the capacity to deliver the package of services across regions with different levels of socioeconomic development. The majority of provinces that have funds deducted by the central government are low- and lower-middle-income provinces, and the reductions in payment may have a further negative impact on the quality of services in less-developed areas.

Primary care facilities mainly rely on government funding to provide the BPHS package and basic medical services. NBPHS funding is one of the main revenue sources for primary care facilities. Primary care
providers’ salaries are often determined according to the volume of services delivered rather than by the quality of care offered due to overall limits on funding to support the operation of the facilities and the weak management capacity for introducing a real performance-based salary system. Similarly, the subsidy for providing the basic package of services is too little to motivate private practitioners (i.e. village doctors) to provide proper quality services.

The measures of the quality of care for patients with chronic illness in the BPHS centre on meeting standards for the management and treatment of chronic conditions. During the past decade, the standard management of patients with hypertension, type 2 diabetes, severe mental disorders or TB improved across regions, but the proportions of patients with controlled blood pressure or blood glucose levels remained low. Assessments of quality mainly rely on monitoring data from the NBPHSP, and there is a lack of evidence about service coverage at the population level. There is little evidence about the impact of the package of BPHS on the health outcomes of patients with chronic conditions.

A shortage of qualified primary care providers, a lack of competence and insufficient incentives at the primary care level, and fragmented health information systems are major obstacles to improving the quality of care for patients with chronic conditions. It is hard to retain well-trained primary care providers at the primary level, especially in less-developed areas, due to low salaries, suboptimal opportunities for career development and the perception that primary-level providers are less valued. The separation of the BPHS from basic medical services also compromises the coordination of care for people with chronic conditions. Consequently, local residents do not trust the quality of care at primary care facilities.
Lessons learned for other settings
China’s experiences in scaling up and paying for a package of BPHS for NCDs and for controlling infectious diseases provide important lessons for other low- and middle-income countries as they move towards implementing universal health coverage.

The central government made a strong commitment to continue funding for the NBPHSP and provided greater contributions to low- and lower-middle-income provinces. This allocation of funding aims to close the gap between more- and less-developed areas and achieve universal coverage of standardized essential health services, and it has improved the coverage of preventive activities and the health management of chronic conditions across the different regions in China.

The performance-based allocations are introduced at each administrative level, but their share of the total Programme fund is small. According to the results of assessments of the Programme’s management and implementation, high-income provinces often receive additional performance-based funding, while funds are deducted from low- and lower-middle-income provinces. Thus, the guidelines for Programme assessment should take into account the local capacity for service delivery and set milestones for sustainable development.

The development of the NBPHSP is embedded in comprehensive health system reform in China, which includes reforms for financing primary care facilities. The number of service categories included in the BPHS is increasing as funding for the Programme has increased. However, government funding, especially in less socioeconomically developed areas, neither sufficiently compensates for the operation of primary care facilities nor incentivizes qualified primary care providers to deliver high-quality services. Given the limited financial and human resources available, the organization and delivery of services should be prioritized, and resources should be allocated to ensure that incentives are sufficient to improve the quality of care in both the short and long term.

Fragmented health information systems and the absence of synergies between BPHS preventive services and basic medical services (i.e. outpatient and inpatient care) compromise the coordination of continuing care for patients with chronic conditions. Hence, policies are required to support providers, coordinate care and encourage collaboration to improve responsiveness, and optimize the design of the primary care system. Health information systems should be integrated to document continued care and ensure records are complete for patients receiving care for chronic conditions. Data should be used to support timely health-related decision-making.

The central government set the service standards for the delivery of BPHS. However, the standards have not been refined since the
Programme was established in 2009. Measures of quality centre on the coverage of key practices (e.g. frequency of follow up, standards for case management), but they are neither linked to health outcomes nor consider changes in a population’s needs over time. Despite the central government providing inputs for annual assessments, data for these are primarily taken from routine records, and there is a lack of population-based evidence. This highlights the need for periodic internal and external Programme evaluations to be scientifically robust and the importance of encouraging policy-makers to engage in evidence-based decision-making.
References


Annexes
Annex 1. Priority areas for action in the new round of comprehensive health system reform in China

In 2009, China launched comprehensive health system reform, with the government making a greater contribution to move towards the goal of universal health coverage. Since then there have been two phases of health system reform.

A1.1 The first phase of reform: 2009–2011

During the first phase of health system reform, five areas were prioritized and benefited from substantial government investment. Those priorities were to:

- expand health insurance coverage;
- establish a National Essential Medicines System;
- strengthen the primary care system by providing subsidies to build health infrastructure, construct information systems and train primary care providers;
- establish the National Basic Public Health Services Programme;
- pilot public hospital reforms.

A1.2 The second phase of reform: 2012–present

The second phase began in 2012 and is continuing; it prioritizes building a value-based health care delivery system by:

- reforming the financing and payment methods for public hospitals;
- establishing a primary care based system to deliver integrated care;
- restructuring national health care governance;
- promoting the private sector;
- refining first-phase initiatives.
Annex 2. Study design and methods

A2.1 Study design and settings

This study used a mixed-methods design. We first conducted a scoping review to identify and summarize information about the implementation and evaluations of the National Basic Public Health Services Programme (NBPHSP), with a focus on the health management of four chronic conditions: hypertension, type 2 diabetes, severe mental disorders and tuberculosis. In addition, we conducted a small-scale qualitative study in one lower-middle-income province (Henan, 2021; population: 66.2 million; gross domestic product [GDP] per capita: US$ 9282) and one better-off province (Jiangsu, 2021; population: 85.1 million; GDP per capita: US$ 21 453) to further understand the real-world implementation of the Programme. Two prefectures were selected from each province. The selection of provinces and prefectures was based on their geographical location, level of socioeconomic development and local health authorities' interest in and willingness to contribute to and cooperate with the research.

We collected both quantitative and qualitative data from open sources and interviews to gain an understanding of how the purchasing arrangements for the NBPHSP contribute to the quality of services provided to prevent and treat chronic disease in areas with different levels of socioeconomic development in China.

A2.2 Data sources

A2.2.1 Scoping review

We searched PubMed, the Web of Science, Embase and two Chinese databases (CNKI and Wanfang Data) using the following groups of search terms: “basic public health services”, “primary health care”, “universal health coverage”; “financing”, “fund allocation”, “payment method”, “incentives”; “hypertension”, “type 2 diabetes”, “psychosis”, “tuberculosis”; “quality of care”, “performance assessment”, “equity”; and “China”. These terms were used to identify peer-reviewed journal articles in English and Chinese published from 1 January 2010 to 30 October 2022. We also screened the references of all identified studies and contacted experts in relevant fields to achieve a comprehensive literature search (Fig. A2.1).

We also screened the websites of national and provincial health commissions, the finance sector and the official website of the NBPHSP to collect policy documents and practical guidance about standards, fund management measures and plans for performance evaluations. We also included the grey literature and internal
reports suggested by participants interviewed for the qualitative part of the study. In addition, we searched other open data sources from the World Health Organization, the Global Burden of Disease Study 2019 and the China Health Statistics Yearbooks.

We extracted and summarized data from the following three domains:

- Programme design elements, including funding sources and allocation, payment methods and incentives, the implementing body, the target population, coverage of services and plans for evaluations;

- Service delivery and quality of care for chronic conditions, including information about the distribution of health care resources, organization of health services and measures of the quality of care;

- Facilitators and inhibitors of improving the quality of care for chronic conditions, including contextual factors, the quality of governance and other health system determinants.
Studies identified from databases

Identification

Studies identified from English-language databases ($N = 2061$)
- PubMed ($n = 1525$)
- Embase ($n = 288$)
- Web of Science ($n = 248$)

Chinese databases ($N = 1592$)
- CNKI ($n = 287$)
- Wanfang Data ($n = 1305$)

Duplicate records removed ($N = 207$)
- English-language database ($n = 164$)
- Chinese database ($n = 43$)

Screening

Studies screened by title and abstract ($N = 3446$)
- English-language database ($n = 1897$)
- Chinese database ($n = 1549$)

Full-text studies retrieved and assessed ($N = 458$)
- English-language database ($n = 110$)
- Chinese database ($n = 348$)

Included

53 studies included
- English-language ($n = 29$)
- Chinese ($n = 24$)

- Expert-recommended studies ($n = 3$)
- Retrieved from reference lists ($n = 10$)
A2.2.2 Interviews for qualitative data
In the two study provinces, we conducted interviews with policymakers in charge of the NBPHSP and noncommunicable diseases (NCDs) at the provincial, city and county levels to gain a qualitative understanding of the strategic plans for the Programme at the study sites, with a focus on the impact of purchasing arrangements on the quality of care for chronic conditions, the challenges in managing chronic conditions and plans for improving the quality of care.

We also interviewed health care managers at primary care facilities and hospitals to discuss the routine practices of service delivery for patients with chronic conditions, the coordination of services across the tiers of the delivery system, and the facilitators and inhibitors to improving the quality of care.

In addition, we organized focus group discussions and individual interviews with urban and rural primary care providers to understand their experiences of providing the package of basic public health services, the perceived challenges and the support needed to improve the quality of care.

A total of 30 people were interviewed (19 in Henan province and 11 in Jiangsu province). Table A2.1 lists the demographic details of participants in this part of the study.

All interviews were recorded with the permission of the participants and were transcribed in Chinese for analysis. We adopted a framework approach for qualitative data analysis. All data were coded, charted and summarized to draw interpretations about the impact of purchasing arrangements on the quality of care for chronic conditions, and then these results were combined with the findings from the scoping review. We used NVivo v. 12 (Lumivero, Denver, CO, USA) for qualitative data management.

A2.3 Quality assurance
The quality of the data was assured by triangulating findings from the different data sources and respondents and the results generated by the different methods. We examined conflicts in the data and analysed the reasons for disparities. We also presented our data and findings to experts in the field for consultation to explore up-to-date sources and avoid any potential misunderstandings.
Table A2.1. Demographic characteristics of participants interviewed to gain a qualitative understanding of the National Basic Public Health Services Programme, China, 2022

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Province (lower-middle income)</th>
<th>Jiangsu (better-off)</th>
<th>Contents of interview</th>
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<tbody>
<tr>
<td>Provincial Health Commission</td>
<td>Division of Basic Public Health Services; Division of Finance ($n = 2$)</td>
<td>Division of Basic Public Health Services; Division of Mental Health ($n = 2$)</td>
<td>Discussed the design, fundraising for, health resource allocation of, monitoring and evaluation of NBPHSP in the province, with a focus on the quality of care for patients with chronic conditions, the challenges in implementing the Programme and plans for improving the quality of implementation</td>
</tr>
<tr>
<td>Municipal Health Commission</td>
<td>Division of Basic Public Health Services ($n = 1$)</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>County-level Health Commission</td>
<td>Division of Basic Public Health Services ($n = 1$)</td>
<td>NA</td>
<td>Discussed the implementation and supervision of the NBPHSP, including coordination and cooperation across health sectors, as well as suggestions for providing better quality care for people with chronic conditions</td>
</tr>
<tr>
<td>Provincial CDC</td>
<td>NA</td>
<td>Division of Tuberculosis; Division of NCDs; Division of Basic Public Health Services ($n = 3$)</td>
<td>Discussed the implementation and supervision of the NBPHSP, including coordination and cooperation across health sectors, as well as suggestions for providing better quality care for people with chronic conditions</td>
</tr>
<tr>
<td>Municipal CDC</td>
<td>NA</td>
<td>Division of NCDs ($n = 1$)</td>
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Health care managers

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<tr>
<th>Hospital</th>
<th>Municipal-level hospital; county-level hospital ($n = 2$)</th>
<th>Provincial-level hospital ($n = 1$)</th>
<th>Discussed the routine practices of chronic care delivery and coordination across the tiered service delivery system, the facilitators and inhibitors of improving the quality of care for chronic conditions, particularly the impact of purchasing arrangements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary care</td>
<td>Community health care centre ($n = 4$); township health care centre ($n = 1$)</td>
<td>Community health care centre ($n = 1$); township health care centre ($n = 1$)</td>
<td></td>
</tr>
<tr>
<td>Primary care providers</td>
<td>Community health care centre ($n = 6$); township health care centre ($n = 2$)</td>
<td>Community health care centre ($n = 1$); township health care centre ($n = 1$)</td>
<td>Talked about their routine practices for delivering care for chronic conditions and the perceived support and difficulties in this routine practice, particularly their views about how the purchasing arrangements for the package of basic public health services impacts the quality of care for chronic conditions</td>
</tr>
</tbody>
</table>

| Total                             | 19                                                         | 11                              |                                                                                                                                                                                                                      |

CDC: Center for Disease Control and Prevention; NBPHSP: National Basic Public Health Services Programme; NA: not applicable; NCDs: noncommunicable diseases.