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Are interventions for improving the quality of services provided by specialized drug shops effective in sub-Saharan Africa? A systematic review of the literature

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Abstract

Purpose. We set out to determine effectiveness of interventions for improving the quality of services provided by specialized drug shops in sub-Saharan Africa.

Data sources. We searched PubMed, CAB Abstracts, Web of Science, PsycINFO and Eldis databases and websites for organizations such as WHO and Management Sciences for Health. Finally, we searched manually through the references of retrieved articles.

Study selection. Our search strategy included randomized trials, time-series studies and before and after studies evaluating six interventions; education, peer review, reorganizing administrative structures, incentives, regulation and legislation.

Data extraction. We extracted information on design features, participants, interventions and outcomes assessed studies for methodological quality, and extracted results, all using uniform checklists.

Results of data synthesis. We obtained 10 studies, all implementing educational interventions. Outcome measures were heterogeneous and included knowledge, communication and dispensing practices. Education improved knowledge across studies, but gave mixed results on communication between sellers and clients, dispensing of appropriate treatments and referring of patients to health facilities. Profit incentives appeared to constrain behaviour change in certain instances, although cases of shops adopting practices at the expense of sales revenue were also reported.

Conclusion. Evidence suggests that knowledge and practices of pharmacies and drug shops can be improved across a range of diseases and countries/regions, although variations were reported across studies. Profit incentives appear to bear some influence on the level of success of interventions. More work is required to extend the geographical base of evidence, investigate cost-effectiveness and evaluate sustainability of interventions over periods longer than 1 year.

Keywords: quality improvement, patient-provider communication/information, developing countries, pharmacy, training/education

Introduction

Private providers are an increasingly important source of treatment in developing countries [1, 2], contributing as much as 80% of health provision in some countries [3] and absorbing up to 83% of total expenditure on health [4]. Studies have shown them to be common sources of treatment for malaria [5, 6], sexually transmitted infections (STIs) [7] and acute respiratory infections (ARIs) [8] among others. Many of these encounters are not with private clinicians, but with medicine retailers, who are popular for their proximity, expediency, flexibility in operating hours and responsiveness to client demands among other reasons [8–10].

Medicine retailers vary across countries, but two main categories can be identified; shops that specialize in selling medicines and those that sell medicines alongside general

household merchandise. We term the former specialized drug shops (SDSs). We further classify SDSs into four types; pharmacist-run pharmacies (PRPs), non-PRPs (NPRPs), unregistered drug shops and community-owned drug shops. As the name suggests, PRPs (commonly referred to as 'pharmacies') are operated by graduate pharmacists and licensed to sell both prescription medicines and over-the-counter medicines.

Sub-Saharan Africa (SSA) suffers from very low numbers of trained pharmacists overall. As a result, pharmacies tend to be few in number and clustered in larger towns, thus failing to meet the need for medicines in many rural areas [11, 12]. Consequently, many countries license non-pharmacists to operate special cadres of shops (NPRPs) and dispense a limited range of medicines subject to meeting certain requirements. However, it is quite common to find these shops selling prescription medicines illegally [13]. Unregistered drug shops are fairly common in SSA [13] and are categorized separately to differentiate them from the legally recognized NPRPs. The final category consists of not-for-profit drug shops managed by communities through revolving funds. NPRPs are commonly referred to as 'drug shops', although the term also refers to unregistered and community-owned drug shops in some literature.

Pharmacies in SSA tend to be relatively large establishments with several staff, and a wider range of medicines compared with NPRPs. The latter often operate out of just one or two rooms, and their staff have lower-level health qualifications, such as nurse assistant or pharmacy technician [13]. Pharmacies are more common in urban areas, whereas NPRPs operate mainly in rural and peri-urban areas. In SSA, such drug shops are often the most widely used source of medicine, providing an alternative avenue through which essential treatments can be provided to the public.

Although SDSs remain popular, there is evidence of regulatory infringements such as dispensing prescription medicines without prescription and selling sub-therapeutic quantities of drugs [9, 14]. To address such inadequacies, a range of interventions have been implemented. We

conducted this review to assess the effectiveness of interventions for improving the quality of services provided by SDSs in SSA. We focus on SSA given the distinctive nature of its retail pharmaceutical sector due to the small number of trained pharmacists and the large role of NPRPs.

Review methodology

Scope of review and methods for identification of studies

Black and Gruen [15] categorized interventions for improving the quality of health services into six areas: education, feedback, incentives, reorganizing administrative structures, regulation and legislation. We adopted the Black and Gruen classification in this review for its breadth, thus allowing us to develop a comprehensive search strategy. We excluded studies targeting general shops, community-owned shops and pharmacies located within health facilities. We considered primarily randomized controlled trials (RCTs), interrupted time-series studies and before and after studies. We included uncontrolled before and after (UBA) studies alongside the more rigorous controlled before and after (CBA) designs due to the limited number of evaluations overall. Finally, we considered evaluations reporting any objective outcome related to improvement in the quality of services provided by the shops.

An exploratory PubMed search facilitated identification of search terms and elaboration of a search strategy (Table 1), which we subsequently applied to PubMed, CAB Abstracts, Web of Science, PsycINFO, id21 and Eldis databases. We searched websites for the International Network for the Rational Use of Drugs, e-Drug, WHO Essential Medicines and Management Sciences for Health for references to relevant articles. We conducted cited-reference searches in the Web of Science database to identify studies written by experts on the topic and those citing other relevant studies. Finally, we searched manually through references of all retrieved articles.

Table 1 Search terms applied in electronic databases

Group A: target population (combined by 'OR')	Group B: geographic location (combined by 'OR')	Group C: interventions (combined by 'OR')
drug retailer*	Third World Countr*	feedback
medicine retailer*	Less-Developed Countr*	educat*, train*
pharmacy	Sub-Saharan Africa*	regulat*, accred*, licens*, certificat*
pharmacies	low-and middle income countr*	legisl*
drug shop*	Developing countries [MeSH]	inspect*
medicine shop*	Africa South of the Sahara [MeSH]	motivat*, incentiv*
drug seller*	[List of Sub-Saharan African countries]	supervis*
medicine seller*		peer influenc*
drug vendor*		Feedback [MeSH]
medicine vendor*		Education [MeSH]
drug store*		Social Control, Formal [MeSH]
medicine store*		Government Regulation [MeSH]
Pharmacies [MeSH]		Facility Regulation and Control [MeSH]

Methods of review

The search initially identified 557 articles (final search: 15 April 2009), of which 548 were discarded for failure to meet the review criteria. The remaining nine articles, reporting 10 studies, were all included. We extracted information on study design features, participants, interventions and main outcomes and assessed each study for methodological quality using EPOC guidelines (http://www.epoc.cochrane.org/en/handsearchers.html; Table 2). Areas assessed included the randomization processes (for RCTs), blinding of outcome assessors (where applicable), completeness of follow-up of participants, presence of baseline measurement and protection against contamination. Finally, we extracted results and reported key outcomes (Table 3). The studies were heterogeneous in terms of interventions and outcomes, making attempts to calculate overall effect sizes inappropriate. Consequently, we undertook a structured narrative synthesis.

Results

Study characteristics

There was one RCT [16], one non-randomized single-site cross-over study [17] and eight before and after studies, four having contemporaneous controls [18–21] and four having no controls [7, 22, 23]. Four evaluations were conducted in Nigeria, two each in Ghana and Uganda, and one each in Tanzania and Kenya. Eight studies were conducted after the year 2000. Five evaluations targeted PRPs exclusively [7, 17, 18, 20, 23], whereas four focused on NPRPs [16, 19, 22]. One study included both PRPs and NPRPs [21]. Education was the primary intervention in all 10 studies, with seven describing the provision of information, education and communication (IEC) materials as part of the intervention. In one evaluation, training was implemented through negotiation sessions between moderators and patent medicine vendors (PMVs) [22]. Only four studies described the training sessions as interactive [16, 20–22]; the rest did not adequately describe the training model. No evaluations of the other five intervention types were identified, although the negotiation-based training model implemented in Uganda can also be classified under 'feedback'. The simulated client methodology was used, either alone or alongside questionnaire surveys, to assess SDS practices in 8 of the 10 evaluations. Only Oparah *et al.* and Aguwa *et al.* did not use simulated clients.

With regard to the study quality, all 10 studies had baseline measurements. Follow-up of participants was well-described and relatively high (over 80% generally) in majority of studies. All four CBA studies described the characteristics of control sites, a practice recommended by EPOC. On the other hand, the RCT neither described randomization processes nor explained whether or how protection against contamination was done. The study did, however, report blinding of outcome assessors.

The studies were considerably heterogeneous in the outcomes they reported (Table 3). Eight reported outcomes on

knowledge of disease signs and symptoms [16, 17, 19–23], seven on communication with clients [16, 18–22], six on treatment of diseases [7, 16, 18, 21, 22], four on patient referral [7, 21, 22], three reported changes in selling of certain medicines [16, 20, 21] and two reported on costs of medicines [7, 18]. None reported on the cost-effectiveness of the interventions. Eight studies used tracer diseases of infectious origin. These were malaria (reported in three studies), STIs [3], ARIs [3], diarrhoea [3] and colds and guinea worm (one study each). The two evaluations that did not include tracer infectious diseases used hypertension [17, 23]. Evaluation periods varied across studies with three doing evaluations immediately or 1 month post-intervention [19–21], six after 2–6 months [16–18, 22, 23] and one after ~1 year [7]. None of the studies had evaluation periods longer than 1 year.

Study findings

Knowledge of attendants. An evaluation in Kenya reported improvement in pharmacy attendants' knowledge on appropriateness of antibiotics for diarrhoea and signs of bacterial diarrhoea following an educational intervention ($P < 0.05$ in both) [20]. Two evaluations done 12 years apart also reported improvement in the knowledge of PMVs in Nigeria. The first evaluation found improvement in knowledge scores on management and referral for various diseases ($P < 0.001$) [19], whereas the latter reported improved knowledge on signs of severe malaria and ways of preventing the disease ($P < 0.01$) [22]. In Tanzania, trained attendants performed better in 8 of 10 questions testing knowledge on antimalarials, antibiotics and diarrhoea medicines and measures for reducing fever in children ($P < 0.01$) [16].

Communication with clients. There was improvement in counselling of STI patients on partner notification in Ghana ($P < 0.05$) [18], and taking patient history and providing advice on use of insecticide-treated bednets (ITNs) in Nigeria and Uganda ($P < 0.01$ in both) [22]. In another Nigerian evaluation, the proportion of PMVs indicating that they could explain medication use to clients increased after training, although inference values were not provided [19]. In Tanzania, 95% of attendants from intervention shops asked about sick children's age compared with 60% in the control ($P < 0.01$) [16]. The same study reported better post-intervention performance in inquiring about sick children's symptoms and duration of illness before recommending treatment ($P < 0.01$).

On the other hand, education failed to increase the number of questions clients seeking care for diarrhoea in Kenyan pharmacies were asked [20] and did not improve history taking for ARI in Ugandan pharmacies and drug shops [21]. The latter study also failed to report improvement in provision of medication instructions to caregivers. In Ghana, training did not significantly improve counselling of STI patients on condom use [18].

Treatment and referral of patients. Educational interventions significantly reduced inappropriate dispensing of medicines in Tanzania, Kenya and Nigeria [16, 20, 22]. In Kenya, the sale of anti-diarrhoeal medicines (not usually recommended)

Table 2 Description and methodological quality of studies

Ref. No.	Study	Location	Design	Participants (number evaluated)	Intervention	Methodological quality
18	Adu-Sarkodie *et al.* (2000)	Ghana	CBA	Pharmacies (*n* = 100)	Training staff on STIs	BL-done, B-done, PC-nc, CC-done, F/U-done
17	Aguwa and Ukwe (2008)	Nigeria	Cross-over	Patients visiting one pharmacy (*n* = 24)	Training pharmacy staff on pharmaceutical care	BL-done, B-nd, F/U-nc
22	Greer *et al.* (2004)	Nigeria	UBA	Patent medicine vendors (*n* = 247)	Training, IEC materials, certification, public education, launch of pre-packed antimalarials	BL-done, F/U-done, B-N/A
22	Greer *et al.* (2004)	Uganda	UBA	Patent medicine vendors (*n* = 138)	Negotiating behaviour change for management of fever in children	BL-done, F/U-nc, B-N/A
7	Mayhew *et al.* (2001)	Ghana	UBA	Pharmacies (*n* = 248)	Training (1 day) on STIs	BL-done, F/U-done; B-N/A
16	Nsimba (2007)	Tanzania	RCT	Drug shops (*n* = 40)	Training, IEC materials, control received IEC only	AC-nc, F/U-nc, B-nc, BL-done, PC-nc
23	Oparah *et al.* (2006)	Nigeria	UBA	Patients visiting one pharmacy (*n* = 36)	Training pharmacy staff on pharmaceutical care	BL-done, F/U-nc, B-N/A
19	Oshiname and Brieger (1992)	Nigeria	CBA	Patent medicine vendors (*n* = 37)	Training on counselling, signs, prevention and referral	BL-done, B-nd, PC-nc, F/U-nc, CC-done
20	Ross-Degnan *et al.* (1996)	Kenya	CBA	Pharmacies (*n* = 107)	IECs and face-to-face educational outreaches	BL-done, B-done, F/U-done, PC-done, CC-done
21	Tumwikirize *et al.* (2004)	Uganda	CBA	Pharmacies and drug shops (*n* = 191)	Face-to-face training and IEC materials	BL-done, B-nc, PC-nc, CC-done, F/U-done

CBA, controlled before and after; UBA, uncontrolled before and after; RCT, randomized controlled trial; AC, allocation concealment; B, blinding; BL, baseline; CC, characteristics of controls described; F/U, follow-up; nc, not clear; N/A, not applicable; PC, protection against contamination.

Table 3 Summary of study findings

Ref. No.	Study (year)	Study outcomes (evaluation period)	No. of measures (No. significant at $P < 0.05$)	Key significant outcomes
18	Adu-Sarkodie et al (2000)	Management of STI (6–8 months)	3 (3)	Improvement in partner notification, counselling on condoms and proper treatment of STIs
17	Aguwa and Ukwe (2008)	Patient compliance, blood pressure, lifestyle, knowledge and client satisfaction (5 months)	15 (9)	Improvement in blood pressure, lifestyle, knowledge on disease, adherence to drugs, detection of drug problems, physical health and social relationships
22	Greer et al (2004)	Uptake of pre-packaged drugs, knowledge, communication and treatment (4 months)	25 (21)	Improvement in knowledge on bednets, signs and symptoms of severe childhood illness, history taking and giving correct treatment for malaria in children
22	Greer et al (2004)	Advice on correct medicine and dose, ITN use, history taking and referral (2 months)	12 (7)	Improvement in recommending right drug and dose, giving instructions on how to take drugs for simple malaria, advising on ITNs and referring patients
7	Mayhew et al (2001)	Management of STI (~1 year)	10 (not clear)	Improvement in managing urethral discharge, some improvement in patient referral, little change in management of genital ulcers and related conditions
16	Nsimba, E (2007)	Use of national treatment guidelines (6 months)	10 (not clear)	Improvement in providing correct treatment for diarrhoea, ARI, colds and fever
23	Oparah et al (2006)	Patient compliance, blood pressure, knowledge and satisfaction (6 months)	56 (not clear)	Improvement in blood pressure, compliance scores, knowledge on hypertension and risk factors, and patient satisfaction
19	Oshiname and Brieger (1992)	Knowledge on signs, counselling and prevention (immediate)	2 (2)	Pre- and post-improvement in overall questionnaire score in the intervention arm; post-training improvement in intervention arm significant compared to control
20	Ross-Degnan et al (1996)	Knowledge, communication and sales (2–4 weeks)	21 (10)	Improvement in knowledge on causes, treatment and referral of diarrhoea; selling of appropriate drugs and communication with patients on diarrhoea
21	Tumwikirize et al (2004)	Patient assessment and, dispensing practices of pharmacies and drug shops (1 month)	28 (3)	Improvement in asking questions on cough, prescribing correct antibiotic for ARI and reduced dispensing of cough syrups. No improvement in majority of outcomes

declined, with the reduction among pharmacies within the capital city (Nairobi) being significant at the 95% level (−19%; 95% CI: −36 to −3), whereas in Tanzania, 85% of clients who visited intervention shops got an appropriate antimalarial drug compared with 55% in the control group ($P < 0.01$). The latter study also reported reduction in the inappropriate sale of antibiotics for cough, although the decline corresponded with a large increase in the sale of cough mixtures (80% increase in intervention shops compared with 20% in the control) [16]. Whereas the number of PMVs recommending correct doses of antimalarials increased from 9% to 53% in Nigeria ($P < 0.01$), fewer attendants recommended correct treatments for both simple and complicated malaria after negotiations sessions in Uganda ($P < 0.01$ in both cases) [22]. Another Ugandan evaluation found education effective in improving the dispensing of antibiotics for severe ARI ($P = 0.001$), although a concomitant decline in referral of severely ill children ($P = 0.004$) pointed to the possibility that by improving attendants' knowledge, the intervention inadvertently resulted in more shops treating, rather than referring severely ill children as required by policy [21]. Opposite trends were reported in Ghana, Nigeria and elsewhere in Uganda, with staff referring patients more readily post-intervention. Trained PMVs referred severely ill patients more frequently in Nigeria and Uganda [22], whereas in Ghana, they were more likely to refer patients with genital ulcers [7]. With regard to sale of medicines, education reduced the sale of antimalarials without prescription in Tanzania, although the practice remained prevalent overall at 43% and 80% in intervention and control shops, respectively [16]. The same evaluation underscored the impact of client demand on dispensing practices. Simulated clients were three times more likely to get a drug they requested if they visited a control rather than intervention shop (36% compared with 13%; no P-values), suggesting that education may have empowered sellers to refuse client requests for drugs in certain instances.

Patient-based outcomes. An evaluation of a pharmaceutical care intervention for hypertensive patients visiting a pharmacy in Nigeria, reported improved patient satisfaction in two domains; 'friendly explanation' and 'managed care' [23]. A similar study elsewhere in Nigeria reported improvement in health-related quality of life scores for hypertensive patients, particularly in the domains of 'physical health' and 'social relationships', following implementation of pharmaceutical care training [17]. Both evaluations further reported improvement in patient compliance-rated scores ($P = 0.001$ for Aguwa *et al.* and $P = 0.006$ for Oparah *et al.*), signifying post-intervention improvement in compliance to treatment. Finally, patient knowledge on risk factors, drug-related problems and management of hypertension improved significantly following the intervention in both studies. This presumably contributed to improvement in patient satisfaction and quality of life scores.

Amount of money spent on medicines. There were no significant differences between intervention and control groups with regard to the amount of money spent purchasing medicines in Ghanaian pharmacies [18]. Similarly, another evaluation in Ghana reported no significant differences in prices of medicines before and after training [7].

Discussion

Recent years have witnessed increased recognition of the importance and inadequacies of SDS in public health, with several interventions being implemented to improve their performance across a wide range of disease areas and countries [24, 25]. This increase in recognition is reflected in the review, with 8 of the 10 evaluations having been conducted over the last decade. Although the complete absence of evaluations from Francophone states may reflect a weakness in our search strategy, it is more likely that there are few evaluations on the topic from these countries overall, an observation also made in a previous review on a related topic [13]. This could be a reflection of more negative attitudes towards less qualified providers on the part of the medical communities in these countries.

Interventions have been directed at improving outcomes such as attendant knowledge and practices, with majority targeting pharmacies rather than drug shops, despite the fact that the latter form the vast majority of SDSs in SSA [13]. Of the six types of interventions introduced earlier, only education has been implemented in SSA according to articles reviewed. The popularity of training as an intervention for pharmacies is reflected in another review that focused more broadly on developing countries, although regulation and peer review were reported to be fairly common as well [25]. The preference for combining training and IEC materials concurs with findings from a review that found multi-faceted interventions more effective than stand-alone ones [26]. Majority of studies used simulated clients to study practices of SDSs, reflecting the advantages of this method in minimizing observer bias [27, 28].

The relatively small number of evaluations included in this review may not reflect the number of initiatives implemented to improve the impact of SDSs. Other initiatives launched in recent years include Accredited Drug Dispensing Outlets (ADDOs) in Tanzania [29], CareShops in Ghana [30] and clinical social franchising initiatives including BlueStar and ProFam programmes in several African states [31]. However, evaluations meeting our inclusion criteria were not identified for these programmes.

Aside from the overall scarcity of studies on the topic, there are concerns over how well evaluations were conducted. The RCT article failed to adequately describe key processes such as randomization and controlling for contamination, making it difficult to infer quality of evidence. CBA and UBA study designs were better reported, with all having baseline measurements and CBA studies having some description of characteristics of control sites. However, the relatively short follow-up periods remains a major concern, as it makes it difficult to gauge long-term effectiveness of educational interventions for SDSs. Furthermore, evaluations targeting staff with different levels of training failed to

separately report impacts of interventions on the different cadres, thus making it difficult to identify staff with the greatest potential to benefit. Lastly, the limited number of evaluations, coupled with wide variations in reporting outcomes, made it inappropriate to analyse patterns of effects across geographical location, disease types or length of follow-up periods.

Despite the limitations described, it is possible to draw some tentative conclusions. The general improvement in outcome indicators across majority of studies suggests that knowledge and practices of SDS staff can be improved through education. Although majority of studies showed mixed results across outcomes, findings related to change in knowledge were positive across all studies, indicating that education does improve knowledge of SDS attendants. With regard to communication, there was improvement in counselling and advising of patients overall. However, findings on patient history taking were mixed, with success in Tanzania, but not Uganda for instance. This discrepancy could not be explored further due to the limited number of studies. Another inconsistency that could not be explored in-depth was the impact the client demand has on practices of attendants. Whereas one evaluation inferred that education can significantly reduce the likelihood of attendants acceding to client demands, another study found it ineffective in encouraging attendants to question clients seeking to buy medicines without prescription. With regard to providing recommended treatments, education was beneficial in majority of evaluations. However, it also emerged that there could potentially arise conflict between policy objectives if proposed roles of SDSs vis-à-vis other providers were not clearly outlined at the onset. In this review for instance, education improved attendants' choice of treatments for severe ARI in Ugandan children, but inadvertently resulted in more shops opting to treat rather than refer the severely ill children. Such task-shifting phenomena could happen in cases where objectives of interventions are not clearly spelt out at the outset. The need to tailor interventions to reflect broader policy objectives with regard to the roles of retailers has been voiced in another review looking at interventions for improving malaria treatment in children [24].

The importance of profit among SDSs was underscored in the Tanzanian study, where a decline in the sale of antibiotics for cough corresponded with an increase in the sale of cough mixtures, despite the fact that such multi-ingredient preparations have unproven efficacy. Such perverse behaviours (substituting between products) could nullify policy gains if not adequately considered when designing interventions for private-for-profit groups. Profit may also have been a constraining factor in Kenya and Uganda, where shop attendants dispensed treatments without asking appropriate questions. Although profit incentives appeared to constrain positive change or encourage perverse outcomes, there were cases of SDSs adopting practices that seemed to reduce sales. In Uganda, Nigeria and Ghana, for instance, increased referral rates were reported post-intervention, and in Tanzania, trained sellers were less likely to accede to client requests for medicines. These outcomes highlight the importance of factors beyond profit incentives in influencing practices of SDSs [32]. Although findings of this nature may be particularly encouraging, short evaluation periods make assessment of sustainability difficult.

More evaluations need to focus on other interventions such as regulation, incentives and peer-review strategies. Studies also need to focus on non-pharmacy types of SDSs frequently found in rural areas of SSA. These shops, whose legal stature varies from country to country, are not acknowledged by some governments, despite their role as the primary *de facto* providers of medicines and treatment advice in majority of rural areas. Finally, the overriding issue of a general lack of independent and rigorous impact evaluations needs to be addressed to ensure policymakers and development partners invest in programs that actually work.

Conclusion

There is evidence that knowledge and practices of SDSs can be improved across a wide range of diseases and geographical areas, although there were variations across studies. Profit incentives appear to influence the success of educational interventions in some, but not all cases. However, outcome patterns could not be explored across studies in detail due to the limited number of studies overall. Further evaluations are needed to extend the geographical base of evidence, investigate cost-effectiveness, determine sustainability of interventions over longer periods and evaluate other types of interventions.

Funding

References

1. World Bank. *World Development Report 1997—The state in a changing world*. Washington, DC: World Bank, 1997.

2. Zwi A, Brugha R, Smith E. Private health care in developing countries—if it is to work, it must start from what users need. *Br Med J* 2001;**323**:463–4.

3. Hanson K, Berman P. Private health care provision in developing countries: a preliminary analysis of levels and composition. *Health Policy Plan* 1998;**13**:195–211.

4. Marzolf J. *The Indonesian Private Health Sector: Opportunities for Reform. An Analysis of Obstacles and Constraints to Growth*. Washington, DC: World Bank, 2002.

5. Foster S. Treatment of malaria outside the formal health services. *J Trop Med Hyg* 1995;**98**:29–34.

6. Goodman CA. An economic analysis of the retail market for fever and malaria treatment in rural Tanzania. *Ph.D. Thesis.* Department of Public Health and Policy, London School of Hygiene and Tropical Medicine, University of London 2004.

7. Mayhew S, Nzambi K, Pepin J *et al.* Pharmacists' role in managing sexually transmitted infections: policy issues and options for Ghana. *Health Policy Plan* 2001;**16**:152−60.

8. Chuc NT, Larsson M, Falkenberg T *et al.* Management of childhood acute respiratory infections at private pharmacies in Vietnam. *Ann Pharmacother* 2001;**35**:1283−8.

9. Stenson B, Syhakhang L, Eriksson B *et al.* Real world pharmacy: assessing the quality of private pharmacy practice in the Lao People's Democratic Republic. *Soc Sci Med* 2001;**52**:393−404.

10. Van der Geest S. Self-care and the informal sale of drugs in south Cameroon. *Soc Sci Med* 1987;**25**:293−305.

11. Battersby A, Goodman C, Abondo C *et al. Improving the Supply, Distribution and Use of Antimalarial Drugs by the Private Sector in Tanzania.* London: Malaria Consortium, 2003.

12. Jacobs B, Whitworth J, Kambugu F *et al.* Sexually transmitted disease management in Uganda's private-for-profit formal and informal sector and compliance with treatment. *Sex Transm Dis* 2004;**31**:650−4.

13. 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.

14. Trostle J. Inappropriate distribution of medicines by professionals in developing countries. *Soc Sci Med* 1996;**42**:1117−20.

15. Black N, Gruen R. *Understanding Health Services.* Maidenhead: Open University Press, 2005.

16. Nsimba SE. Assessing the impact of educational intervention for improving management of malaria and other childhood illnesses in Kibaha District-Tanzania. *East Afr J Public Health* 2007;**4**:5−11.

17. Aguwa CN, Ukwe CV, Ekwunife OI. Effect of pharmaceutical care programme on blood pressure and quality of life in a Nigerian pharmacy. *Pharm World Sci* 2008;**30**:107−10.

18. Adu-Sarkodie Y, Steiner MJ, Attafuah J *et al.* Syndromic management of urethral discharge in Ghanaian pharmacies. *Sex Transm Infect* 2000;**76**:439−42.

19. Oshiname FO, Brieger WR. Primary care training for patent medicine vendors in rural Nigeria. *Soc Sci Med* 1992;**35**:1477−84.

20. Ross-Degnan D, Soumerai SB, Goel PK *et al.* The impact of face-to-face educational outreach on diarrhoea treatment in pharmacies. *Health Policy Plan* 1996;**11**:308−18.

21. Tumwikirize WA, Ekwaru PJ, Mohammed K *et al.* Impact of a face-to-face educational intervention on improving the management of acute respiratory infections in private pharmacies and drug shops in Uganda. *East Afr Med J* 2004; **Suppl**:S25−S32.

22. Greer G, Akinpelumi A, Madueke L *et al. Improving Management of Childhood Malaria in Nigeria and Uganda by Improving Practices of Patent Medicine Vendors.* Arlington, VA: BASICS II for the United States Agency for International Development, 2004.

23. Oparah AC, Adje DU, Enato EFO. Outcomes of pharmaceutical care intervention to hypertensive patients in a Nigerian community pharmacy. *Int J Pharm Pract* 2006;**14**:115−22.

24. Brieger W, Unwin A, Greer G *et al. Interventions to Improve the Role of Medicine Sellers in Malaria Case Management for Children in Africa.* London, UK and Arlington, VA, USA: The Malaria Consortium and BASICS for the United States Agency for International Development; Prepared for Roll Back Malaria's Sub-group for Communication and Training and Malaria Case Management Working Group, 2004.

25. Smith F. Private local pharmacies in low- and middle-income countries: a review of interventions to enhance their role in public health. *Trop Med Int Health* 2009;**14**:362−72.

26. Gross PA, Pujat D. Implementing practice guidelines for appropriate antimicrobial usage: a systematic review. *Med Care* 2001;**39**:II55−II69.

27. Madden JM, Quick JD, Ross-Degnan D *et al.* Undercover careseekers: simulated clients in the study of health provider behavior in developing countries. *Soc Sci Med* 1997;**45**: 1465−82.

28. Watson M, Norris P, Granas A. A systematic review of the use of simulated patients and pharmacy practice research. *Int J Pharm Pract* 2006;**14**:83−93.

29. Health Research for Action. *Review of the Accredited Drug Dispensing Outlets (ADDO) Roll out Programme in Tanzania.* Report by Health Research for Action (HERA), 19 March 2006.

30. Segrè J, Tran J. *What Works: CareShop Ghana Improving Access to Basic Drugs Through Conversion Franchising.* World Resources Institute, 2008. www.wri.org/publication/what-works-careshop-ghana (July 2009, date last accessed).

31. Montagu D *et al. Clinical Social Franchising: An Annual Compendium of Programs, 2009.* San Francisco: The Global Health Group, Global Health Sciences, University of California San Francisco, 2009.

32. Goel P, Ross-Degnan D, Berman P *et al.* Retail pharmacies in developing countries: a behavior and intervention framework. *Soc Sci Med* 1996;**42**:1155−61.