BMJ Global Health

Private pharmacies as healthcare providers in Odisha, India: analysis and implications for universal health coverage

Anuska Kalita,[1] Bijetri Bose,[1] Liana Woskie,[1,2] Annie Haakenstad,[1,3] Jan E Cooper ,[1] Winnie Yip[1]

To cite: Kalita A, Bose B, Woskie L, *et al*. Private pharmacies as healthcare providers in Odisha, India: analysis and implications for universal health coverage. *BMJ Global Health* 2023;**8**:e008903. doi:10.1136/bmjgh-2022-008903

Handling editor Lei Si

► Additional supplemental material is published online only. To view, please visit the journal online (http://dx.doi.org/10.1136/bmjgh-2022-008903).

Received 24 February 2022
Accepted 15 October 2022

[1]Global Health and Population, Harvard T.H. Chan School of Public Health, Boston, MA, USA
[2]Tufts University School of Arts and Sciences, Medford, MA, USA
[3]Institute of Health Metrics and Evaluation, University of Washington, Seattle, Washington, USA

Correspondence to
Anuska Kalita; akalita@hsph.harvard.edu and Bijetri Bose; bbose@hsph.harvard.edu

ABSTRACT

Introduction In India, as in many low-income and middle-income countries, the private sector provides a large share of health care. Pharmacies represent a major share of private care, yet there are few studies on their role as healthcare providers. Our study examines: (1) What are the characteristics of and services provided by private pharmacies and how do these compare with other outpatient care providers? (2) What are the characteristics of patients who opted to use private pharmacies? (3) What are the reasons why people seek healthcare from private pharmacies? (4) What are the quality of services and cost of care for these patients? Based on our findings, we discuss some policy implications for universal health coverage in the Indian context.

Methods We analyse data from four surveys in Odisha, one of India's poorest states: a household survey on health-seeking behaviours and reasons for healthcare choices (N=7567), a survey of private pharmacies (N=1021), a survey of public sector primary care facilities (N=358), and a survey of private-sector solo-providers (N=684).

Results 17% of the households seek outpatient care from private pharmacies (similar to rates for public primary-care facilities). 25% of the pharmacies were not registered appropriately under Indian regulations, 90% reported providing medical advice, and 26% reported substituting prescribed drugs. Private pharmacies had longer staffed hours and better stocks of essential drugs than public primary-care facilities. Patients reported choosing private pharmacies because of convenience and better drug stocks; reported higher satisfaction and lower out-of-pocket expenditure with private pharmacies than with other providers.

Conclusion This is the first large-scale study of private pharmacies in India, with a comparison to other healthcare providers and users' perceptions and experiences of their services. To move towards universal health coverage, India, a country with a pluralistic health system, needs a comprehensive health systems approach that incorporates both the public and private sectors, including private pharmacies.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Most healthcare in India—and outpatient care in particular—is provided by the private sector.
⇒ Private pharmacies in India and other low-income and middle-income countries (LMICs) are a major source of medicines.
⇒ Few studies to date have analysed the role of private pharmacies as providers of health services beyond selling medicines in India.

WHAT THIS STUDY ADDS

⇒ A significant proportion of the households report accessing care from private pharmacies as the first point of care; a majority of private pharmacies also report providing medical advice to patients and substituting prescribed drugs.
⇒ Data from this first large, in-depth examination of private pharmacies in India shows that considerable share of private pharmacies are unregistered, thus being outside the purview of government regulations.
⇒ However, both registered and unregistered pharmacies provide similar services.
⇒ Usage of private pharmacies are common across different social, economic, and demographic groups, and levels of usage are similar to those of public primary-care providers.
⇒ Patients prefer private pharmacies over other outpatient providers due to the convenient hours and better drug stocks; they also experience lower out-of-pocket expenditure than at most other providers.
⇒ Patient satisfaction with private pharmacies is significantly higher than satisfaction with other outpatient care providers.

INTRODUCTION

In many low-income and middle-income countries (LMICs), the private sector provides a large share of healthcare services and, along with the public sector, plays an important role in their health systems.[1–6] Private pharmacies, or privately-owned drug shops, constitute a major part of the private sector in many

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ There is a need to collect and analyse data on private pharmacies as providers of healthcare in India and other LMICs.
⇒ Regulatory mechanisms in LMICs need to address private pharmacies as a type of primary care providers and not solely as dispensers of drugs or as shops selling medicines.
⇒ Understanding the role of private pharmacies can help inform policies designed to address the unmet healthcare needs of populations and shortfalls in healthcare delivery systems related to affordability, accessibility and quality of care.
⇒ A comprehensive health systems approach that incorporates both the public and private sectors, with formal and informal providers, including private pharmacies, is required to help move India towards universal health coverage.

LMICs. These providers dispense a large share of medicines and often operate beyond their primary stated focus of selling drugs, providing additional healthcare services such as diagnostic and therapeutic advice.[2] Because of their role in healthcare provision, better understanding the services provided by private pharmacies and their interaction with patients is critical to understanding how people are currently using healthcare services. This, in turn, is essential to expanding healthcare in a way that meets population needs while ensuring access, affordability and quality of services, issues critical to moving countries toward universal health coverage (UHC).

In this paper, we examine the role of private pharmacies as a distinct category of healthcare providers in India, a topic pertinent to India, which has a pluralistic health system and dominant private sector. While the Indian public sector comprises government-fundedand-run secondary and tertiary hospitals and primary-care centres, the private sector is heterogeneous, ranging from super-specialty internationally accredited hospitals to traditional healers.[2 6–8] Indian policies have focused on delivering primary care through public sector health facilities, largely overlooking private providers.[9–11] Yet, estimates suggest that almost 70% of the outpatient visits and out-of-pocket (OOP) expenditure nationwide occur in the private sector.[5] Private pharmacies are estimated to constitute a major part of this sector.[6] According to an Indian association of pharmacists, there are more than 850 000 registered private retail pharmacies in the country.[12] The actual number of private pharmacies is likely greater considering that membership to these associations is restricted to registered entities, and media reports indicate that many establishments that sell medicines are not registered as pharmacies.[13–15] These providers account for as much as 86% of total domestic drug sales,[16] and may also represent a much wider range of health services.[17]

Despite their widespread presence, very little is known about the characteristics of private pharmacies as healthcare providers in India, their range of services, characteristics of people who use these services and their experiences. In India, no consolidated registry of all private pharmacies exists, and most large-scale household surveys have not collected information of healthcare usage from pharmacies for a wide range of illnesses.[4 5 18] Existing research has usually combined private pharmacies with other private sector providers, including qualified and unqualified practitioners.[19 20] Following a literature review on pharmacies in India, we found one study that characterised and mapped private pharmacies in India, but it was limited to a single district.[21] A recent report surveyed private pharmacies across different states, but it focused on registered pharmacies in urban areas.[22] Further, these studies do not capture the demand-side perspective of users. A systematic review of studies in LMICs on informal providers, defined as 'providers without formal training or professional memberships, who receive payments directly from users and are operate outside government regulations', did not identify a single study on private pharmacies in India.[2] Most research on private pharmacies in India has focused primarily on their role as dispensers of medicines for specific health conditions and prescription-only drugs, especially antibiotics,[3 23–34] and has largely focused on registered pharmacies run by qualified pharmacists, thus excluding the large numbers of unregistered ones.[3]

There are similar knowledge gaps in the literature from other LMICs. There have been several studies on private pharmacies in other LMICs[3] that have contributed to our understanding of their roles mostly as a part of either the 'private sector' or 'informal providers'.[2 3 35–44] However, characteristics, range of services, and user experiences unique to private pharmacies are still under-researched areas.

This study attempts to fill a gap in knowledge on the role of private pharmacies as a distinct category of healthcare providers by posing the following four research questions: (1) What are the characteristics of private pharmacies the drug-dispensing, and other healthcare services provided by them, and how do these services compare with other outpatient care providers? (2) What are the characteristics of patients who opted to use private pharmacies? (3) What are the reasons why people seek healthcare from private pharmacies? (4) What are the quality of services received and cost of care incurred by these patients? Additionally, based on our findings and drawing from the existing literature, we discuss some policy implications for UHC in the Indian context.

METHODS

Definition

We operationally define 'private pharmacies' as privately-owned for-profit shops that primarily dispense and sell drugs and other medical products, bearing a store sign with words like 'Pharmacy', 'Pharmacist', 'Druggist', 'Drugstore', 'Chemist' or other similar terms in English and local languages. Our study sample included all such shops, irrespective of whether they are registered as

'pharmacies' under Indian laws or have qualified 'pharmacists'. Providers in both urban and rural areas who might also sell or dispense drugs along with their primary role of clinical consultations with patients were included under the provider category of 'solo providers' in our study. Providers like traditional healers, quacks and other such informal practitioners were categorised separately as 'other providers'. These categories were informed through fieldwork in Odisha prior to constructing our survey tools, in consultation with local experts as well as communities about provider categories that are most easily identifiable by potential respondents of our surveys. Detailed explanation of the provider categories is included in online supplemental appendix table 1.

Study design

This paper is a part of a larger study, the Odisha Health System Assessment, under the India Health Systems Project.[45] Odisha, like other parts of India, has a pluralistic health system where a range of formal and informal providers in both the public and private sectors deliver primary healthcare. The public sector primary-care facilities, funded and run by the state's department of health, include sub-centres (SCs), health and wellness centres (HWCs) and primary health centres (PHCs). These public facilities are required to be staffed by teams of community health workers, nurses and doctors trained in both modern and Indian systems of medicine like Ayurveda, depending on the type of facility. Outpatient and primary healthcare are also provided by outpatient departments of public sector secondary and tertiary hospitals, including community health centers (CHCs), sub-divisional hospitals, district hospitals, and medical college hospitals. The private sector is heterogeneous. It includes a range of providers—super-specialty hospitals with highly-skilled doctors, charitable hospitals and clinics, doctors with small individual practices (or solo providers), traditional healers and private pharmacies. Data suggests that between 40–56% of the outpatient care in Odisha is provided by the private sector, with the majority being hospitals and private pharmacies.[4 5 18 46 47]

The paper draws on data from four surveys conducted in Odisha, India: (1) a household survey that assesses people's health-seeking behaviours and reasons behind their healthcare choices, (2) a survey of private pharmacies, (3) a survey of public primary-care facilities, including PHCs, SCs and HWCs and (4) a survey of private primary-care providers with individual practices or solo providers.[48]

Data were drawn from 30 blocks in six districts of Odisha to be representative of the state population.[48] For the household survey, we collected data from 7567 households and 30 645 individuals. We validated the representativeness of our survey with the 2017–2018 National Sample Survey. Of the 30 645 individuals interviewed, there were 3726 cases of reported illness or injury in the last 15 days prior to the survey, among which outpatient care was sought for 3321 cases. For this paper, after dropping observations with missing variables, our final sample size for cases was 2993.

For the pharmacy survey, we collected data from 1021 private pharmacies. In the absence of data about the universe of pharmacies, we relied on three sources to draw our sample: data from households about their preferred providers, mapping private pharmacies within a fixed radius of a health facility and snowballing from interviews with providers about pharmacies in the vicinity. A similar sampling strategy was used for the 684 solo providers from whom data were collected. For the public primary-care facilities, a block-level census of the PHCs was undertaken while SCs and HWCs located near the sampled primary sampling units for the household survey were surveyed. The final public primary-care facilities sample was 358.

Data were collected between August 2019 and March 2020 by an independent data collection agency. Informed consent from all participants was obtained before the interviews. Our author reflexivity statement is in the online supplementary material, appendix 7.

Measures

Provider choice

To assess the usage of private pharmacies, we analysed responses to the question in the household data of where outpatient care was sought if someone in the household was sick in the past 15 days. The responses were categorised into seven provider types: public hospitals, public primary-care facilities, AYUSH hospitals, private hospitals, solo providers, private pharmacies, and other providers like traditional healers. For hospitals, we included cases that sought only outpatient care.

We define care-seeking from private pharmacies as seeking medical advice from the pharmacy, which may or may not be combined with buying drugs based on that advice. We differentiate it from self-treatment or instances of only purchase of drugs from the pharmacy prescribed by another provider (online supplemental appendix table 1). That is, the provider choice variable is a categorical variable that takes values of 1–7 depending on the provider that a patient visited to seek outpatient care.

Patients were asked to identify the primary reasons for choosing to go to the particular provider. The patient responses were categorised into 11 options: convenient location, convenient hours, doctor/provider competency, doctor/provider friendliness, good stock of drugs, facility cleanliness, only provider/facility in the area, referrals by other providers, referrals by relatives/friends, choice among everyone in the area, and provision of free/low-cost care.

Provider-level factors

To understand the characteristics of private pharmacies, we analysed self-reported data on their registration status, location, number of employees, qualification of the staff who primarily attends to patients, stocks of

essential medicines, the share of revenue from the sale of different types of drugs, most common illnesses catered to and infrastructure available. We compared the types of services, hours of operation, infrastructure and equipment availability and the share of 41 essential medicines in stock at private pharmacies with the surveyed public primary-care facilities and solo providers.

Patient-level factors

At the patient level, to account for illness severity, we used self-reported variables: days of work missed due to illness, being diagnosed with a chronic disease by a healthcare provider and self-rated health. To account for patient characteristics, use of care was studied through a disaggregated analysis of care-seeking patterns by demographic and socio-economic characteristics, including sex, age, education, rurality, religion, caste/tribe, below poverty line status and wealth quintiles.

Patient satisfaction

For quality of care, we collected subjective patient satisfaction measures; questions were adapted from the World Health Survey Responsiveness Module, piloted in Ghana, India, Kenya, Mexico and Nigeria.[49 50] Respondents were asked to rate an aspect of care on a 4-point Likert-scale, with the following options: excellent, good, fair and poor. For primary analyses, responses were coded as binary variables: combining excellent and good and combining fair and poor.

Out-of-Pocket expenditure

We asked for details about expenditure for each outpatient visit in the household during the 15 days before the survey, including how much was spent OOP for each visit and spending on various components of the visit.

All variables used in our analysis are described in online supplemental appendix table 1.

Data analysis

First, we conducted univariate descriptive analyses to assess the distribution of the characteristics of the private pharmacies and the services they provide using the pharmacy data. We then used independent t-tests to examine whether there are significant differences in the services of public primary-care facilities, solo providers and private pharmacies (including registered and unregistered pharmacies). Second, using the household data, we ran a multinomial logit regression of provider choice on patients' illness severity and socio-economic characteristics to understand the factors that drive patients' choice of private pharmacies versus other types of providers. Third, we conducted multivariable regression of the outcomes capturing the reasons underlying patients' choice of provider, quality of care and OOP expenditures on provider choice. We used logistic or least squares regressions depending on the outcome variable. To understand if patients' characteristics drive the differences in outcomes, we ran the regressions using district fixed effects and controls for the socio-demographic and illness severity variables associated with provider choice at $p<0.05$ in the multinomial logit regressions. All household data analyses were weighted using survey weights.

RESULTS

Characteristics and services provided

Most surveyed private pharmacies reported that they were registered under the Pharmacy Act (74%), while the other 26% were either unregistered or registered under acts unrelated to drug dispensing or healthcare delivery. Most pharmacy staff we interviewed (72%) had their highest qualification in areas unrelated to health, medicine or pharmacy, out of which 27% had only high school diplomas. Furthermore, only 6% of the interviewed staff reported undergoing any kind of in-service training in pharmacy courses—a mandatory stipulation to renew and retain pharmacy licenses. On average, 90% of the pharmacies reported offering medical advice to their customers as a service. Pharmacies reported that 70% of their patients came with a prescription, with 26% reporting that they substituted prescribed drugs, although not permissible under the law. The most common illnesses pharmacies reported catering to were fever, cold, diarrhoea, hypertension and diabetes. We found that an average of 74% of the pharmacies' sales was off more expensive branded drugs and only 10% off generics. A disaggregated analysis of the registered and unregistered pharmacies shows that both categories were similar in all characteristics and types of services, except that unregistered pharmacies reported providing significantly more medical advice than registered ones (42.5% vs 29%). Online supplemental appendix table 2 presents summary statistics on the characteristics of private pharmacies.

Table 1 summarises the comparison of private pharmacies, public primary-care facilities and solo providers. The share of private pharmacies located in rural areas (58%) was significantly lower than the share of public primary-care facilities (99%) and significantly more than the share of rural solo providers (13%). Private pharmacies were open for a mean of 11.37 hours a day—slightly less than public primary-care facilities and almost 6.46 hours more than solo providers. However, when we account for the fact that primary-care facilities are often open but without appropriate staffing, we find that their hours of operation reduce to 4.90 hours per day. In which case, private pharmacies scored more highly (11.37 vs 4.90 hours per day), assuming that private pharmacies were staffed whenever open.

There were significant differences in the share of providers offering various services, including dispensing drugs, medical advice and diagnostic services. As high as 90% of the private pharmacies in our sample offered outpatient services such as advising customers or administering injections, although statistically fewer than public primary-care facilities and solo providers. Significantly fewer private pharmacies (9%) had a separate

Table 1 Characteristics of and services provided by private pharmacies compared with other providers

	Private pharmacies		Public primary-care facilities		Solo providers	
	Mean	SE	Mean	SE	Mean	SE
Percentage of facility/providers in rural areas	57.88	(0.56)	98.88***	(1.55)	12.87***	(1.55)
Hours of facility operation in a day	11.37	(0.27)	11.93**	(0.10)	4.90***	(0.10)
Hours with staff in attendance in a day	11.37	(0.27)	4.90***	(0.10)	4.90***	(0.10)
Percentage of facilities/providers that sell drugs	100.00	(1.85)	85.76***	(0.00)	3.22***	(0.00)
Percentage of facilities/providers providing outpatient care	90.30	(0.00)	100.00***	(0.93)	100.00 ***	(0.93)
Number of patients seeking medical advice/outpatient care in a week	95.66	(16.42)	217.62***	(4.06)	105.73*	(4.06)
Percentage of facilities/providers providing diagnostic services	9.40	(2.59)	60.61***	(0.91)	0.00***	(0.91)
Percentage of facilities/providers with patient examination room	9.01	(2.64)	48.32***	(0.90)	96.64***	(0.90)
Percentage of facilities/providers with four basic equipments	21.06	(0.1.24)	93.85***	(1.28)	88.16***	(1.28)
Percentage of primary essential medicines in stock	55.10	(1.11)	34.24***	(0.62)	1.32***	(0.62)
N	1021		358		684	

This table reports the mean characteristics of private pharmacies, public primary-care facilities and solo providers. SEs in parentheses. The stars indicate whether the results from independent t-tests on the differences between the characteristics of the private pharmacies vis-a-vis public primary facilities and solo providers, respectively. ***indicates significance at 1% level, **at 5% level, *at 10% level. Detailed characteristics and services of private pharmacies are presented in online supplemental appendix table 2.

room to counsel patients and the basic equipment for initial diagnosis (21%) relative to other outpatient care providers. On average, private pharmacies had 55% of the commonly used essential medicines in stock, significantly higher than the share of essential medicines in stock at public primary-care facilities (34%) and solo providers (1%), most of whom reported not selling drugs. The list of essential medicines we considered was derived from the Indian government's National List of Essential Medicines (NLEM) for different levels of health facilities,[51] based on WHO's essential medicine list.[52] We referenced the stocks at private pharmacies against the essential medicine list used for the CHC-level. The reference lists for SC and PHC levels were used for the public primary-care facilities, and the reference list for PHCs was used for solo providers. Detailed essential medicines lists for each of the provider types are in online supplemental appendix 6.

Use of services

A majority of the study respondents (52%) who reported being sick in the 15 days prior to the household survey chose private sector providers for outpatient care. We found that most of our survey respondents (65%) reported buying drugs from private pharmacies, including in cases when they sought care at public facilities in the last 15 days prior to the household survey.[46] Private pharmacies were the first point of contact for 17% of these patients seeking outpatient care, a proportion similar to those seeking care at public primary-care facilities (figure 1). Given that the Indian government's primary-care policies have focused on increasing access to public primary-care facilities,[9–11] and we found that the levels of usage for both types of providers were similar, we focus our comparison between private pharmacies and public primary-care facilities (PHCs, SCs and HWCs). The detailed results for a comparison of all providers are in the online supplemental appendix.

Seeking care at private pharmacies was common across all households. Comparing use of private pharmacies with public primary-care facilities, there were no significant differences between rural and urban households or between households from disadvantaged castes and tribes and those from upper castes and non-indigenous groups (table 2). Users with secondary or higher levels of education were more likely to choose public primary-care facilities (OR=1.52) than those with no education. Although levels of use were similar for households across the lower wealth quintiles, those in the highest wealth quintile were less likely to choose public primary-care facilities (OR=0.47) over private pharmacies than the patients from households in the lowest wealth quintile. Chronic disease diagnosis and self-rated health, proxies

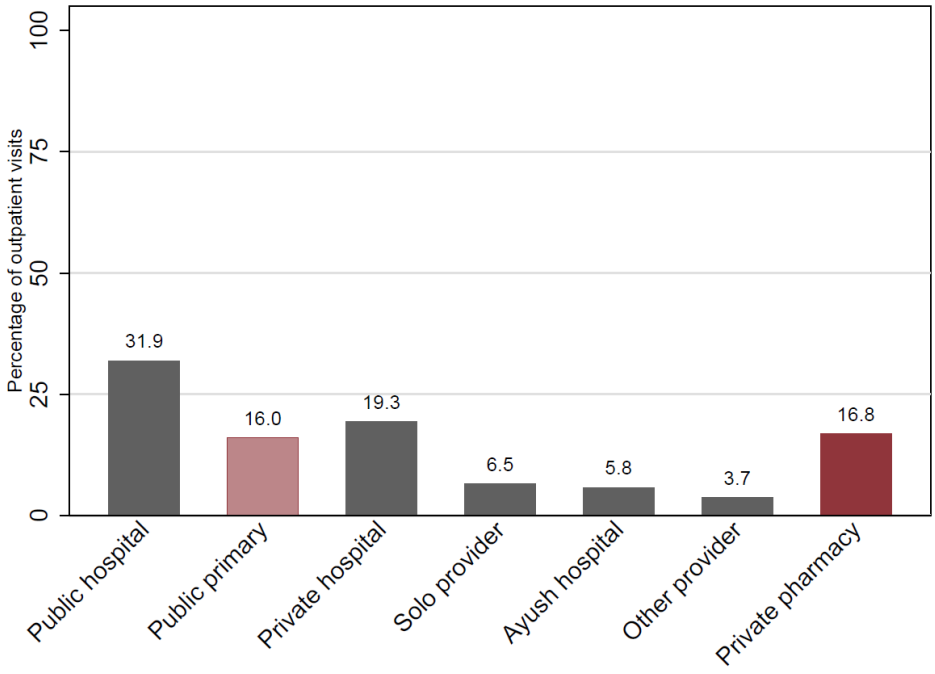

Figure 1 Distribution of outpatient care seeking across different provider types. Outpatient visits are counted for people who self-reported being sick in the 15 days before the date of the interview. Public hospital includes medical colleges, district hospitals, subdistrict hospitals, community health centres and first referral units. Public primary includes urban health centres, primary health centres, sub-centres, health and wellness centres, community health workers, anganwadi centres, government-run pharmacies and government-run mobile medical units. Private hospital includes private secondary and tertiary care facilities, nursing homes, maternity homes and charitable hospitals. Private primary includes health camps, dispensaries, diagnostic laboratories and solo providers. AYUSH hospital includes both private and public providers. Other provider includes traditional healers, 'Bengali doctors'/providers with other names, and other stores (eg, grocery stores). Percentages are weighted.

for severity of patients' illness, had mixed associations with provider choices. Online supplemental appendix table 3 presents the complete set of results.

Reasons driving provider-choice

Table 3 presents the five most commonly reported reasons why patients choose to seek outpatient care at private pharmacies: convenient location (76%), convenient hours (47%), competent provider (24%), good drug stock (19%) and referrals of relatives and friends (16%). Patients visiting public primary-care facilities were significantly less likely to mention good stock of drugs (OR=0.21), referrals by relatives and friends (OR=0.57) and referrals by other providers (OR=0.07) as a reason for their provider choice than those visiting private pharmacies. Although convenient hours were more likely to be stated as a reason for their provider choice by those choosing private pharmacies than those visiting other outpatient care providers, both groups of people were equally likely to state this as a reason for their choice over other providers. Also, patients at public primary-care facilities were significantly more likely to report competent doctors/providers (OR=1.96) as a reason for their choice than private pharmacy users. Online supplemental appendix table 4 shows all reported reasons behind provider choice.

Patient satisfaction and cost of care from private pharmacies

People who sought care from private pharmacies were significantly more likely to report higher satisfaction and had significantly shorter wait times than patients who visited public primary-care facilities. Overall satisfaction ratings (OR=0.58) and ratings on provider respect (OR=0.22) and privacy (OR=0.46) for public primary-care facilities were more likely to be lower than for private pharmacies. Further, people were less likely to report public primary-care facilities meeting their overall needs (OR=0.58) than private pharmacies. Wait times at public facilities were significantly longer (OR=10.57) than at private pharmacies. Figure 2 compares the mean share of patient satisfaction ratings and waiting times, disaggregated by provider choice. Online supplemental appendix table 5 reports the detailed results.

Total mean OOP expenditure was not significantly different between patients visiting private pharmacies and public primary-care facilities (figure 2). We did not observe any significant differences in expenses for various visit components, like consultation fees and transportation. However, when they purchased drugs, patients at public primary-care facilities (₹485) reported significantly higher expenses than those at private pharmacies (₹376). Online supplemental appendix table 5 reports the detailed results.

Table 2 Associations between provider choice (relative to the choice of private pharmacies) and select patient characteristics/illness severity (ORs)

Patient characteristics and illness severity	Public hospitals	Public primary-care facilities	Private hospitals	Solo providers
Women	1.13	0.98	0.71*	0.91
	(0.20)	(0.19)	(0.13)	(0.24)
Age	0.99	1.00	0.99**	1.00
	(0.00)	(0.00)	(0.00)	(0.01)
Primary education	0.91	1.08	0.55***	1.03
	(0.18)	(0.24)	(0.11)	(0.33)
Secondary/higher education	1.08	1.52*	1.00	0.98
	(0.24)	(0.36)	(0.22)	(0.36)
Rural	0.46***	1.44	0.97	0.66
	(0.13)	(0.50)	(0.28)	(0.28)
Hindu	1.66	0.61	0.60	1.60
	(0.75)	(0.32)	(0.29)	(1.22)
Scheduled tribe	0.73	0.83	0.59	0.84
	(0.27)	(0.31)	(0.23)	(0.43)
Scheduled caste	1.11	0.72	1.07	1.27
	(0.37)	(0.25)	(0.36)	(0.56)
Other backward castes	1.04	0.87	0.91	0.70
	(0.31)	(0.28)	(0.28)	(0.27)
Wealth quintile 2	1.21	1.39	1.43	1.32
	(0.33)	(0.40)	(0.42)	(0.62)
Wealth quintile 3	1.34	0.79	1.28	1.27
	(0.36)	(0.23)	(0.38)	(0.59)
Wealth quintile 4	1.14	0.65	1.25	1.04
	(0.33)	(0.19)	(0.40)	(0.56)
Wealth quintile 5	0.94	0.47**	1.88*	1.07
	(0.30)	(0.17)	(0.61)	(0.65)
Chronic diagnosis	1.92***	1.54*	2.00***	0.69
	(0.41)	(0.38)	(0.46)	(0.27)
Poor/fair self-rated health	1.41*	1.19	1.49*	1.72
	(0.30)	(0.29)	(0.34)	(0.60)
Days of work missed due to illness	1.04	1.03	1.06**	0.92
	(0.03)	(0.03)	(0.03)	(0.06)

N=2993. This table reports ORs from a multinomial logit regression of the provider choice variable on patient characteristics and illness severity (base outcome: private pharmacies). The base category for education is: no formal education; for religion: non-Hindu; for caste/tribe: others; for self-rated health: good or excellent health. Robust SEs are in parentheses. ***indicates significance at 1% level, **at 5% level, *at 10% level. The complete table with all provider types is presented in online supplemental appendix 3.

DISCUSSION

Our study shows that private pharmacies provide a range of outpatient services to a substantial share of the population, and their levels of usage are similar to those of public primary-care facilities. Private pharmacies have longer and more convenient hours than most other outpatient providers and better drug stocks than public primary-care facilities, reasons why patients reported choosing them over other providers, even though they perceive provider competence to be lower at private pharmacies than public facilities. Patient satisfaction is higher for private pharmacies than public primary-care facilities. Although public primary-care facilities are theoretically supposed to provide care free-of-charge,[9] mean total OOP expenditures incurred by their patients were similar to those at private pharmacies, and expenses on drugs were higher. Use of care from pharmacies and public primary-care facilities was equal across different

Table 3 Associations between select reasons for choosing a provider, as reported by patients, and provider choice (relative to the choice of private pharmacies)

	Convenient location	Convenient hours	Competent doctor/ provider	Good drug stock	Referred by relative/friends
Public hospitals	0.73	0.69**	3.07***	0.33***	0.78
	(0.15)	(0.12)	(0.63)	(0.08)	(0.19)
Public primary-care facilities	1.17	0.89	1.96***	0.21***	0.57**
	(0.29)	(0.17)	(0.43)	(0.07)	(0.16)
Private hospitals	0.48***	0.46***	3.94***	0.35***	0.86
	(0.10)	(0.08)	(0.82)	(0.08)	(0.20)
Solo providers	0.95	0.61*	0.70	0.65	0.56
	(0.31)	(0.18)	(0.24)	(0.22)	(0.23)

N=2993. This table reports the ORs from logistic regressions where the dependent variables (noted in each column) are dummy variables that take value of 1 if a patient reported the specific reason for choosing a care provider; the main independent variable is the provider choice variable (base outcome: private pharmacies). All regression controls for women, age, education, rural, religion, caste, wealth quintile, chronic illness, self-rated health and district fixed effects. Robust SEs are in parentheses. ***indicates significance at 1% level, **at 5% level, *at 10% level. The complete table is presented in online supplemental appendix 4.

social groups, rural and urban areas, and among lower wealth quintiles. Many private pharmacies do not follow mandatory regulations and a significant proportion are unregistered and, therefore, outside the purview of government regulations. In this section, we discuss these findings and their implications for the possible engagement of private pharmacies as providers of primary care in India.

Private pharmacies address unmet healthcare needs and provide patient-centred care

One of our key findings is that private pharmacies are addressing the needs of the population that are often unmet by public primary-care facilities. They offer an array of convenient and affordable outpatient services, which may not be accessible to vulnerable households. While the Indian public sector is often plagued by shortfalls in infrastructure, supplies, personnel, provider absenteeism and overcrowding,[53–56] private sector clinics and hospitals have been described as prohibitively expensive.[4 5 55 57] In addition, public primary-care facilities focus predominantly on infectious diseases, childbirth and immunisations,[9] and until recently, chronic diseases have been largely neglected.[10 11] As a result, many people may seek care from private pharmacies for common illnesses, and routine management of chronic conditions.[20 58–62] Our findings support the existing evidence on this topic and advance the hypothesis that private pharmacies serve as a key provider of care, in addition to providing medicines. Users rated private pharmacies as addressing their 'overall needs'. We find that hypertension and diabetes are among the five most common conditions that pharmacies cater to. Even though the prevalence of non-communicable diseases are rising and they cause 52% of all deaths in Odisha,[63] care for these conditions are often not available at public primary-care facilities.[64 65]

Private pharmacies appear to tailor their services to patients' demands, such as convenience, affordability and patient satisfaction—aspects of care often neglected by many public facilities in India.[66] Private pharmacies have significantly shorter wait times, longer staffed hours and better drug stocks than public primary-care facilities. Other studies suggest that limited staffed hours at public sector facilities mean that most of the low-income working population might have to forgo their daily wages to access care.[62 66] Our findings on low drug stocks at public primary-care facilities indicate that even when people visit them, medicines might not always be available and have to be accessed through multiple visits, requiring even more loss of wages or, as we report elsewhere, these drugs are purchased from private pharmacies.[46 47] These link to our findings that even though total OOP expenditure is similar for pharmacies and public primary-care facilities, expenses on drugs for the latter were significantly higher. Anecdotal evidence suggests that pharmacies, motivated by profit concerns, are more adaptable to change based on customer needs than other providers, and may often extend credits and discounts to their customers.[67 68] During COVID-19, pharmacies demonstrated a high level of malleability in response to the pandemic—quickly altering services to become more convenient by accepting telephonic orders and delivering drugs to people's homes.[69] These link to our findings on higher satisfaction ratings for private pharmacies than public primary-care facilities. Further, people chose private pharmacies even though they perceived providers at public facilities to be more competent, indicating that disadvantaged populations may compromise on perceived quality for cheaper and more convenient options. Other studies from LMICs reveal similar findings behind people's preference for pharmacies and other informal private-sector providers, where people often

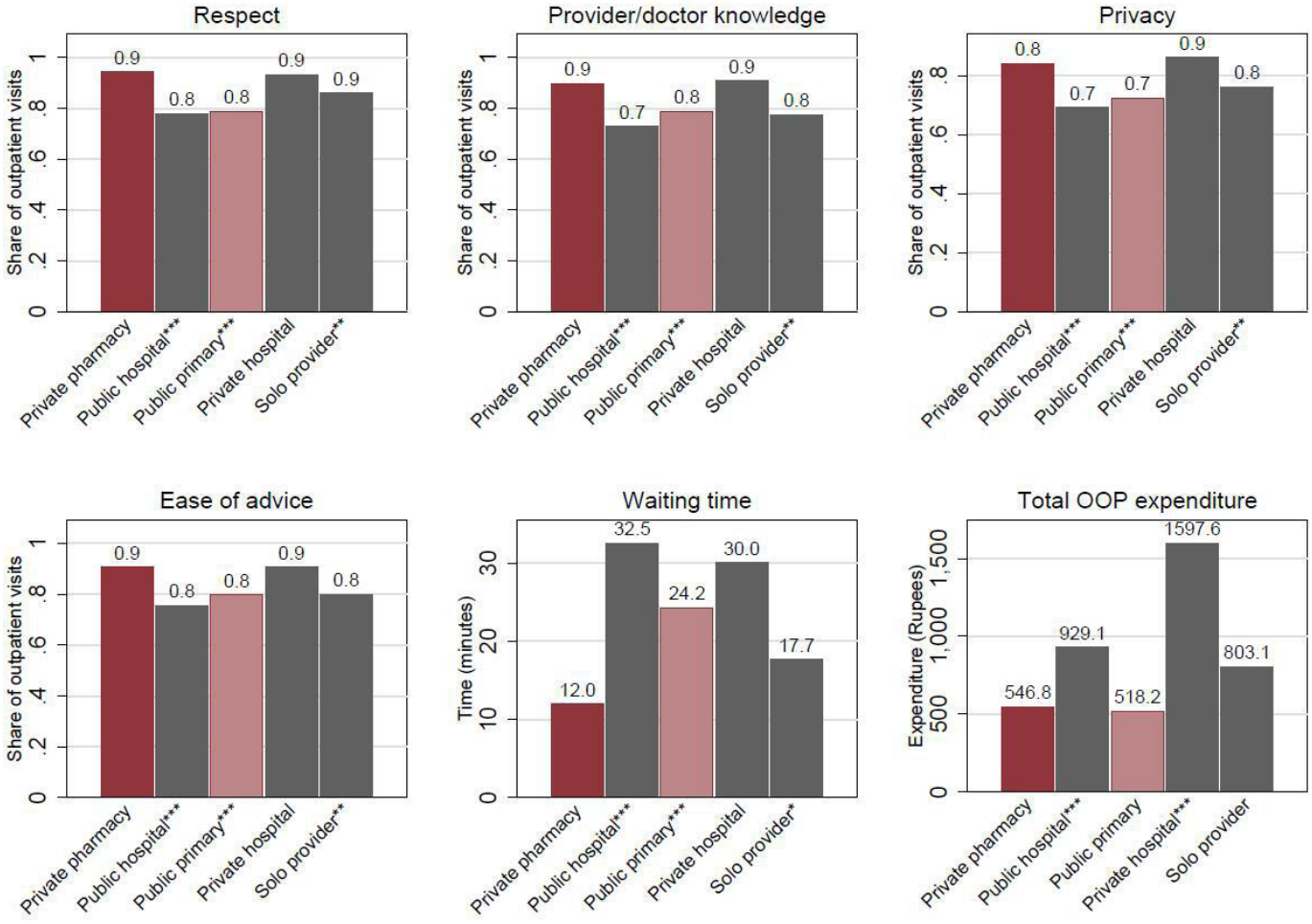

Figure 2 Select patient satisfaction ratings and out-of-pocket (OOP) expenditures by provider choice. This figure reports the weighted mean experiences of patients who chose private pharmacies, public hospitals, public primary-care facilities, private hospitals and solo providers, respectively, for outpatient care. ***indicates significance at 1% level, **at 5% level, *at 10% level from the multivariable regression of patient experiences on provider choice controlling for women, education, rural, religion, caste, wealth quintile, age, chronic illness, self-rated health and district fixed effects. The regressions of patient experiences with public hospitals, public primary-care facilities, private hospitals and solo providers are relative to private pharmacies. The complete set of results is presented in online supplemental appendix table 5.

value convenience, trust and respect over differences in expenses and perceived quality.[41 42 56 70] However, it is interesting to note that after receiving care, patients who used services from private pharmacies rated the competency of providers equal to, or higher than, those who received care from public facilities. While these ratings may be subject to bias due to differences in people's expectations of different providers, they appear to affirm the choice of private pharmacies and potentially justify tradeoffs made by patients.

People's preferences and satisfaction with private pharmacies offer lessons for designing primary-care delivery systems. Our analyses reveal what people value in their healthcare providers and offer some important lessons. Ensuring reliable and convenient operating hours, availability of consultation and medicines from the same facility, providers' respectful behaviour towards patients and lower expenses may be useful strategies to improve usage of care.[41 70] If the perceived clinical quality of outpatient care services is not discernibly different between private pharmacies and public primary-care facility options, patients will likely continue to seek care from providers that offer convenience, respectful treatment and lower expenses. India's new Ayushman Bharat Health and Wellness Centres could consider incorporating these aspects in their design to make care more patient-centred. Immediate- to medium-term changes might include tailoring hours of operation to people's convenience and offering a broader and more responsive set of services catered to chronic disease patients, while longer-term goals could include building trust among users by reliably having staff and medicines at the facilities and improving provider behaviour and communication with patients.

Strengths of private pharmacies could be leveraged for UHC, with some prerequisites

The role pharmacies play, their accessibility and patients' expressed preferences revealed through our data highlight the importance of considering this category of

providers when designing health system reforms for UHC. Acknowledging similar findings worldwide, especially from LMICs,[2 3 36 38 71–75] many experts, including the WHO, have begun to recommend a supportive approach towards private pharmacies that leverages their strengths to deliver primary healthcare.[3 36 71 73–76] Along with many high-income countries, South Africa, Uganda and Indonesia have successfully integrated pharmacists into their primary-care delivery systems and have engaged private pharmacies through government-sponsored insurance programmes.[77–79]

However, engaging the private sector, especially providers like private pharmacies, has been a contentious issue. Critics argue that private providers offer poor quality of care.[80–84] There is an extensive body of evidence from India and other LMICs on poor clinical quality in private pharmacies.[3 19 26 28–31 85] However, poor clinical quality is not unique to private pharmacies, and may be endemic to the Indian health system[35 83 86 87] and needs to be improved across the board. Our research from this same project, reported elsewhere, find concerning levels of poor clinical quality among public- and private-sector providers.[47] Another set of associated concerns is that private pharmacies are used disproportionately by disadvantaged populations,[44 70] If the hypothesis that private pharmacies provide worse clinical quality of care than public primary-care facilities in India is true, then this may lead to increasing disparities in health outcomes. However, more evidence is needed to understand the clinical competency of private pharmacists and how their competence compares to public outpatient care options.

In a resource-constrained and pluralistic health system that includes a heterogenous range of public and private providers, like India's, acknowledging and building on the opportunities and resources of private pharmacies as an existing healthcare provider that is widely used and preferred by people is a pragmatic solution. However, it is critical that the concerns we list above, of clinical competence and quality of care, incentives, licensing and regulation, are addressed and treated as prerequisites for considering the role of private pharmacies in primary care and UHC. Below, we list some prerequisites for Indian policymakers to consider for effectively engaging private pharmacies to move toward UHC.

Improving provider competency

Interventions to improve the technical competency of pharmacies, such as training to improve patient counselling, use of pharmacy treatment guidelines for diagnosing common conditions and making referrals to registered medical practitioners and peer influence, have been successful in LMICs.[88–91] For example, in India, training pharmacy staff on correct diagnosis and recommended referral patterns have been effective for tuberculosis.[32] While most attention in India has been on whether pharmacies have a qualified pharmacist, evidence, including our own analysis published elsewhere,[47] shows that formal qualification is not necessarily a significant predictor of clinical effectiveness among Indian providers.[87 92] Further, a substantial number of pharmacies are unregistered, and they provide a similar range of services irrespective of registration status. Therefore, it is critical that pharmacies have access to clinical guidelines and training, regardless of their registration and staff qualifications. Policy directives and incentives that encourage pharmacies to undergo appropriate training and observe clinical guidelines are important.

Provider payments and incentives

In addition to training, attention is increasingly turning to interventions with provider incentives that encourage improved care quality and coverage.[36] While studies have found different provider payment mechanisms to be effective in improving the practices of providers,[90 93] these are difficult to implement for private pharmacies in LMIC settings, especially in India, without insurance coverage for outpatient care. The Indian government's health insurance programme, Pradhan Mantri Jan Aarogya Yojana,[94] could consider adopting these policy levers if and when it extends coverage to outpatient care, and could require regular training and observation of quality standards for empanelment, as seen in other countries like South Africa.[77]

Regulatory enforcement

Enforcing regulation, although challenging, is important to leverage the strengths of private pharmacies. We found that many private pharmacies were unregistered but provided similar services and more medical advice than registered pharmacies. These data are concerning as unregistered pharmacies fall outside the purview of most regulatory oversight.[95 96] Like studies from other LMICs,[3 21 37] our findings highlight that a majority of the registered pharmacies violated several fundamental stipulations of the Indian Pharmacy Act (1948) and the Pharmacy Practice Regulations (2015), such as having a qualified registered pharmacist present at all times to dispense and sell drugs, regular re-training for renewing pharmacy licenses or not substituting drugs without a prescription.[95 96] Like in other LMICs,[36 38 97 98] some of the reasons have been weak enforcement capacity of the Pharmacy Council of India and lack of clarity and coordination at the local level.[99] Regulations are also outdated—the Pharmacy Act has been used in India since 1948, and has weak penalties that are not prohibitive enough for private pharmacies to refrain from violations.[95] Media reports from India, and research from other countries, also indicate capture of regulatory staff who come to identify with pharmacists and who could even own infringing retailers or facilities,[39 100–102] resulting in routine bribe payments to avoid inspection visits or adverse reports.[99 103 104] Evidence from Laos, Vietnam and Thailand have shown positive results in improving pharmacy practice by increasing awareness about regulations and self-regulation by professional bodies.[3 88 89] The support of the Indian Pharmacists Association could

be valuable for similar efforts in India to promote better pharmacy practices.

Robust data

The availability of robust data and their meaningful analyses are the first steps towards designing policies to engage private sector providers, like pharmacies, in UHC efforts.[6] Currently, data are absent on the total number of registered and unregistered pharmacies in India, combined with the exclusion of private pharmacies from national surveys. This leads to an underestimation of the scale and scope of private pharmacies; it also makes it challenging to enforce regulations or implement any of the interventions discussed above. India's newly launched Ayushman Bharat Digital Mission aims to collect electronic data from all types of providers, including pharmacies.[105] This could be a powerful mechanism for monitoring pharmacy practices and clinical quality, enforcing regulations and implementing incentives. Equally important is regularly collecting and analysing data from users of private pharmacies through national and state-level surveys.

This study builds on prior research to provide the first large-scale examination of the characteristics of private pharmacies in an Indian state, further enriched with a comparative analysis across similar outpatient care providers. Uniquely, we examine household data along with provider information to connect demand- and supply-side perspectives for understanding the roles of pharmacies in meeting the basic healthcare needs of the population. The contributions of this study to the data and knowledge about private pharmacies as healthcare providers have implications for government policies to build people-centred health systems with equitable and affordable access to high-quality health services.[106] These aspects of care have become especially critical in the context of COVID-19, and Indian primary-care policies, including the recently-launched Ayushman Bharat,[10] which could consider the role of private pharmacies in the health system.

Study limitations

This paper is subject to a number of limitations. Most of our data, collected through household and provider surveys, are based on individuals' self-reported information. For example, we were unable to verify self-reported qualifications of providers, registration details of private pharmacies or numbers of customers and expect our estimates to represent the upper bound of the true statistics. For characteristics of pharmacy personnel, instructions were to interview the primary person who was the head of the staff or pharmacy manager, or owner present on the day of the interview. There could be other personnel on other days whose characteristics are not reflected in our results. Recall error could also affect our results.[107] While the sampling frame for public sector facilities was clearly known, the same was not available for private providers, and hence, our sample is not necessarily representative of the universe of private pharmacies and solo providers. However, our reliance on multiple sources to draw our sample for private pharmacies and solo providers minimise the issues caused by the absence of a reliable sampling frame. We lack data on more objective aspects of care quality, such as adherence to evidence-based clinical guidelines. As a result, we were not able to assess the clinical effectiveness of care delivered by private pharmacies. Nonetheless, we believe our study provides strong evidence of the role played by private pharmacies in delivering healthcare.

CONCLUSION

This study is the first large, in-depth examination of private pharmacies in India and their comparison with other outpatient care providers. Our analyses connecting demand- and supply-side perspectives provide an understanding of the characteristics of private pharmacies, the types of services they offer, the reasons why people seek care from them and users' experiences in terms of patient satisfaction and financial hardships. Our findings highlight that private pharmacies are a major pillar of the Indian health system, addressing unmet needs of the population. We discuss priorities that need to be addressed for effectively engaging private pharmacies and leveraging their strengths for UHC. Finally, we appeal for countries like India with pluralistic health systems to adopt a comprehensive health systems approach that incorporates public and private sectors and considers formal and informal providers in designing UHC reforms and governance structures.

Twitter Anuska Kalita @anuskakalita

Acknowledgements The authors gratefully acknowledge the valuable reviews by Professor Michael R Reich and Dr Terence Cheng from the Harvard T.H. Chan School of Public Health. Their feedback greatly enhanced this paper. We are grateful to our Research Assistants, Saikat Panda and Snipta Mallick, for their help. We are thankful to our colleagues at the Health Systems Transformation Platform and the Indian Institute of Public Health Bhubaneshwar for consultations and valuable inputs to this project. We thank the team at Oxford Policy Management, who collected and cleaned the data for this study. We are grateful to the Government of Odisha for their support and encouragement for undertaking this assessment of the state's health system and for granting us the necessary permissions for this study. We express our heartfelt thanks to our study participants; this study would not have been possible without their cooperation.

Contributors All coauthors participated in planning and reviewing the paper. AK conceptualised and led the manuscript. BB led the data analyses. AK, BB, LW, AH and JEC undertook different parts of the data analyses used in this paper. WY, as the senior author, guided the conceptualisation of the paper and reviewed the data analyses and the manuscript. AK, AH and WY were involved in study design. AK and AH were involved in data collection. WY is the guarantor, and takes responsibility for the work and/or the conduct of the study, had access to the data, and controlled the decision to publish.

Funding The study was funded by the Bill and Melinda Gates Foundation (grant number OPP1181215), and funding for data collection for the study was provided by the Tata Trusts. The donors were not involved in any aspect of research design, data collection or analysis for this paper.

Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval Institutional Review Board (IRB) at the Harvard T.H. Chan School of Public Health ID: IRB18-1675. Research and Ethics Committee of the Directorate of Health Services, Government of Odisha ID: 60/PMU/187/17. Sigma, registered with

the Division of Assurance and Quality Improvement of the Office for Human Research Protections, USA (IRB00009900). Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request.

ORCID iD

Jan E Cooper http://orcid.org/0000-0002-2637-9050

REFERENCES

1 World Health Organization. *The private sector, universal health coverage and primary care. Technical series on primary health care*. Geneva: WHO, 2018.
2 Sudhinaraset M, Ingram M, Lofthouse HK, *et al*. What is the role of informal healthcare providers in developing countries? A systematic review. *PLoS One* 2013;8:e54978.
3 Miller R, Goodman C. Performance of retail pharmacies in low- and middle-income Asian settings: a systematic review. *Health Policy Plan* 2016;31:940–53.
4 National Sample Survey Office. Key Indicators of Social Consumption in India: Health, (National Sample Survey 71st Round). In: *National sample survey office (NSSO) MoSaPIM*. Delhi: Government of India, 2014.
5 National Sample Survey Office. Key Indicators of Household Consumption on Health in India. In: *Nss 75th round in: Ministry of statistics and program implementation (MoPSI) GoI*. New Delhi: Government of India, 2019.
6 Mackintosh M, Channon A, Karan A, *et al*. What is the private sector? understanding private provision in the health systems of low-income and middle-income countries. *The Lancet* 2016;388:596–605.
7 Bloom G, Standing H, Lucas H, *et al*. Making health markets work better for poor people: the case of informal providers. *Health Policy Plan* 2011;26 Suppl 1:i45–52.
8 Chowdhury AMR, Iqbal K, Bhuiya A. *The state of health in Bangladesh 2007. health workforce in Bangladesh: who constitutes the healthcare system? Bangladesh health Watch*. Dhaka, 2008.
9 Government of India. National health mission in: Ministry of health and family welfare.
10 Ministry of Health and Family Welfare. Ayushman Bharat - Health and Wellness Centers: Government of India. Available: https://ab-hwc.nhp.gov.in/
11 Ministry of Health and Family Welfare. National Health Policy of India 2017. In: *Ministry of health and family welfare*. New Delhi: Government of India, 2017.
12 All India Organisation of Chemists and Druggists. All India Organisation of Chemists & Druggists history. Available: http://www.aiocd.net/2021 [Accessed 01 Sep 2021].
13 Times News Network. FDA raids Aurangabad medical store for selling drugs sans licence. *The Times of India* 2015.
14 Times News Network. Unlicenced medical stores, clinics raided. *Times of India* 2017.
15 Times News Network. FDA shuts 246 medical stores in statewide raid. *The Times of India* 2021.
16 Ayub M, Mustafa M. An overview of unorganized retail pharmacy sector in Indian pharmaceutical industry. *International Journal of Development Research* 2017;7.
17 Leo L. Pharma sales grow in double digits in March but Covid-19 overhang continues. *Mint* 2021.
18 International Institute for Population Sciences (IIPS). *National family health survey (NFHS-4) 2015-16*. Mumbai: IIPS, 2017.
19 Kwan A, Daniels B, Bergkvist S, *et al*. Use of standardised patients for healthcare quality research in low- and middle-income countries. *BMJ Glob Health* 2019;4:e001669–e69.
20 Das J, Chowdhury A, Hussam R, *et al*. The impact of training informal health care providers in India: a randomized controlled trial. *Science* 2016;354. doi:10.1126/science.aaf7384. [Epub ahead of print: 07 10 2016].
21 Sabde YD, Diwan V, Saraf VS, *et al*. Mapping private pharmacies and their characteristics in Ujjain district, central India. *BMC Health Serv Res* 2011;11:351.
22 Bhargava I O. *The future of pharmacies: creating a better normal for community health*. Samhita & Cipla, 2021.
23 Pai M. Improving the quality of tuberculosis care: we need standards and strategies to translate them into practice. *J Epidemiol Glob Health* 2014;4:77–80.
24 Nafade V, Huddart S, Sulis G, *et al*. Over-the-counter antibiotic dispensing by pharmacies: a standardised patient study in Udupi district, India. *BMJ Glob Health* 2019;4:e001869.
25 Kotwani A, Ewen M, Dey D, *et al*. Prices & availability of common medicines at six sites in India using a standard methodology. *Indian J Med Res* 2007;125:645–54.
26 Kotwani A, Wattal C, Joshi PC, *et al*. Irrational use of antibiotics and role of the pharmacist: an insight from a qualitative study in New Delhi, India. *J Clin Pharm Ther* 2012;37:308–12.
27 Sulis G, Batomen B, Kotwani A, *et al*. Sales of antibiotics and hydroxychloroquine in India during the COVID-19 epidemic: an interrupted time series analysis. *PLoS Med* 2021;18:e1003682.
28 Satyanarayana S, Subbaraman R, Shete P, *et al*. Quality of tuberculosis care in India: a systematic review. *Int J Tuberc Lung Dis* 2015;19:751–63.
29 Shet A, Sundaresan S, Forsberg BC. Pharmacy-based dispensing of antimicrobial agents without prescription in India: appropriateness and cost burden in the private sector. *Antimicrob Resist Infect Control* 2015;4:55.
30 Basak SC, Sathyanarayana D. Evaluating medicines dispensing patterns at private community pharmacies in Tamil Nadu. *Southern Medical Review* 2010;3:27–31.
31 Basak SC, Sathyanarayana D. Exploring knowledge and perceptions of generic medicines among drug retailers and community pharmacists. *Indian J Pharm Sci* 2012;74:571–5.
32 Daftary A, Satyanarayana S, Jha N, *et al*. Can community pharmacists improve tuberculosis case finding? a mixed methods intervention study in India. *BMJ Glob Health* 2019;4:e001417.
33 Barker AK, Brown K, Ahsan M, *et al*. What drives inappropriate antibiotic dispensing? A mixed-methods study of pharmacy employee perspectives in Haryana, India. *BMJ Open* 2017;7:e013190.
34 Porter G, Kotwani A, Bhullar L, *et al*. Over-the-counter sales of antibiotics for human use in India: the challenges and opportunities for regulation. *Med Law Int* 2021;21:147–73.
35 Montagu D, Anglemyer A, Tiwari M. *Private versus public strategies for health service provision for improving health outcomes in resource-limited settings*. San Francisco, CA: Global Health Sciences, University of California, San Francisco, 2011.
36 Montagu D, Goodman C. Prohibit, constrain, encourage, or purchase: how should we engage with the private health-care sector? *Lancet* 2016;388:613–21.
37 Wafula FN, Miriti EM, Goodman CA. Examining characteristics, knowledge and regulatory practices of specialized drug shops in sub-Saharan Africa: a systematic review of the literature. *BMC Health Serv Res* 2012;12:223–23.
38 Lowe RF, Montagu D. Legislation, regulation, and consolidation in the retail pharmacy sector in low-income countries. *South Med Rev* 2009;2:35.
39 Goodman C, Brieger W, Unwin A, *et al*. Medicine sellers and malaria treatment in sub-Saharan Africa: what do they do and how can their practice be improved? *Am J Trop Med Hyg* 2007;77:203–18.
40 Goodman C, Kachur SP, Abdulla S, *et al*. Drug shop regulation and malaria treatment in Tanzania--why do shops break the rules, and does it matter? *Health Policy Plan* 2007;22:393–403.
41 Keesara SR, Juma PA, Harper CC. Why do women choose private over public facilities for family planning services? A qualitative study of post-partum women in an informal urban settlement in Kenya. *BMC Health Serv Res* 2015;15:335.
42 Ozawa S, Walker DG. Comparison of trust in public vs private health care providers in rural Cambodia. *Health Policy Plan* 2011;26 Suppl 1:i20–9.

43 Seeberg J, Pannarunothai S, Padmawati RS, *et al*. Treatment seeking and health financing in selected poor urban neighbourhoods in India, Indonesia and Thailand. *Soc Sci Med* 2014;102:49–57.
44 Onwujekwe O, Hanson K, Uzochukwu B. Do poor people use poor quality providers? Evidence from the treatment of presumptive malaria in Nigeria. *Trop Med Int Health* 2011;16:1087–98.
45 India Health Systems Project. Harvard T.H. Chan school of public health, 2021. Available: https://sites.sph.harvard.edu/india-health-systems/ [Accessed 20 Sep 2021].
46 Haakenstad A, Kalita A, BoseB, *et al*. Catastrophic health expenditure on private sector pharmaceuticals: a cross-sectional analysis from the state of Odisha, India. *Health Policy and Planning* 2022;37:872–84.
47 Yip W, Kalita A, Bose B, *et al*. Comprehensive assessment of health system performance in Odisha, India. *Health Systems and Reform* 2021;8.
48 Kalita A, Yip W, India health systems project. Odisha health system assessment: study design and methodology working paper. USA Harvard T.H. Chan School of Public Health; 2020.
49 Kim J-H, Bell GA, Ratcliffe HL, *et al*. Predictors of patient-reported quality of care in low- and middle-income countries: a four-country survey of person-centered care. *Int J Qual Health Care* 2021;33. doi:10.1093/intqhc/mzab110. [Epub ahead of print: 20 Aug 2021].
50 Ratcliffe HL, Bell G, Awoonor-Williams K, *et al*. Towards patient-centred care in Ghana: health system responsiveness, self-rated health and experiential quality in a nationally representative survey. *BMJ Open Qual* 2020;9:e000886.
51 Ministry of Health and Family Welfare. National List of Essential Medicines in India. In: *MOHFW*. Delhi: Government of India, 2018.
52 World Health Organization. *Who model list of essential medicines, 20th list*. Geneva: WHO, 2017.
53 Sodani PR, Sharma K. Strengthening primary level health service delivery: lessons from a state in India. *J Family Med Prim Care* 2012;1:127–31.
54 Ramani S, Sivakami M, Gilson L. How context affects implementation of the primary health care approach: an analysis of what happened to primary health centres in India. *BMJ Glob Health* 2018;3:e001381.
55 Powell-Jackson T, Acharya A, Mills A. An assessment of the quality of primary care in India. *Economic & Political Weekly* 2013;48:53–51.
56 Karthik Muralidharan NC, Hammer J, Kremer M, *et al*. *Is there a doctor in the house? absent medical providers in India*. Working Paper: The World Bank, 2011.
57 Garg S, Tripathi N, Ranjan A, *et al*. Comparing the average cost of outpatient care of public and for-profit private providers in India. *BMC Health Serv Res* 2021;21:838.
58 Kujawski SA, Leslie HH, Prabhakaran D, *et al*. Reasons for low utilisation of public facilities among households with hypertension: analysis of a population-based survey in India. *BMJ Glob Health* 2018;3:e001002.
59 Das J, Holla A, Mohpal A, *et al*. Quality and accountability in health care delivery: Audit-Study evidence from primary care in India. *Am Econ Rev* 2016;106:3765–99.
60 Rao KD, Sheffel A. Quality of clinical care and bypassing of primary health centers in India. *Soc Sci Med* 2018;207:80–8.
61 Gautham M, Binnendijk E, Koren R. 'First we go to the small doctor': First contact for curative health care south by rural communities in Andhra Pradesh & Orissa, India. *India Journal of Medical Research* 2011;134:627–38.
62 Praja Foundation. *The state of health in Mumbai*. Mumbai: Praja Foundation, 2018. www.praja.org
63 I.C.M.R. PHFI, & I.H.M.E.. India: Health of the nation's states – the Indian state-level disease burden initiative in the Global Burden of Disease Study, 2017. Available: https://wwwhealthdataorg/
64 Directorate General of Health Services. Indian Public Health Standards (IPHS) Guidelines for Primary Health Centres. In: *Ministry of health and family welfare*. New Delhi: Government of India, 2012.
65 Sriram S. Are the subcenters adequately equipped to deliver primary healthcare? A study of public health manpower and infrastructure in the health district in Andhra Pradesh, India. *J Family Med Prim Care* 2019;8:102–8.
66 Kalita A, Kapila S, Reich M R. Delivering primary healthcare with quality and accountability in India: the case of Swasth *Working Paper*. *India Health Systems* 2020;2.
67 Akhzer A. Branded generics key to pharmacies offering discounts on medicines. *The Indian Expres* 2018.
68 Sridhar GN. Pharmacies lure customers with discounts, freebies. *The Hindu Business Line* 2018.
69 Simon S. Home delivery of medicines takes off during second Covid wave. *The New Indian Express* 2021.
70 Paphassarang C, Philavong K, Boupha B, *et al*. Equity, privatization and cost recovery in urban health care: the case of Lao PDR. *Health Policy Plan* 2002;17 Suppl:72–84.
71 Bennett S, Hanson K, Kadama P. *Working with the non-state sector to achieve public health goals. Evidence and information for policy cluster*. Geneva: WHO, 2005.
72 Burger NE, Kopf D, Spreng CP, *et al*. Healthy firms: constraints to growth among private health sector facilities in Ghana and Kenya. *PLoS One* 2012;7:e27885.
73 Bustreo F, Harding A, Axelsson H. Can developing countries achieve adequate improvements in child health outcomes without engaging the private sector? *Bull World Health Organ* 2003;81:886–95.
74 Mills A, Brugha R, Hanson K. What can be done about the private health sector in low-income countries? *World Health Bulletin* 2002;80.
75 McPake BP, Hanson KP. Managing the public–private mix to achieve universal health coverage. *The Lancet* 2016;388:622–30.
76 Patouillard E, Goodman CA, Hanson KG, *et al*. Can working with the private for-profit sector improve utilization of quality health services by the poor? A systematic review of the literature. *Int J Equity Health* 2007;6:17.
77 Naidoo V, Suleman F, Bangalee V. The transition to universal health coverage in low and middle-income countries: new opportunities for community pharmacists. *J Pharm Policy Pract* 2020;13:1–10.
78 Hermansyah A, Wulandari L, Kristina SA, *et al*. Primary health care policy and vision for community pharmacy and pharmacists in Indonesia. *Pharm Pract* 2020;18:2085.
79 Mayora C, Kitutu FE, Kandala N-B, *et al*. Private retail drug shops: what they are, how they operate, and implications for health care delivery in rural Uganda. *BMC Health Serv Res* 2018;18:532–32.
80 Brugha R, Zwi A. Improving the quality of private sector delivery of public health services: challenges and strategies. *Health Policy Plan* 1998;13:107–20.
81 Sauerborn R. Low quality of care in low income countries: is the private sector the answer? *Int Journal for Quality in Health Care* 2001;13:281–2.
82 Ogwal-Okeng JW, Obua C, Waako P, *et al*. A comparison of prescribing practices between public and private sector physicians in Uganda. *East Afr Med J* 2004;:S12–16.
83 Basu S, Andrews J, Kishore S, *et al*. Comparative performance of private and public healthcare systems in low- and middle-income countries: a systematic review. *PLoS Med* 2012;9:e1001244.
84 Coarasa J, Das J, Gummerson E, *et al*. A systematic tale of two differing reviews: evaluating the evidence on public and private sector quality of primary care in low and middle income countries. *Global Health* 2017;13:24.
85 Ban B, Hodgins S, Thapa P, *et al*. A national survey of private-sector outpatient care of sick infants and young children in Nepal. *BMC Health Serv Res* 2020;20:545.
86 Berendes S, Heywood P, Oliver S, *et al*. Quality of private and public ambulatory health care in low and middle income countries: systematic review of comparative studies. *PLoS Med* 2011;8:e1000433.
87 Das J, Holla A, Das V, *et al*. In urban and rural India, a standardized patient study showed low levels of provider training and huge quality gaps. *Health Aff* 2012;31:2774–84.
88 Chuc NTK, Larsson M, Do NT, *et al*. Improving private pharmacy practice: a multi-intervention experiment in Hanoi, Vietnam. *J Clin Epidemiol* 2002;55:1148–55.
89 Chalker J, Ratanawijitrasin S, Chuc NTK, *et al*. Effectiveness of a multi-component intervention on dispensing practices at private pharmacies in Vietnam and Thailand--a randomized controlled trial. *Soc Sci Med* 2005;60:131–41.
90 Rowe AK, Rowe SY, Peters DH, *et al*. Effectiveness of strategies to improve health-care provider practices in low-income and middle-income countries: a systematic review. *Lancet Glob Health* 2018;6:e1163–75.
91 Satyanarayana S, Kwan A, Daniels B, *et al*. Use of standardised patients to assess antibiotic dispensing for tuberculosis by pharmacies in urban India: a cross-sectional study. *Lancet Infect Dis* 2016;16:1261–8.
92 Rao KD, Sundararaman T, Bhatnagar A, *et al*. Which doctor for primary health care? quality of care and non-physician clinicians in India. *Soc Sci Med* 2013;84:30–4.
93 Li X, Krumholz HM, Yip W, *et al*. Quality of primary health care in China: challenges and recommendations. *Lancet* 2020;395:1802–12.

94 National Health Authority. Government of India, 2019. Available: www.pmjay.nic.in
95 Government of India. The Pharmacy Act. In: *Ministry of health and family welfare*. Delhi, 1948.
96 Pharmacy Council of India. *Pharmacy practice regulations*. Delhi, India: Go, 2015.
97 Sheikh K, Saligram PS, Hort K. What explains regulatory failure? analysing the architecture of health care regulation in two Indian states. *Health Policy Plan* 2015;30:39–55.
98 Ahmed SM, Naher N, Hossain T, *et al*. Exploring the status of retail private drug shops in Bangladesh and action points for developing an accredited drug shop model: a facility based cross-sectional study. *J Pharm Policy Pract* 2017;10:21.
99 Kunnathoor P. Medical shops in Odisha violate law as they are run without pharmacists despite complaints from IPA. *PharmaBiz* 2019.
100 Morgan R, Ensor T. The regulation of private hospitals in Asia. *Int J Health Plann Manage* 2016;31:49–64.
101 Bloom G, Henson S, Peters DH. Innovation in regulation of rapidly changing health markets. *Global Health* 2014;10:53.
102 Sikdar P. Most med shops run by unqualified 'pharmacists'. *The Times of India* 2016.
103 Wafula F, Molyneux C, Mackintosh M, *et al*. Protecting the public or setting the bar too high? understanding the causes and consequences of regulatory actions of front-line regulators and specialized drug shop operators in Kenya. *Soc Sci Med* 2013;97:220–7.
104 Bagonza A, Peterson S, Mårtensson A, *et al*. Regulatory inspection of registered private drug shops in East-Central Uganda-what it is versus what it should be: a qualitative study. *J Pharm Policy Pract* 2020;13:55.
105 Government of India. National Digital Health Mission. In: *Ministry of health and family welfare (MoHFW)*. https://ndhm.gov.in/
106 World Health Organization. Universal health coverage. Available: https://www.who.int/health-topics/universal-health-coverage#tab=tab_1; [Accessed 01 Sep 2021].
107 Das J, Hammer J, Sanchez-Paramo C. *The impact of recall periods on reported morbidity and health seeking behavior policy research working paper 5578 impact evaluation series no 51: world bank*. Development Research Group, 2011.