

## The primary health-care system in China

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## 1. Method of literature searching

We searched the PubMed/Medline (1966-2017) and CNKI (China National Knowledge Infrastructure) database in July 2016, to identify relevant studies on seven domains of primary health care (structural, human resources, electronic health record system, financial, insurance, medications, and quality of care) in China. In the PubMed/Medline (1966-2017), we used MeSH and free text terms in conjunction to increase sensitivity to potentially appropriate literature. The MeSH terms include "primary health care", "General Practice", "General Practitioners", "Physicians, Family ", "Community Health Services", "Delivery of Health Care", and terms for each specific domain. Search terms and all their possible synonyms and spellings were identified and used in the search strategy (Table A-1). In the database of CNKI, we used similar strategy to include literature published in Chinese journals (Table A-1).

**Table A-1 English literature from PubMed/Medline**

Search topic	Query	Items found
EHR system	Search (China[Title/Abstract] OR Chinese[Title/Abstract]) AND ("primary health care"[Mesh] OR "General Practice"[Mesh] OR "General Practitioners"[Mesh] OR "Physicians, Family "[Mesh] OR "Community Health Services"[Mesh] OR "Delivery of Health Care"[Mesh] OR "township hospital"[Title/Abstract] OR "township health center"[Title/Abstract] OR "township health centre"[Title/Abstract] OR "community health station"[Title/Abstract] OR "village clinic"[Title/Abstract] OR "community health center"[Title/Abstract] OR "community health centre"[Title/Abstract]) AND ("Electronic Health Records"[Mesh] OR "Hospital Information Systems"[Mesh] OR "information technology"[Title/Abstract]) AND ((eng[Language]) OR chi[Language]) NOT	26

Search topic	Query	Items found
	<p>“Autobiography”[ptyp] NOT “Bibliography”[ptyp] NOT “Biography”[ptyp] NOT “Consensus Development Conference”[ptyp] NOT “Consensus Development Conference, NIH”[ptyp] NOT “Corrected and Republished Article”[ptyp] NOT “Dataset”[ptyp] NOT “Dictionary”[ptyp] NOT “Directory”[ptyp] NOT “Duplicate Publication”[ptyp] NOT “Electronic Supplementary Materials”[ptyp] NOT “Festschrift”[ptyp] NOT “Interactive Tutorial”[ptyp] NOT “Legal Cases”[ptyp] NOT “Letter”[ptyp] NOT “News”[ptyp] NOT “Patient Education Handout”[ptyp] NOT “Periodical Index”[ptyp] NOT “Personal Narratives”[ptyp] NOT “Portraits”[ptyp] NOT “Published Erratum”[ptyp] NOT “Retracted Publication”[ptyp] NOT “Retraction of Publication”[ptyp] NOT “Twin Study”[ptyp] NOT “Video-Audio Media”[ptyp] NOT “Webcasts”[ptyp]</p>	
Medications	<p>Search (China[Title/Abstract] OR Chinese[Title/Abstract]) AND ("primary health care"[Mesh] OR "General Practice"[Mesh] OR "General Practitioners"[Mesh] OR "Physicians, Family"[Mesh] OR "Community Health Services"[Mesh] OR "Delivery of Health Care"[Mesh] OR "township hospital"[Title/Abstract] OR "township health center"[Title/Abstract] OR "township health centre"[Title/Abstract] OR "community health station"[Title/Abstract] OR "village clinic"[Title/Abstract] OR "community health center"[Title/Abstract] OR "community health centre"[Title/Abstract]) AND ("Drugs, Essential"[Mesh] OR “Medication Systems”[Mesh] OR “Medicine, Chinese Traditional”[Mesh]) AND ((eng[Language]) OR chi[Language]) NOT “Autobiography”[ptyp] NOT “Bibliography”[ptyp] NOT “Biography”[ptyp] NOT “Consensus Development Conference”[ptyp] NOT “Consensus Development Conference, NIH”[ptyp] NOT “Corrected and Republished Article”[ptyp] NOT “Dataset”[ptyp] NOT “Dictionary”[ptyp] NOT “Directory”[ptyp] NOT “Duplicate Publication”[ptyp] NOT “Electronic Supplementary</p>	434

Search topic	Query	Items found
	<p>Materials"[ptyp] NOT "Festschrift"[ptyp] NOT "Interactive Tutorial"[ptyp] NOT "Legal Cases"[ptyp] NOT "Letter"[ptyp] NOT "News"[ptyp] NOT "Patient Education Handout"[ptyp] NOT "Periodical Index"[ptyp] NOT "Personal Narratives"[ptyp] NOT "Portraits"[ptyp] NOT "Published Erratum"[ptyp] NOT "Retracted Publication"[ptyp] NOT "Retraction of Publication"[ptyp] NOT "Twin Study"[ptyp] NOT "Video-Audio Media"[ptyp] NOT "Webcasts"[ptyp]</p>	
Quality	<p>Search (China[Title/Abstract] OR Chinese[Title/Abstract]) AND ("primary health care"[Mesh] OR "General Practice"[Mesh] OR "General Practitioners"[Mesh] OR "Physicians, Family "[Mesh] OR "Community Health Services"[Mesh] OR "Delivery of Health Care"[Mesh] OR "township hospital"[Title/Abstract] OR "township health center"[Title/Abstract] OR "township health centre"[Title/Abstract] OR "community health station"[Title/Abstract] OR "village clinic"[Title/Abstract] OR "community health center"[Title/Abstract] OR "community health centre"[Title/Abstract]) AND ("Health Services Accessibility"[Mesh] OR "Healthcare Disparities"[Mesh] OR "Practice Patterns, Physicians"[Mesh] OR "Practice Patterns, Nurses"[Mesh] OR "Professional-Patient Relations"[Mesh] OR "Health Services Research"[Mesh] OR "Quality of Health Care"[Mesh] OR "quality"[Title/Abstract] OR "performance"[Title/Abstract]OR behavior [Title/Abstract] OR behaviors [Title/Abstract] OR behaviour [Title/Abstract] OR behaviours [Title/Abstract] OR "disparities"[Title/Abstract] OR "disparity"[Title/Abstract] OR "gap"[Title/Abstract] OR "gaps"[Title/Abstract] OR "measure"[Title/Abstract] OR "measurements"[Title/Abstract] OR "adherence"[Title/Abstract] OR Inequity[Title/Abstract] OR equity[Title/Abstract] OR inefficiency[Title/Abstract] OR efficiency[Title/Abstract] OR efficient[Title/Abstract]) AND ((eng[Language]) OR chi[Language]) NOT "Autobiography"[ptyp]</p>	7675

Search topic	Query	Items found
	<p>NOT "Bibliography"[ptyp] NOT "Biography"[ptyp] NOT "Consensus Development Conference"[ptyp] NOT "Consensus Development Conference, NIH"[ptyp] NOT "Corrected and Republished Article"[ptyp] NOT "Dataset"[ptyp] NOT "Dictionary"[ptyp] NOT "Directory"[ptyp] NOT "Duplicate Publication"[ptyp] NOT "Electronic Supplementary Materials"[ptyp] NOT "Festschrift"[ptyp] NOT "Interactive Tutorial"[ptyp] NOT "Legal Cases"[ptyp] NOT "Letter"[ptyp] NOT "News"[ptyp] NOT "Patient Education Handout"[ptyp] NOT "Periodical Index"[ptyp] NOT "Personal Narratives"[ptyp] NOT "Portraits"[ptyp] NOT "Published Erratum"[ptyp] NOT "Retracted Publication"[ptyp] NOT "Retraction of Publication"[ptyp] NOT "Twin Study"[ptyp] NOT "Video-Audio Media"[ptyp] NOT "Webcasts"[ptyp]</p>	
Human resources	<p>Search (China[Title/Abstract] OR Chinese[Title/Abstract]) AND ("primary health care"[Mesh] OR "General Practice"[Mesh] OR "General Practitioners"[Mesh] OR "Physicians, Family "[Mesh] OR "Community Health Services"[Mesh] OR "Delivery of Health Care"[Mesh] OR "township hospital"[Title/Abstract] OR "township health center"[Title/Abstract] OR "township health centre"[Title/Abstract] OR "community health station"[Title/Abstract] OR "village clinic"[Title/Abstract] OR "community health center"[Title/Abstract] OR "community health centre"[Title/Abstract]) AND ("manpower"[Mesh] OR "Education, Public Health Professional"[Mesh] OR "Education, Professional"[Mesh] OR "Education, Medical, Continuing"[Mesh] OR "Professionalism"[Mesh] OR "Career Choice"[Mesh] OR "Career Mobility"[Mesh] OR "human resources"[Title/Abstract] OR "retention"[Title/Abstract] OR "incentives"[Title/Abstract] OR "salary"[Title/Abstract] OR "professional medical master"[Title/Abstract] OR Motivation[Mesh] OR "Salaries and Fringe Benefits"[Mesh] OR "Staff Development"[Mesh] OR</p>	4557

Search topic	Query	Items found
	<p>“Inservice Training”[Mesh] OR “Training Support”[Mesh] OR “Physician Incentive Plans”[Mesh] OR “Employee Incentive Plans”[Mesh] OR “Personnel Management”[Mesh] OR “Health Resources”[Mesh] OR incentive[Title/Abstract] OR motivation[Title/Abstract] OR motivations[Title/Abstract] OR motivating[Title/Abstract] OR salaries[Title/Abstract] OR income[Title/Abstract] OR wage[Title/Abstract] OR wages[Title/Abstract] OR "financial reward"[Title/Abstract] OR "financial rewards"[Title/Abstract] OR "fringe benefit"[Title/Abstract] OR "fringe benefits"[Title/Abstract] OR train[Title/Abstract] OR training[Title/Abstract] OR trainings[Title/Abstract] OR scholarship[Title/Abstract] OR scholarships[Title/Abstract] OR education[Title/Abstract] OR educational[Title/Abstract] OR "career development"[Title/Abstract] OR "development opportunity"[Title/Abstract] OR "development opportunities"[Title/Abstract] OR "resource availability"[Title/Abstract] OR "resources availability"[Title/Abstract] OR "working condition"[Title/Abstract] OR "working conditions"[Title/Abstract] OR "work condition"[Title/Abstract] OR "work conditions"[Title/Abstract] OR "working environment"[Title/Abstract] OR "working environments"[Title/Abstract] OR "work environment"[Title/Abstract] OR "work environments"[Title/Abstract] OR "human resource management"[Title/Abstract] OR "human resources management"[Title/Abstract] OR "personnel management"[Title/Abstract] OR “Personnel Turnover”[Mesh] OR “Emigration and Immigration”[Mesh] OR Personnel Loyalty[Mesh] OR “Professional Practice Location”[Mesh] OR attraction[Title/Abstract] OR attracting[Title/Abstract] OR attract[Title/Abstract] OR attracted[Title/Abstract] OR attracts[Title/Abstract] OR retaining[Title/Abstract] OR retain[Title/Abstract] OR retained[Title/Abstract] OR retains[Title/Abstract] OR recruitment[Title/Abstract] OR recruiting[Title/Abstract] OR</p>	

Search topic	Query	Items found
	<p>recruit[Title/Abstract] OR recruited[Title/Abstract] OR recruits[Title/Abstract] OR migration[Title/Abstract] OR migrate[Title/Abstract] OR migrating[Title/Abstract] OR migrated[Title/Abstract] OR migrates[Title/Abstract] OR immigration[Title/Abstract] OR immigrate[Title/Abstract] OR immigrating[Title/Abstract] OR immigrated[Title/Abstract] OR immigrates[Title/Abstract] OR emigration[Title/Abstract] OR emigrate[Title/Abstract] OR emigrating[Title/Abstract] OR emigrated[Title/Abstract] OR emigrates[Title/Abstract] OR mobility[Title/Abstract] OR turnover[Title/Abstract] OR "brain drain"[Title/Abstract]) AND ((eng[Language]) OR chi[Language]) NOT "Autobiography"[ptyp] NOT "Bibliography"[ptyp] NOT "Biography"[ptyp] NOT "Consensus Development Conference"[ptyp] NOT "Consensus Development Conference, NIH"[ptyp] NOT "Corrected and Republished Article"[ptyp] NOT "Dataset"[ptyp] NOT "Dictionary"[ptyp] NOT "Directory"[ptyp] NOT "Duplicate Publication"[ptyp] NOT "Electronic Supplementary Materials"[ptyp] NOT "Festschrift"[ptyp] NOT "Interactive Tutorial"[ptyp] NOT "Legal Cases"[ptyp] NOT "Letter"[ptyp] NOT "News"[ptyp] NOT "Patient Education Handout"[ptyp] NOT "Periodical Index"[ptyp] NOT "Personal Narratives"[ptyp] NOT "Portraits"[ptyp] NOT "Published Erratum"[ptyp] NOT "Retracted Publication"[ptyp] NOT "Retraction of Publication"[ptyp] NOT "Twin Study"[ptyp] NOT "Video-Audio Media"[ptyp] NOT "Webcasts"[ptyp]</p>	
Insurance	<p>Search (China[Title/Abstract] OR Chinese[Title/Abstract]) AND ("primary health care"[Mesh] OR "General Practice"[Mesh] OR "General Practitioners"[Mesh] OR "Physicians, Family "[Mesh] OR "Community Health Services"[Mesh] OR "Delivery of Health Care"[Mesh] OR "township hospital"[Title/Abstract] OR "township health center"[Title/Abstract] OR "township health</p>	422

Search topic	Query	Items found
	<p>centre"[Title/Abstract] OR "community health station"[Title/Abstract] OR "village clinic"[Title/Abstract] OR "community health center"[Title/Abstract] OR "community health centre"[Title/Abstract]) AND ("Insurance, Health"[Mesh] OR "out-of-pocket"[Title/Abstract] OR "New Rural Cooperative"[Title/Abstract] OR affordability[Title/Abstract] OR affordable[Title/Abstract] OR catastrophic[Title/Abstract] OR "urban resident basic medical insurance"[Title/Abstract] OR "cooperative medical scheme "[Title/Abstract] OR "NCMS"[Title/Abstract] OR "financial protection"[Title/Abstract]) AND ((eng[Language]) OR chi[Language]) NOT "Autobiography"[ptyp] NOT "Bibliography"[ptyp] NOT "Biography"[ptyp] NOT "Consensus Development Conference"[ptyp] NOT "Consensus Development Conference, NIH"[ptyp] NOT "Corrected and Republished Article"[ptyp] NOT "Dataset"[ptyp] NOT "Dictionary"[ptyp] NOT "Directory"[ptyp] NOT "Duplicate Publication"[ptyp] NOT "Electronic Supplementary Materials"[ptyp] NOT "Festschrift"[ptyp] NOT "Interactive Tutorial"[ptyp] NOT "Legal Cases"[ptyp] NOT "Letter"[ptyp] NOT "News"[ptyp] NOT "Patient Education Handout"[ptyp] NOT "Periodical Index"[ptyp] NOT "Personal Narratives"[ptyp] NOT "Portraits"[ptyp] NOT "Published Erratum"[ptyp] NOT "Retracted Publication"[ptyp] NOT "Retraction of Publication"[ptyp] NOT "Twin Study"[ptyp] NOT "Video-Audio Media"[ptyp] NOT "Webcasts"[ptyp]</p>	
Financial	<p>Search (China[Title/Abstract] OR Chinese[Title/Abstract]) AND ("primary health care"[Mesh] OR "General Practice"[Mesh] OR "General Practitioners"[Mesh] OR "Physicians, Family "[Mesh] OR "Community Health Services"[Mesh] OR "Delivery of Health Care"[Mesh] OR "township hospital"[Title/Abstract] OR "township health center"[Title/Abstract] OR "township health</p>	1110



Search topic	Query	Items found
	<p>centre"[Title/Abstract] OR "community health station"[Title/Abstract] OR "village clinic"[Title/Abstract] OR "community health center"[Title/Abstract] OR "community health centre"[Title/Abstract]) AND ("Healthcare Financing"[Mesh] OR "Remuneration"[Mesh] OR "Capital Financing"[Mesh] OR "Health Resources"[Mesh] OR "Resource Allocation"[Mesh] OR payment[Title/Abstract] OR subsidy[Title/Abstract] OR subsidies[Title/Abstract] OR budget[Title/Abstract] OR fund[Title/Abstract] OR resource[Title/Abstract] OR resources[Title/Abstract] OR resourcing[Title/Abstract]) AND ((eng[Language]) OR chi[Language]) NOT "Autobiography"[ptyp] NOT "Bibliography"[ptyp] NOT "Biography"[ptyp] NOT "Consensus Development Conference"[ptyp] NOT "Consensus Development Conference, NIH"[ptyp] NOT "Corrected and Republished Article"[ptyp] NOT "Dataset"[ptyp] NOT "Dictionary"[ptyp] NOT "Directory"[ptyp] NOT "Duplicate Publication"[ptyp] NOT "Electronic Supplementary Materials"[ptyp] NOT "Festschrift"[ptyp] NOT "Interactive Tutorial"[ptyp] NOT "Legal Cases"[ptyp] NOT "Letter"[ptyp] NOT "News"[ptyp] NOT "Patient Education Handout"[ptyp] NOT "Periodical Index"[ptyp] NOT "Personal Narratives"[ptyp] NOT "Portraits"[ptyp] NOT "Published Erratum"[ptyp] NOT "Retracted Publication"[ptyp] NOT "Retraction of Publication"[ptyp] NOT "Twin Study"[ptyp] NOT "Video-Audio Media"[ptyp] NOT "Webcasts"[ptyp]</p>	
Structural	<p>Search (China[Title/Abstract] OR Chinese[Title/Abstract]) AND ("primary health care"[Mesh] OR "General Practice"[Mesh] OR "General Practitioners"[Mesh] OR "Physicians, Family "[Mesh] OR "Community Health Services"[Mesh] OR "Delivery of Health Care"[Mesh] OR "township hospital"[Title/Abstract] OR "township health center"[Title/Abstract] OR "township health centre"[Title/Abstract] OR "township health centers"[Title/Abstract] OR "township health centres"[Title/Abstract] OR "community</p>	2435

Search topic	Query	Items found
	<p>health station"[Title/Abstract] OR "village clinic"[Title/Abstract] OR "village clinics"[Title/Abstract] OR "community health center"[Title/Abstract] OR "community health centre"[Title/Abstract] OR "community health centers"[Title/Abstract] OR "community health centres"[Title/Abstract]) AND ("Organization and Administration"[Mesh] OR "Health Policy"[Mesh] OR "Organizational Policy"[Mesh] OR "Referral and Consultation"[Mesh] OR "gatekeeping"[Mesh] OR gatekeeper[Title/Abstract] OR governance[Title/Abstract] OR reform[Title/Abstract] OR referral[Title/Abstrac] OR "integrated health care"[Title/Abstrac] OR "three tier health care system"[Title/Abstrac]) AND ((eng[Language]) OR chi[Language]) NOT "Autobiography"[ptyp] NOT "Bibliography"[ptyp] NOT "Biography"[ptyp] NOT "Consensus Development Conference"[ptyp] NOT "Consensus Development Conference, NIH"[ptyp] NOT "Corrected and Republished Article"[ptyp] NOT "Dataset"[ptyp] NOT "Dictionary"[ptyp] NOT "Directory"[ptyp] NOT "Duplicate Publication"[ptyp] NOT "Electronic Supplementary Materials"[ptyp] NOT "Festschrift"[ptyp] NOT "Interactive Tutorial"[ptyp] NOT "Legal Cases"[ptyp] NOT "Letter"[ptyp] NOT "News"[ptyp] NOT "Patient Education Handout"[ptyp] NOT "Periodical Index"[ptyp] NOT "Personal Narratives"[ptyp] NOT "Portraits"[ptyp] NOT "Published Erratum"[ptyp] NOT "Retracted Publication"[ptyp] NOT "Retraction of Publication"[ptyp] NOT "Twin Study"[ptyp] NOT "Video-Audio Media"[ptyp] NOT "Webcasts"[ptyp]</p>	

**Table A-2 Chinese literature from Chinese National Knowledge Infrastructure (CNKI)**

Search topic	Query	Items found
Structural	TI='基层卫生'+ '基层医疗'+ '初级卫生'+ '社区医疗'+ '社区卫生'+ '乡村医疗'+ '乡村卫生' AND TI='组织'+ '框架'+ '结构'+ '改革'+ '转诊'+ '协同'+ '配合'+ '分工'+ '分级诊疗'	Journal articles: 158 Doctoral thesis: 4 Master thesis: 41
Financial	TI='基层卫生'+ '基层医疗'+ '初级卫生'+ '社区医疗'+ '社区卫生'+ '乡村医疗'+ '乡村卫生' AND TI='经费'+ '资金'+ '财政'+ '支出'+ '收入'+ '收支'+ '补偿'+ '拨款'+ '拨付'+ '药品零差'	Journal articles: 87 Doctoral thesis: 4 Master thesis: 19
Insurance	TI='基层卫生'+ '基层医疗'+ '初级卫生'+ '社区医疗'+ '社区卫生'+ '乡村医疗'+ '乡村卫生' AND TI='医保'+ '保险'+ '自付'+ '报销'+ '新农合'+ '新型农村合作医疗'+ '封顶'+ '起付'+ '拨款'+ '拨付'+ '药品零差'+ '救助'	Journal articles: 49 Doctoral thesis: 2 Master thesis: 15
Human resources	TI='基层卫生'+ '基层医疗'+ '初级卫生'+ '社区医疗'+ '社区卫生'+ '乡村医疗'+ '乡村卫生' AND TI='人力资源'+ '人员流动'+ '薪酬'+ '激励'+ '职业发展'+ '职业规划'+ '培训'+ '技能'+ '人员能力'+ '教育'+ '轮转' AND HX=Y	Journal articles: 129 Doctoral thesis: 3 Master thesis: 59
Quality	TI='基层卫生'+ '基层医疗'+ '初级卫生'+ '社区医疗'+ '社区卫生'+ '乡村医疗'+ '乡村卫生' AND AB='医疗质量'+ '服务质量'+ '患者满意'+ '用药合理性'+ '合理用药'+ '医疗安全'+ '服务	Journal articles: 190 Doctoral thesis: 33

Search topic	Query	Items found
	效率'+依从性'+循证'+同质'+医疗可及性'+服务可及性'	Master thesis: 207
EHR system	TI='基层卫生'+基层医疗'+初级卫生'+社区医疗'+社区卫生'+乡村医疗'+乡村卫生' AND TI='信息系统'+电子病历'+信息技术'+数据'+健康档案'	Journal articles: 33 Doctoral thesis: 1 Master thesis: 13
Medications	TI='基层卫生'+基层医疗'+初级卫生'+社区医疗'+社区卫生'+乡村医疗'+乡村卫生' AND TI='基本药物'+基药'+药品供应'+药品零差'+药品加成'+药品定价'+药政'+药品管理'	Journal articles: 78 Doctoral thesis: 2 Master thesis: 31

## 2. Study design of a nationwide survey on primary health care in China

The study design has been published previously, with detailed protocol and questionnaires.<sup>1</sup>

### Setting and sampling

The survey leveraged a nationwide collaborative network of the China Patient Centered Evaluative Assessment of Cardiac Events (PEACE) Millions Persons Project (MPP).<sup>2</sup> The MPP is a national population-based screening project, based on primary health care system across China to identify subjects with high risk of cardiovascular diseases from population aged from 35 to 75 years. In each of the 31 provinces in mainland China, we involved 3-6 sites (i.e. counties or district), with the total number of 121, according to the urbanization level, economic condition and geographic location. In each site, about 5 towns or sub-districts were chosen according to their population size and stability. In each town or sub-district, we had approached all primary health care institutions involved in the MPP, including community health centres, community health stations, township health centres, and village clinics. 3602 of them participated in the survey. The response rate was 97·4%. The ownership in institutions involved, with the exception of village clinics, is similar with the national overall statistics in the *China Health and Family Planning Statistical Yearbook*<sup>3</sup>, which indicated that 93·2% of community health centres, 71·1% of community health stations, 99·5% of township health centres, and 62·8% of village clinics are publicly owned (Table A-3). In the participating primary health care institutions, we had invited all healthcare professionals, including physicians, nurses, public health professionals, village doctors and their assistants. 25,162 of them accepted. The response rate was 95·4%. From the MPP, we consecutively enrolled about 50,000 subjects with written informed consent, as potential primary health care consumers due to their high risk of cardiovascular diseases. The central ethics committee at the China National Center for Cardiovascular Disease approved the MPP and the survey.

**Table A-3 Basic characteristics of primary health care institutions in the survey**

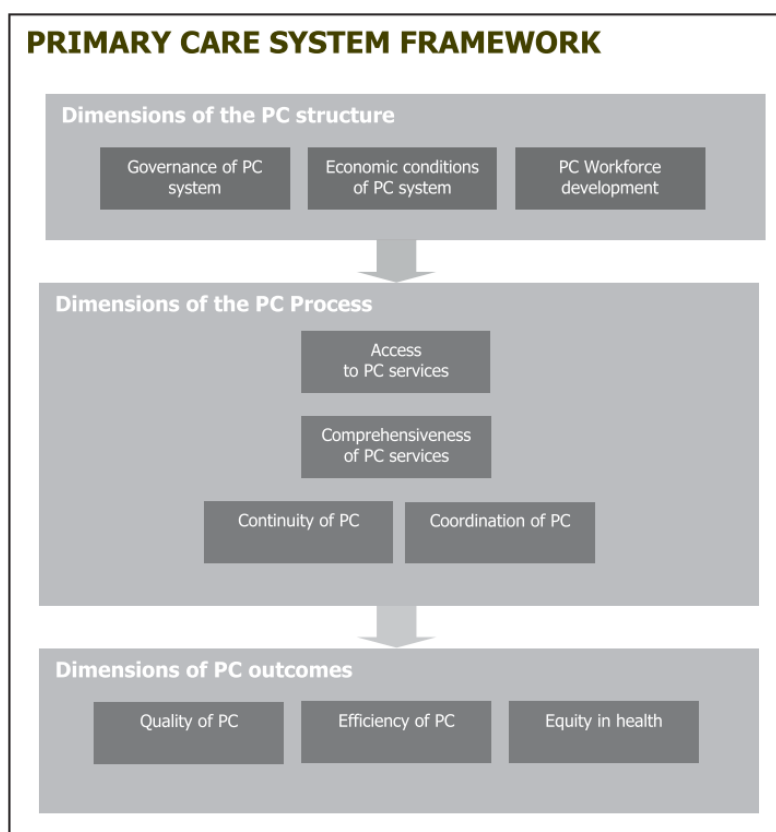
	Urban		Rural	
	Community health centre	Community health station	Township health centre	Village clinic
N	210	457	293	2642
Economic-geographic region, n (%)				
Eastern	80 (38.1)	224 (49.0)	82 (28.0)	711 (26.9)
Central	57 (27.1)	68 (14.9)	90 (30.7)	991 (37.5)
Western	73 (34.8)	165 (36.1)	121 (41.3)	940 (35.6)
Publicly owned, n (%)	201 (95.7)	331 (72.4)	293 (100)	2291 (86.7)
Run by, n (%)				
Government	125 (59.5)	85 (18.6)	174 (59.4)	541 (20.5)
Public hospital	51 (24.3)	91 (19.9)	29 (9.9)	185 (7.0)
Private hospital	2 (1.0)	6 (1.3)	0 (0.0)	6 (0.2)
Collective	25 (11.9)	155 (33.9)	90 (30.7)	1570 (59.4)
Self-owned	7 (3.3)	120 (26.3)	0 (0.0)	340 (12.9)
Primary health care professionals				
Doctors	2837 (36.4)	876 (44.0)	3528 (42.6)	3385 (47.8) *
Other health care professionals	4957 (63.6)	1116 (56.0)	4759 (57.4)	3704 (52.2)
Employment status				
Permanent staff	4836 (63.8)	658 (42.9)	5718 (71.5)	-
Contract staff	2748 (36.2)	877 (57.1)	2276 (28.5)	-

\* Including village doctors

### Data collection

The data collection in questionnaires was designed according to a framework developed for assessing primary health care system in 31 European countries.<sup>4</sup> By modifying

Donbedian's model, this assessment framework includes 3 dimensions (structure, process and outcome), and one level below them, 13 domains (governance, financing, workforce, facility infrastructure, health information system, drug supply, access, comprehensiveness, continuity, coordination, quality, equity, and efficiency) (Figure A-1).



**Figure A-1 Structure of the framework for assessing primary health care system**

Questionnaires for institutional leaders, healthcare professionals, and consumers were developed to collect comprehensive information at different levels (Table A-5).

**Table A-5 Main aspects of the assessment framework covered by the survey questionnaires**

Dimension	Domain	Institution	Professional	Consumer
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		Questionnaire	Questionnaire	Questionnaire
<b>Structure</b>	Governance	✓	✓	
	Financing	✓		
	Workforce	✓	✓	
	Facility infrastructure	✓		
	Health information system	✓		
	Drug supply	✓	✓	
<b>Process</b>	Access	✓	✓	✓
	Comprehensiveness	✓		
	Continuity	✓	✓	✓
	Coordination	✓	✓	✓
<b>Outcome</b>	Quality		✓	
	Equity		✓	
	Efficiency		✓	✓

Data collection in this survey was strengthened by a design based on original document acquisition and review. In each participating primary health care institution, 10 kinds of original documents were copied and reviewed (Table A-6).

**Table A-6 Data elements in the 10 kinds of documents**

Document	Main data elements covered
Outpatient prescriptions (1-year records)	Date, age, gender, diagnosis, medications, amount, total charge
Employee Roster (3-year records)	Age, gender, ethnicity, first high education degree, highest education degree, seniority, qualification, license, government quota post, year of working, department



<b>Document</b>	<b>Main data elements covered</b>
Annual financial statement (3-year records)	Funding/income (funding/income sources and amount of funding/income), expenditure (expense flow and amount of expense)
Clinical equipment list	Type of equipment (physical measurement, laboratory, imaging and clinical treatment), name, manufacturer, model, amount of the equipment, unit price, year of start use
Health insurance policy document	Funding sources (government, patients and employers), deductible, reimbursement ration, ceiling, co-payment, reimbursement for hypertension patient, reimbursement for diabetes patients
Medication lists	Type of drug list (i.e. national essential medicine list (EML), provincial EMLs, insurance reimbursement medicine list), name of drug, dosage, package size, manufacturer, price
Health information systems	Type of system, name, software developers, maximum coverage, year of installation, purchase price, annual maintenance fee
Basic clinical services item list	Name of service, description, price of service, unit of service
Assessment indicators for basic public health service program	Assessment indicators and predefined targets for each basic public health service
Annual report for basic public health service program	Assessment indicators and values for each basic public health service

All study instruments and documents are deposited in the Document Bank as an open-access source for other researchers.

### **Quality assurance**

We have applied a set of policies and procedures to ensure data quality.

- 1) Questionnaire piloting: After the questionnaires were developed, we piloted them in about 90 PHC institutions. The questions were revised and updated based on the feedback of the local PHC health professionals and senior managers. The final version of the questionnaire is considered reasonable and well understood by the participating PHC institutions.
- 2) Software design: The e-questionnaire module in the offline electronic data collection system was designed with capabilities for quality control. Firstly, instructions and explanations for questions were listed within questionnaires alongside each question. Secondly, logical data checks were embedded to verify that the questions were answered completely and that the values entered meet the predefined range and formats. The system displayed a warning message for users to correct or re-enter data if answers violated the pre-defined rules. Thirdly, a standardized coding system was adopted using organization ID, file type, year/month, and file sequence number as a combination for naming all data files. Lastly, we will ensure data security during the transfer of data by using encrypted data transmissions from local study sites to China's National Center for Cardiovascular Diseases (NCCD).
- 3) Training: Before data collection started, all regional coordinating centre staff and key personnel of PHC institutions underwent training in a 2-day conference. The training was organized by the NCCD and delivered by specialised trainers. The training programme covered the sections of introduction, questionnaire, original documents collection and processing, scanning and practice sessions. Meanwhile, the NCCD provided the fieldwork staff a package of training materials, including standard operating protocols, training videos, and slides of the presentations given during the training conference. In addition, the NCCD sent trainers to PHC institutions and delivered on-site training. The NCCD also provided remote training as an alternative training method. Telephone and web-based hotlines were available for any queries during the data collection through the NCCD. We also provided additional training material for people who participate in the anonymous questionnaires (general staff and village doctors) to ensure data quality.

- 4) Central monitoring: We conducted central monitoring to review collected data and documents that are stored in the document bank in the NCCD. Data were uploaded daily and were inspected manually for completeness and clarity of documents by five full-time data quality specialists.
- 5) On-side monitoring visits: The goal of an on-site visit was to monitor staff compliance with the operations manual. Experienced NCCD staff directly visited about 2000 PHC institutions, scattered in all the 31 provinces, to install and maintain software applications, conduct in-person questionnaire interviews, collect documents, and check the completeness and quality of documents.
- 6) Real-time data monitoring: We developed a SAS QA/QC package to conduct real-time data checks on both questionnaire and structured document data. Specifically, the package ran at midnight every day and identifies records with data errors or potential data errors. These records were reviewed by data specialists made make necessary corrections. The SAS package focuses on the following aspects at each PHC institution:
  - a) progress status tracking: for example, this was done by comparing numbers of provider questionnaires finished with the total number of employees confirmed by the PHC institution to identify any potential issues with the operation of the survey;
  - b) missing data tracking: the number of questions missed in a questionnaire was used to assess the completeness of questionnaires; the number of documents missing were used to identify operational weaknesses;
  - c) data validation: predefined logic verification standard was applied for data quality checks, for example, the number of outliers for each continuous variable or illogic association between variables were used to identify the process failure of data collection and help to identify staff requiring additional training if appropriated. Once data issues had been identified, through either manual checks or the real-time SAS QA/QC package, the NCCD staff contacted the local coordinating centres to clarify or correct these issues. Any major issues identified during the data review were followed up by an on-site monitoring visit by the NCCD's project team. In addition, the NCCD and regional coordinating teams conducted regular on-site visits in the participating PHC institutions.

## Data analysis

We focused on measures in 5 domains of the primary health care system, including workforce, information technology, financing, insurance, and quality of care (Table A-7). Analyses were based mainly on data abstracted from prescriptions, employee rosters, lists of medications in stock, official health insurance policy documents, and questionnaire interviews. In the workforce domain, the analysis focused on primary health care doctors. Given varied training and credentials for doctors in primary health care settings, we have included 7241 licensed (assistant) doctors or unlicensed practicing individuals in community health centres, community health stations or township health centres, 3385 licensed (assistant) doctors or certificated village doctors in village clinics We used the Maslach Burnout Inventory for Human Services Survey (MBI-HSS) to assess the burnout status of healthcare professionals.<sup>5</sup> Regional disparities in healthcare resources and economic development necessitated our stratified analysis based on three official economic-geographic regions of China, including Eastern (13 provinces), Central (6 provinces), and Western (12 provinces).<sup>3</sup>

**Table A-7 Measures in national survey on the primary health care system**

Domain	Measure	Definitions
Workforce	Population density	<ul style="list-style-type: none"><li>Number of healthcare professionals per 1000 residents</li></ul>
	Aging	<ul style="list-style-type: none"><li>Median age of PHC doctors or village doctors</li><li>Proportion of PHC doctors or village doctors under the retirement age (60 for male, 55 for female)</li></ul>
	Practicing licensure	<ul style="list-style-type: none"><li>Proportion of PHC doctors who are licensed</li></ul>
	Medical training	<ul style="list-style-type: none"><li>Proportion of PHC doctors who have a junior medical college training or above</li><li>Proportion of village doctors who have a technical school training or above</li></ul>

Domain	Measure	Definitions
	Continuing education	<ul style="list-style-type: none"> <li>Proportion of PHC doctors who have taken continuing education courses in the past year</li> </ul>
	Occupational Burnout	<p>Measured using the Maslach Burnout Inventory for Human Services Survey<sup>5</sup></p> <ul style="list-style-type: none"> <li>Proportion of doctors or village doctors with high exhaustion</li> <li>Proportion of doctors or village doctors with high depersonalization</li> <li>Proportion of doctors or village doctors with high lack of professional accomplishment</li> </ul>
	Social benefits for professionals	<ul style="list-style-type: none"> <li>Proportion of institutions providing no social benefits for professionals</li> <li>Proportion of institutions providing 5 social benefits for professionals</li> </ul>
	Annual income of professionals	Median annual income of PHC doctors or village doctors with junior professional title
	Turnover intention	<ul style="list-style-type: none"> <li>Proportion of village doctors with turnover intention</li> </ul>
Information technology	Accessibility of IT system	<ul style="list-style-type: none"> <li>Proportion of institutions with EMR systems</li> <li>Proportion of institutions with Resident Health Records System</li> </ul>
	Integration of IT system	<ul style="list-style-type: none"> <li>Number of different vendors;</li> <li>Proportion of institutions able to refer patients to tertiary hospitals through the IT systems</li> </ul>
	Use of IT system	<ul style="list-style-type: none"> <li>Proportion of healthcare professionals routinely using the IT systems</li> </ul>
Financing	Indicators influencing the income of professionals	<ul style="list-style-type: none"> <li>Proportion of bonus in the income</li> <li>Proportion of institutions using specific bonus indicators, such as number of outpatient visits</li> </ul>
Insurance	Annual reimbursement cap	<ul style="list-style-type: none"> <li>Upper limit that the insurance can pay for each person annually</li> </ul>
	Reimbursement deductible	<ul style="list-style-type: none"> <li>Amount that must be paid out-of-pocket for covered health care services before the insurer starts to pay any expenses.</li> </ul>

<b>Domain</b>	<b>Measure</b>	<b>Definitions</b>
	Reimbursement rate	<ul style="list-style-type: none"> <li>• Proportion of medical expenses that the insurance covered, within the cap</li> </ul>
Quality of care	Inappropriate drug use	<ul style="list-style-type: none"> <li>• Proportions of prescriptions with antibiotics</li> <li>• Proportions of prescriptions with multiple antibiotics</li> <li>• Proportions of prescriptions with injections</li> </ul>
	Management of cardiovascular disease risk	<ul style="list-style-type: none"> <li>• Proportion of patients with hypertension diagnosed</li> <li>• Proportion of hypertensive patients with blood pressure &lt;140/90 mm Hg</li> <li>• Proportion of patients with diabetes being diagnosed</li> <li>• Proportion of patients with diabetes who have blood glucose &lt;7 mmol/L</li> </ul>

PHC indicates primary health care; IT information technology; EMR electronic medical record

### 3. Evolving of the national basic public health service program

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017
Funding, RMB per capita	15	15	25	25	30	35	40	45	50
Residents' health records	√	√	√	√	√	√	√	√	√
Health education	√	√	√	√	√	√	√	√	√
Child health management	√	√	√	√	√	√	√	√	√
Maternal health care	√	√	√	√	√	√	√	√	√
Elderly health management	√	√	√	√	√	√	√	√	√
Vaccination	√	√	√	√	√	√	√	√	√
Reporting of infectious diseases and public health emergencies	√	√	√	√	√	√	√	√	√
Health management for hypertension	√	√	√	√	√	√	√	√	√
Health management for type-2 diabetes	√	√	√	√	√	√	√	√	√
Health management for psychosis	√	√	√	√	√	√	√	√	√
Health supervision	–	–	√	√	√	√	√	√	√
Traditional Chinese medicine health management	–	–	–	–	√	√	√	√	√
Health management for tuberculosis	–	–	–	–	–	–	√	√	√
Contraceptive device	–	–	–	–	–	–	–	–	√
Health promotion	–	–	–	–	–	–	–	–	√

#### 4. The scope of the clinical care provided in primary health care institutions in China

Clinical conditions	Community health center	Community health station	Township health center	Village clinics
Cold	14.5%	19.1%	13.6%	19.5%
Hypertension	11.0%	11.5%	7.9%	9.8%
Diabetes mellitus	9.6%	9.0%	4.6%	4.6%
Chronic bronchitis	8.7%	8.6%	8.5%	10.5%
Acute bronchitis	8.1%	8.6%	9.0%	10.7%
Gastritis	6.5%	8.4%	7.5%	10.3%
Diarrhea	4.5%	6.7%	5.3%	11.7%
Urinary tract infection	4.1%	3.1%	4.5%	2.9%
Osteoarthritis	3.0%	2.3%	2.4%	0.5%
Low back pain	2.8%	1.5%	2.5%	0.8%
Psoatic strain	2.7%	2.3%	2.6%	0.8%
Peptic ulcer	2.1%	2.0%	2.9%	1.7%
General trauma	2.0%	1.3%	3.1%	1.1%
Sciatica	2.0%	0.6%	1.8%	0.3%
Child dyspepsia	2.0%	4.4%	3.2%	7.0%
Pelvic inflammatory disease	1.9%	0.4%	2.7%	0.6%
Vaginitis	1.8%	0.4%	2.7%	0.5%
Dysmenorrhoea	1.7%	1.2%	2.3%	0.5%
Cholecystitis	1.6%	1.4%	2.6%	1.6%
Toothache	1.5%	3.6%	1.3%	2.7%
Menopausal syndrome	1.4%	0.2%	1.4%	0.1%
Cholelithiasis	1.0%	0.5%	1.6%	0.4%
Idiopathic headache	0.8%	0.6%	0.6%	0.2%
Haemorrhoids	0.7%	0.5%	1.1%	0.4%
Asthma	0.6%	0.1%	0.6%	0.2%
Chronic dermatitis	0.5%	0.3%	0.2%	0.1%
Tympanitis	0.5%	0.4%	0.7%	0.2%
Conjunctivitis	0.5%	0.3%	0.6%	0.1%
Purulent skin infection	0.4%	0.1%	0.5%	0.0%
Sinusitis	0.4%	0.5%	0.6%	0.3%
Convulsion in children	0.3%	0.0%	0.3%	0.0%



To understand the scope of the clinical care provided in primary health care institutions in China, we asked the 10,626 primary health care doctors involved in our survey to identify the top five clinical conditions that they encounter in regular practice. In community health centres and community health stations, the most commonly identified conditions were common cold (14.5% and 19.1%, respectively), followed by hypertension (11.0% and



11.5%), diabetes (9.6% and 9.0%), chronic bronchitis (8.7% and 8.6%), and acute bronchitis (8.1% and 8.6%). Doctors at township health centres and village clinics identified common cold (13.6% and 19.5%, respectively), acute bronchitis (9.0% and 10.7%), and chronic bronchitis (8.5% and 10.5); however, they more often identified gastritis (7.5% and 10.3%) and diarrhea (5.3% and 11.7%) than hypertension (7.9% and 9.8%) and diabetes (4.6% and 4.6%).

**5. Proportions of primary health care institutions providing each basic public health service**

<b>Basic public health service item</b>	<b>Community health centre</b>	<b>Community health station</b>	<b>Township health centre</b>	<b>Village clinic</b>
Residents' health records	93.4	68.2	91.8	84.9
Vaccination	88.7	33.3	87.8	57.3
Maternal health management	83.6	35.6	83.7	68.5
Chronic diseases management	92.5	70.4	88.8	89.0
Health management for tuberculosis	83.6	36.2	76.9	73.3
Reporting of infectious diseases and public health emergencies	86.4	41.3	83.3	73.0
Health education	93.0	63.8	89.5	80.9
Child health management	88.7	42.0	85.4	76.4
Elderly health management	94.8	68.0	85.4	86.9
Health management for psychosis	84.0	43.8	84.0	78.4
Traditional Chinese medicine health management	83.6	46.0	68.7	66.5
Health supervision	77.5	34.4	78.6	58.6

**6. Studies on appropriateness of prescriptions in primary health care institutions in China (Jan 2009 through Jul 2016)**

Study	Design	Study period	Regions	Types of institutions	No. of sites	No. of prescriptions	Indicators	Major findings
Dong. et al. 2011 <sup>6</sup>	Observational	2005	10 provinces in the Western regions	Village clinics	680	20,125	Proportion of antibiotic prescriptions	48.43%
							Average number of drugs per prescription	2.36
							Proportion of injected drug	22.93%
Liu. et al. 2009 <sup>7</sup>	Observational	2007	26 provinces in the Eastern, Central and Western regions	Community health centres and community health stations	744	74,400	Average number of drugs per prescription	2.51
							Proportion of antibiotic prescriptions	43.58% (12.30% two or more antibiotics)
							Proportion of injected drug	35.11%
Li. 2015 <sup>8</sup>	Observational	2009-2013	1 province in the Eastern regions	Community health centres and community health stations	1207	Unspecified	Proportion of injected drug	54.53% to 13.66%
							Proportion of two or more antibiotics	27.23% to 5.64%
Ding. 2010 <sup>9</sup>	Observational	2009	1 province in the Eastern regions	Community health centres	12	1,106	Proportion of injected drug	28.5%
							Proportion of antibiotic prescriptions	43.3% (18.4% two or more antibiotics)
Ying. et al. 2010	Observational	2007-2008	1 province in the Eastern	Community health centres,	97	7,737	Proportion of two or more antibiotics	17% to 26%

Study	Design	Study period	Regions	Types of institutions	No. of sites	No. of prescriptions	Indicators	Major findings
<sup>10</sup>			regions	community health stations, township health centres, village clinics			Proportion of injected drug	35% to 51%
Zhao. et al. 2012 <sup>11</sup>	Observational	2009-2011	1 province in the Central regions	Primary health care centres	5	1,454	Proportion of injected drug	42.07% (pre-EDL) vs. 43.63% (post-EDL)
							Proportion of antibiotic prescriptions	54.55% (pre-EDL) vs. 65.65% (post-EDL) (12.47% vs. 22.43% two or more antibiotics)
							Average number of drugs per prescription	2.78 (pre-EDL) vs. 3.30% (post-EDL)
Jia. et al. 2015 <sup>12</sup>	Observational	2013	1 province in the Eastern regions	Community health centres	13	380	Average number of drugs per prescription	2.95 (pre-EDL) vs. 2.51 (post-EDL)
							Proportion of antibiotic prescriptions	28.9% (pre-EDL) vs. 41.0% (post-EDL)
							Proportion of injected drug	30.0% (pre-EDL) vs. 43.0% (post-EDL)
Qi. et al. 2012 <sup>13</sup>	Observational	2007	1 province in the Eastern regions	Township health centres	5	11,177	Proportion of injected drug	61.5%
							Average number of drugs per prescription	4.1

Study	Design	Study period	Regions	Types of institutions	No. of sites	No. of prescriptions	Indicators	Major findings
							Proportion of antibiotic prescriptions	35.1%
Song. et al. 2014 <sup>14</sup>	Observational	2010-2011	4 provinces in the Eastern and Central regions	Township health centres	146	28,651	Average number of drugs per prescription	3.64 to 3.46
							Proportion of antibiotic prescriptions	60.26% to 58.48%
							Proportion of injected drug	40.31%
Wang. et al. 2014 <sup>15</sup>	Observational	2009-2011	6 provinces in the Eastern or Central regions	Urban and rural primary health care centres	39	7,311	Average number of drugs per prescription	2.7
							Proportion of injected drug	64.30%
							Proportion of antibiotic prescriptions	52.90%
Xiao. et al. 2011 <sup>16</sup>	Observational	2007	2 provinces in the Eastern and Western regions	Community health centres and township health centres	20	22,356	Average number of drugs per prescription	3.1
							Proportion of two or more antibiotics	24.90%
Liu. et al. 2015 <sup>17</sup>	Interventional	2013	1 province in the Central regions	Primary care institutions	10	336,655	Proportion of antibiotic prescriptions	65% to 60% (22% to 20% two or more antibiotics)
							Proportion of injected drug	60% to 55%
Yao. et al. 2015	Observational	2009-2010	1 province in the Central	Community health centres	192	23,040	Average number of drugs per prescription	3.5 (pre-EDL) vs. 4.2 (post-EDL)

Study	Design	Study period	Regions	Types of institutions	No. of sites	No. of prescriptions	Indicators	Major findings
18			regions	and township health centres			Proportion of antibiotic prescriptions	62% (pre-EDL) vs. 67% (post-EDL)
							Proportion of injected drug	45% (pre-EDL) vs. 52% (post-EDL)
Gong. et al. 2016 <sup>19</sup>	Observational	2007-2011	35 cities in the Eastern, Central and Western regions	Community health centres and community health stations	802	376,700	Average number of drugs per prescription	2.3 (EDL) vs. 2.5 (non-EDL)
							Proportion of antibiotic prescriptions	38% (EDL) vs. 48% (non-EDL) (8% vs. 12% two or more antibiotics)
							Proportion of injected drug	31% (EDL) vs. 40% (non-EDL)
Yang. et al. 2013 <sup>20</sup>	Observational	2009-2011	1 province in the Central regions	Community health centres and township health centres	18	55,800	Average number of drugs per prescription	3.4 to 4.7, vs. 4.1 in cohort 1-3
							Proportion of antibiotic prescriptions	53% to 75%
							Proportion of injected drug	59% to 67%, vs. 67%, 66% and 59% in cohort 1-3
Yin. et al. 2015 <sup>21</sup>	Observational	2011	35 cities in the Eastern, Central and Western	Community health centres	422	42,200	Average number of drugs per prescription	2.24 (public) vs. 2.38 (private)
							Proportion of antibiotic prescriptions	30.1% (public) vs. 37.2 (private)

Study	Design	Study period	Regions	Types of institutions	No. of sites	No. of prescriptions	Indicators	Major findings
			regions				Proportion of injected drug	30.5% (public) vs. 36.4 (private)
Yip. et al. 2014 <sup>22</sup>	Interventional	2009-2012	1 province in the Western regions	Township health centres and village clinics	294	1,155,134	Proportion of antibiotic prescriptions	44.2% (control group) vs. 37.6% (intervention group) in township health centres; 34.2% (control group) vs. 28.2% (intervention group) in village clinics
Xiao. et al. 2016 <sup>23</sup>	Observational	2009-2012	2 provinces in the Central regions	Township health centres	24	7311	Proportion of antibiotic prescriptions	52.50% to 53.41%
Jiang. et al. 2012 <sup>24</sup>	Observational	2007	1 province in the Western regions	Township health centres	30	3,059	Proportion of antibiotic prescriptions	85.18% (24.98% two or more antibiotics)
Zhang. et al. 2014 <sup>25</sup>	Observational	2013	1 province in the Central regions	Township health centres	20	Unspecified	Proportion of antibiotic prescriptions	62%
							Proportion of injected drug	65%

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