

The quality of e-pharmacy care in India and Kenya

What can standardised patient methods tell us about e-pharmacy practice?

Executive summary

E-pharmacies are expanding rapidly in low- and middle-income countries, yet empirical evidence on how they operate in routine practice remains limited. Whilst e-pharmacies have the potential to improve access to medicines, their rapid growth raises important questions about how regulatory requirements, clinical safeguards and standards are implemented.

This brief presents findings from a large-scale, standardised patient study conducted in India and Kenya, in which researchers posed as consumers attempting to purchase prescription-only medicines from e-pharmacies across a range of regulatory and clinical scenarios. A subset of these scenarios was also conducted in brick-and-mortar pharmacies to enable direct comparison of pharmacy practices.

Substantial gaps in adherence to prescription regulations and clinical safeguards were observed in both countries. Prescription-only medicines were often dispensed without a prescription in online and brick-and-mortar settings. Detection of clinical risks, such as inappropriate bulk purchases or contraindications, was also uncommon across both settings.

The findings challenge the common perception that e-pharmacies have lower regulatory compliance than brick-and-mortar pharmacies. In several scenarios, e-pharmacies were less likely than brick-and-mortar pharmacies to dispense medicines inappropriately.

Overall, the evidence suggests that weaknesses in prescription enforcement and poor-quality pharmacy care reflect broader challenges across the entire retail pharmacy sector, rather than risks unique to online platforms. The studies also demonstrate that standardised patient methods can be applied rigorously in online environments, enabling structured, cross-country comparisons of regulatory compliance and patient safety across sectors and potentially serving as an important regulatory tool.

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Introduction

Pharmacists in retail settings play a critical role in the interface between patients and health systems. By verifying prescriptions, screening for contraindications, and providing appropriate medicine use instructions, they make a key contribution to the safe and appropriate use of medicines.

E-pharmacies, which allow consumers to order medicines via websites or mobile applications, often with home delivery and remote payment, are reshaping traditional retail pharmacy markets. For consumers, e-pharmacies offer convenience and potentially lower prices. For health systems, they may introduce new forms of traceability and more standardised prescription verification, safety checks, and information provision through online platforms.

While e-pharmacies initially emerged in high-income settings, their growth has accelerated in low- and middle-income countries (LMICs), including in India and Kenya, generating considerable debate. Some view e-pharmacies as a breakthrough for improving access to medicines, while others raise concerns about inappropriate dispensing of prescription-only medicines, poor pharmacy care, and weak regulatory oversight. In India, these concerns have contributed to strong pushback from brick-and-mortar pharmacy associations, with e-pharmacies portrayed as posing greater risks to patient safety than conventional pharmacies.

To date, robust evidence on the regulatory compliance of e-pharmacies and the quality of care they provide remains limited. Many existing studies rely on non-systematic sampling or focus narrowly on whether prescription-only medicines can be obtained without a prescription, without assessing broader dimensions of pharmacy care, such as identifying clinical risks or providing appropriate counselling.

This brief presents findings from a large-scale study conducted in India and Kenya, providing a systematic assessment of e-pharmacy performance and comparison with brick-and-mortar pharmacy practices.

Research objectives

The research aimed to generate rigorous empirical evidence on the performance and quality of care provided by e-pharmacies in India and Kenya, two countries with growing e-pharmacy markets but contrasting regulatory environments. Kenya has relatively comprehensive regulatory guidelines for e-pharmacy, whereas in India, proposed e-pharmacy regulations remain in draft form and have not been formally enacted.

Standardised patients were used to examine whether e-pharmacies comply with regulatory requirements and how they manage patient safety risks in routine practice. This formed part of a broader project on e-pharmacy markets, which also included structured assessments of e-pharmacy websites and apps, stakeholder consultations, and regulatory reviews.

Specifically, the standardised patient study sought to determine whether e-pharmacies enforced prescription requirements and appropriately identified and responded to clinical risks embedded in prescriptions or medication requests, such as contraindications or inappropriate bulk purchases. Other regulatory compliance checks were also undertaken, including attempts to purchase controlled medicines online, which is prohibited in both countries.

A parallel comparative study examined whether practices observed in e-pharmacies differed from those in brick-and-mortar pharmacies, enabling comparison of practices across delivery models.

The study used a census approach to identify all operational e-pharmacies serving consumers in each country at the time of data collection (June to November 2024). For the comparative component, brick-and-mortar pharmacies were selected using a two-stage cluster sampling strategy in one major urban location per country and visited from April to June 2025. Figure 1 (page 4) summarises the overall study design, including pharmacy identification and standardised patient scenarios.

Using standardised patients to evaluate e-pharmacy practice

The standardised patient approach

Standardised patients, sometimes referred to as mystery shoppers, are considered one of the most rigorous approaches for assessing the quality of healthcare delivery. In standardised patient studies, trained researchers pose as genuine consumers and follow detailed scripts when interacting with providers. Because providers believe they are interacting with real consumers, the Hawthorne effect is minimised. The use of standardised scenarios enables objective comparison across pharmacies and countries by ensuring that differences in responses reflect differences in quality of care rather than variation in patient presentations.

While standardised patient methods have been widely used to assess pharmacy practice in brick-and-mortar settings, only a small number of published studies have applied them to e-pharmacies, most of which have been conducted in high-income countries.

Developing and implementing the scenarios

The study developed 13 standardised patient scenarios designed to examine a range of regulatory, pharmacy care, and public health concerns across four broad categories:

1. Correct prescription: Requests for prescription-only medicines with a correct prescription.

2. Without prescription: Requests for prescription-only medicines with no prescription.

3. Pharmacy care issues: Attempts to purchase prescription-only medicines where a clinical risk should be detected, including overdose, bulk requests, and pregnancy contraindication.

4. Regulatory prohibition: Attempts to purchase opioids, which are banned from online sale.

All 13 scenarios were administered in Kenyan e-pharmacies; 11 were administered in Indian e-pharmacies. The antibiotic overdose and medical abortion with correct prescription were not administered in India. A subset of these scenarios was repeated in brick-and-mortar pharmacies (5 scenarios in Kenya and 4 in India).

Researchers first identified all operational retail e-pharmacies in India and Kenya through systematic online searches. Trained standardised patients then interacted with e-pharmacies using websites, mobile applications and messaging platforms, following detailed scripts developed for each scenario. Information was collected across the full patient journey, from product availability and product details through to prescription verification, safety checks, method of payment, delivery and received orders (Figure 2). To minimise the risk of detection, research teams varied the timing of visits and personal details used (e.g. patient name, email address) in each e-pharmacy.

Ethical considerations

Ethical approval was obtained from research ethics committees in India, Kenya, and the United Kingdom, and a waiver of informed consent was granted. The consent waiver reflected the practical challenges of obtaining prior consent from e-pharmacies, including uncertainty around website ownership and the possibility that some providers were operating illegally. It also reflected the fact that e-pharmacy services are publicly accessible, data collection posed minimal risk to providers, and researchers were unlikely to interact directly with staff except where remote contact was needed to initiate or complete an order.

Figure 2: Standardised patient journey

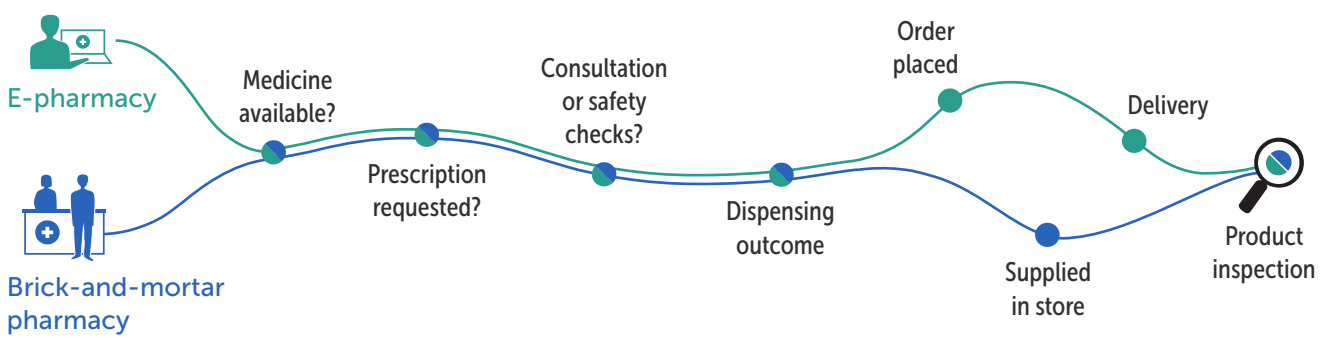
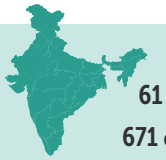


Figure 1: Overview of e-pharmacy study design

IDENTIFYING PHARMACIES

E-pharmacies

Systematic online searches to identify the entire population of e-pharmacies in India and Kenya



India
61 websites/apps
671 online SP visits

Kenya
28 websites/apps
364 online SP visits



Brick-and-mortar pharmacies

Two-stage cluster sampling approach to select pharmacies in one major urban location in each of the study countries



Bengaluru
100 pharmacies
400 in-person SP visits

Nairobi
100 pharmacies
500 in-person SP visits



STANDARDISED PATIENT SCENARIOS

Correct prescription

Tests whether a valid prescription is required and verified.[1]

- Antibiotic
- Antihypertensive
- Insulin
- Medical abortion[2]

Without prescription

Tests refusal to sell prescription-only medicines without prescription.

- Antibiotic
- Antihypertensive
- Insulin
- Medical abortion

Pharmacy care issues

Tests detection of clinical risks.

- Antibiotic overdose[2]
- Request for larger quantity than prescribed
- NSAID contraindicated in pregnancy

Regulatory prohibition

Tests compliance with the absolute prohibition of online opioid sales.[3]

- Opioid (with prescription)
- Opioid (without prescription)

1. **Antibiotic:** Co-amoxiclav (Amoxicillin + Clavulanic acid); **Antihypertensive:** India – Amlodipine, Kenya – Nifedipine; **Insulin:** Mixtard (or generic) 70/30 insulin; **Medical abortion**: Misoprostol+Mifepristone; **NSAID**: Diclofenac; **Opioid**: India – Tramadol+Paracetamol, Kenya – Tramadol

2. "Correct prescription" medical abortion and antibiotic overdose scenarios were not administered in India due to ethical review constraints.

3. Opioids are prohibited for online sale in both countries; for e-pharmacies, "correct pharmacy care" is defined as the product being entirely unavailable. Registered brick-and-mortar pharmacies may legally sell opioids with a valid prescription.

OUTCOME MEASURES

Correct pharmacy care	Adherence to scenario-specific regulatory standards and clinical guidelines. This includes requiring valid prescriptions, detecting clinical errors and complying with the absolute prohibition of online opioid sales.
Availability	Assessment of whether the target medicines were listed, visible, or confirmed in stock at the time of the visit.
Prescription required	Evaluation of whether the provider required a medical prescription prior to dispensing.
Clinical safety and information provision	Assessment of pre-dispensing safety checks (e.g., screening for allergies, drug interactions, or pregnancy) and the provision of patient-specific instructions on dosing and duration.
Product integrity	An audit of the condition of product received (packaging damage and expiration dates).

Cross-country e-pharmacy findings

More than 1,000 visits were attempted across the two countries. Across both settings, prescription-only medicines were often obtained without a prescription, and pharmacy care issues were rarely identified. Results reflect visits where the target medicine was available and the transaction could proceed (except in opioid scenarios, where availability itself was the outcome).

Figure 3: Percentage of e-pharmacy visits with correct pharmacy care

Dispensing without a prescription

When no prescription was supplied, prescription-only medicines were still obtained in 35% of visits in India and 72% of visits in Kenya, indicating weak enforcement of prescription requirements in both countries, particularly in Kenya.

Online availability of opioids

Online sale of opioids is prohibited in both countries. Despite this, the target opioid (tramadol alone or in combination with paracetamol) was listed as available on 23% of Kenyan and 14% of Indian e-pharmacies. Completed purchases were rare, however, as transactions typically did not progress to delivery.

Detection and management of clinical risks

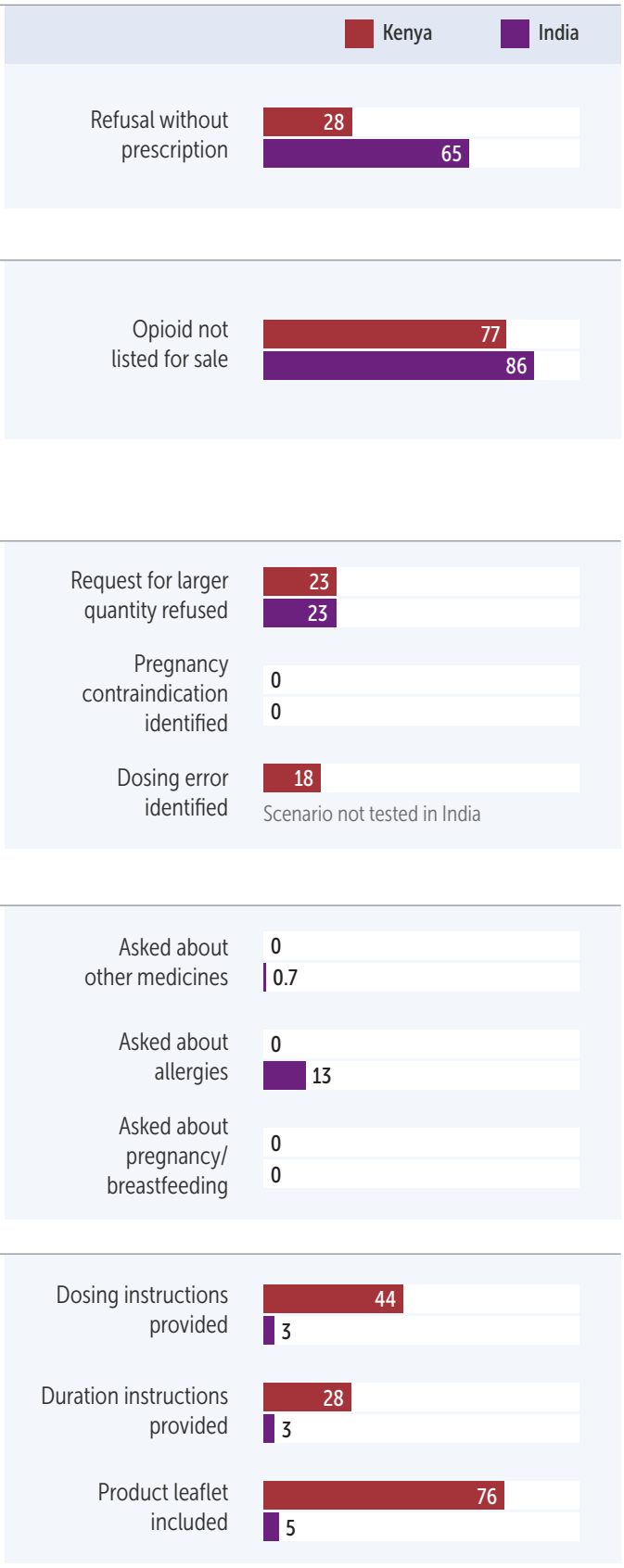
Clinical risk scenarios embedded safety concerns such as antibiotic overdose, requests for larger quantities than prescribed, and a pregnancy contraindication. In both countries, these risks were rarely identified. No e-pharmacy identified the contraindication in the late-pregnancy NSAID scenario. Only a small minority identified antibiotic dosing errors (a scenario tested only in Kenya) or challenged requests for larger quantities than prescribed.

Safety checks

When prescription-only medicines were dispensed, no pre-dispensing safety checks for concurrent medications, contraindications, pregnancy, or breastfeeding were conducted by e-pharmacies in Kenya. In India, checks for allergies were conducted in 13% of orders, but checks for other medications or contraindications occurred in less than 1% of cases.

Patient medicine information and counselling

There were cross-country differences in the provision of written information about dispensed medicines. Kenyan platforms were substantially more likely to include dosing instructions and product information leaflets, which were rarely provided in India.



Better performance among market leading e-pharmacies

In both countries, performance was not uniform across platforms. E-pharmacies in the top quartile by website traffic (market leaders) were two to three times more likely to provide correct pharmacy care than less-visited platforms.

In adjusted analyses controlling for scenario category and medicine type, market leaders in India had two-fold higher odds of correct pharmacy care (adjusted odds ratio 1.95, 95% CI 0.84–4.50), and the association was stronger among market leaders in Kenya (adjusted odds ratio 3.52, 95% CI 1.31–9.45).

These findings suggest that risk-based regulatory approaches, prioritising oversight of smaller or less-established platforms, may be appropriate.

Comparison with brick-and-mortar pharmacies

The parallel standardised patient study in brick-and-mortar pharmacies enabled a direct comparison of pharmacy practices with those of e-pharmacies.

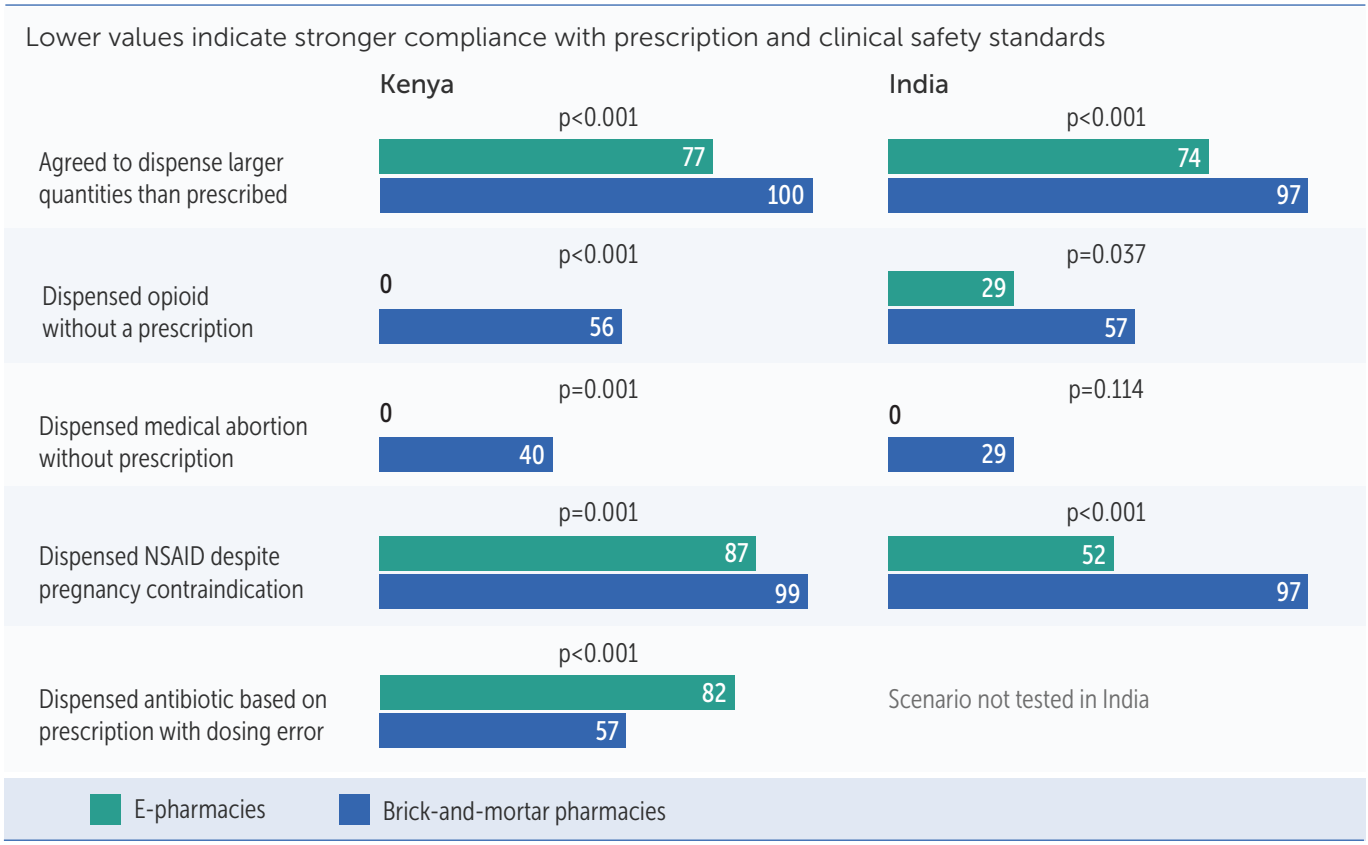
The findings indicate that weaknesses in prescription enforcement and pharmacy care are systemic across the retail pharmacy sector, rather than unique to e-pharmacies.

Across scenarios involving requests without a prescription or with clinical risks, e-pharmacies were less likely than brick-and-mortar pharmacies to dispense inappropriately (for visits where the product was available) (Figure 4). In these scenarios, dispensing always represents incorrect pharmacy care. For example, when presented with a request for a larger quantity of antibiotics than prescribed, brick-and-mortar pharmacies dispensed in 97% of visits in India and 100% in Kenya. In contrast, e-pharmacies dispensed in 74% of cases in India and 77% in Kenya.

Similarly, for medical abortion medicines requested without a prescription, there were no instances of inappropriate dispensing in e-pharmacies, whereas brick-and-mortar pharmacies dispensed without a prescription in 29% of visits in India and 40% in Kenya.

Despite these differences, both sectors performed poorly in both countries on core elements of pharmacy care. Pre-dispensing safety checks were rare or absent across both online and in-person settings.

Figure 4: Percentage of visits with inappropriate dispensing in high-risk scenarios, by sector and country



Implications and insights for regulators and researchers

Revisiting assumptions about e-pharmacy risk

The findings challenge the perception that e-pharmacies are inherently more risky than brick-and-mortar pharmacies. In several scenarios involving requests without a prescription or pharmacy care issues, e-pharmacies were less likely than brick-and-mortar pharmacies to dispense medicines inappropriately. However, the near-total absence of pre-dispensing safety checks and clinical risk detection across both delivery models indicates that patient safety risks are not unique to either sector. Instead, these deficiencies reflect broader systemic weaknesses across the entire retail pharmacy sector.

Heterogeneity within the e-pharmacy sector

Performance was not uniform across online platforms. Market-leading e-pharmacies were significantly more likely to manage visits correctly and to adhere to regulatory standards and clinical guidelines than less-visited platforms. This evidence supports a risk-based approach to e-pharmacy regulation that prioritises oversight of smaller or less-established platforms, while potentially partnering with market leaders to raise standards through peer influence and modelling best practice.

Formal regulation does not necessarily translate into safer practice

Evidence from India and Kenya demonstrates that having formal regulations does not automatically translate to safer pharmacy practices. Despite Kenya's relatively comprehensive e-pharmacy framework and India's lack of e-pharmacy regulations, observed practices were poor in both countries across several domains, particularly in managing clinical risks. This disconnect highlights the importance of empirically assessing regulatory compliance in real-world pharmacy settings, as formal rules alone do not guarantee patient safety.

Standardised patient method as a research and regulatory tool

The research demonstrates that standardised patient methodology can be applied at scale in both online and offline pharmacy settings. The approach enables a structured assessment of the full patient journey – from initial search for a product through to dispensing and delivery – allowing for direct comparison across geographies and delivery models. Beyond research, the standardised patient methodology could support regulatory monitoring, offering a scalable way for authorities to monitor compliance and enforce safety standards under routine conditions.

Future research directions

Standardised patient methods could be used in future research in several ways, including:

- evaluating whether the growth of e-pharmacies in LMICs has improved equitable access to quality pharmacy care across dimensions such as availability, geographic accessibility, affordability, medicine quality, and rational dispensing;
- assessing the effectiveness of specific regulatory strengthening measures and how changes in regulation influence practice over time;
- examining the quality of care within growing telemedicine markets, particularly as telemedicine and e-pharmacy platforms become increasingly integrated.

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Authors: Benjamin Palafox, Sammy Masibo, Sasi Kumar Tiruttani, Victor Mulelo, Darian Alufwani, Krishna Nandakumar, Shwetha Rajaram, Benta Ng'ang'a, Anshika Mittal, Gautam Satheesh, Abdul Salam, Francis Wafula, Catherine Goodman

For more information please contact Benjamin Palafox, Research Fellow in Health Systems, London School of Hygiene & Tropical Medicine (email: benjamin.palafox@lshtm.ac.uk)

www.lshtm.ac.uk/research/centres-projects-groups/regulating-e-pharmacy

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