Published by Oxford University Press in association with The London School of Hygiene and Tropical Medicine
Health Policy and Planning 2015;**30**:i59–i74
doi:10.1093/heapol/czu115

The quality of outpatient primary care in public and private sectors in Sri Lanka—how well do patient perceptions match reality and what are the implications?

Ravindra P Rannan-Eliya,* Nilmini Wijemanne, Isuru K Liyanage, Janaki Jayanthan, Shanti Dalpatadu, Sarasi Amarasinghe and Chamara Anuranga

Institute for Health Policy, Colombo, Sri Lanka

*Corresponding author. Institute for Health Policy, 72 Park Street, Colombo 2, Sri Lanka. E-mail: raviofficelk@gmail.com

Accepted 5 September 2014

Objective To compare the quality of clinical care and patient satisfaction in public and private outpatient primary care services in Sri Lanka.

Methods A prospective, cross-sectional comparison was done by direct observation of patient encounters and exit interviews of outpatients in 10 public hospital general outpatient clinics and 66 private practitioner clinics in three districts of Sri Lanka. A total of 1027 public sector patients and 944 private sector patients were surveyed. Data were collected for 39 quality indicators covering diarrhoea, cough, hypertension, diabetes, asthma, upper respiratory tract infections (URTI) and five other conditions, along with prescribing indicators. The exit interviews collected data for 10 patient satisfaction indicators.

Results The public sector performed better for some conditions (diarrhoea, cough and asthma) and the private sector performed better for others (hypertension, diabetes, URTI and tonsillitis). Overall quality was similar between the sectors in the domains of history taking, examination and investigations and management, but the private sector performed much better on patient education (57 vs 12%). Overall patient satisfaction was high in both sectors (98%), although the private sector performed much better in interpersonal satisfaction (94 vs 84%) and system-related indicators (95 vs 84%). Comparisons with studies from other countries suggest that both sectors perform considerably better than India, and similarly in many indicators to high-income countries.

Conclusions Quality of outpatient primary care in Sri Lanka is generally high for a lower-middle income developing country. The public and private sectors perform similarly, except that private sector patients have longer consultations, are more likely to receive education and advice, and obtain better interpersonal satisfaction. The public system, with its limited funding, is able to deliver care in diagnosis and management that is similar to the private sector, while private sector patients, who spend more on their healthcare receive better quality care in non-clinical areas.

Keywords Asthma, hospitals, maternal care, outpatient care, patient satisfaction, private sector, quality of clinical care, quality measurement, Sri Lanka

KEY MESSAGES

- In Sri Lanka, quality of outpatient primary care in the public sector is better than the private in the technical aspects of care, such as history, examination, investigations and management, but is worse than the private sector in the areas of patient education and interpersonal satisfaction.
- Despite low levels of healthcare spending, quality of outpatient primary clinical care in Sri Lanka is relatively high, and approaches that in high-income countries. This high level of clinical quality adds to the observation of high volumes of medical care as explanations for Sri Lanka's exceptional outcomes.
- In Sri Lanka, richer patients preferentially use private services, and poorer patients use public services, but this segregation is achieved without creating significant inequity in clinical quality of outpatient care.
- Government policy in Sri Lanka has maximized equity of access to quantity and clinical quality of care, at the expense of equity in access to consumer and interpersonal aspects of care, which may be the optimal outcome given resource constraints.

Introduction

In almost all low- and middle-income countries (LMICs), a mix of public and private providers provides medical care, and private providers often dominate in outpatient care (Berendes *et al.* 2011; Rannan-Eliya *et al.* 2012). Where public provision is subsidized, patients seek private care often because of perceptions of better amenities and quality, and patients tend to be richer than those who do not. The appropriate role of private providers in mixed healthcare systems engenders considerable, often ideological, debate, but ultimately policy implications depend on knowing, within the context of particular health systems, the differences between public and private providers in whom they treat, the relative costs to patients and society, quality of care, and the feasibility and costs of potential policy interventions. Quality of care matters primarily because of its impact on eventual health outcomes. However, whilst significant information exists on who uses private providers and what it costs in different countries, there is limited evidence on differences in the clinical quality of outpatient care that patients receive in public and private settings in LMICs (Berendes *et al.* 2011), and also how such differences relate to patient perceptions. One reason is the methodological challenges that researchers have faced in measuring quality in such settings at reasonable cost.

To address this gap in evidence and to better characterize the nature of mixed healthcare delivery in one LMIC, this study examines variations in clinical quality and patient assessment of quality of outpatient primary care in public and private settings in Sri Lanka, and in doing so demonstrates a new approach to measuring quality in developing country settings. The health system in Sri Lanka is known for delivering high volumes of clinical services at relatively low cost (Rannan-Eliya and Sikurajapathy 2008), but whether this is at the expense of quality is not known.

Using a range of quality indicators based on direct observation, we assessed quality of clinical care in samples of 1027 public and 944 private primary care outpatients treated during 2012 in 10 public hospitals and 66 private general practitioner clinics in three districts of Sri Lanka. We also assessed patient perceptions using exit interviews.

The setting

Sri Lanka is a lower-middle income country of 20.3 million people (2012) [Department of Census and Statistics (DCS) 2013], with three-quarters still residing in rural areas. The country spent 3.4% of gross domestic product (GDP) on healthcare in 2011, or an average of US$97 per capita, of which 58% was from private sources, mostly out-of-pocket spending. Outpatient expenditures amounted to 20% of healthcare expenditures (Amarasinghe *et al.* 2013). For a country with a per capita GD of US$2923 in 2012 (World Bank 2014), health outcomes are exceptional, with infant mortality reaching 11 deaths per 1000 live births and life expectancy at birth 75 years (World Health Organization 2013).

The Ministry of Health (MOH) and nine provincial departments of health provide free or nearly free medical services to the whole population through an extensive network of government hospitals and clinics. At the top end are teaching and specialist hospitals, and just beneath them provincial and base hospitals, which act as referral hospitals and provide a less extensive range of specialist services. Below them are a range of facilities ranging from district hospitals (basic secondary services) to freestanding clinics run by medical officers, midwives and nurses. In practice, public facilities at all levels provide outpatient primary care services through general outpatient clinics. However, patients can choose to pay for treatment at private hospitals and clinics, which account for around half of all outpatient care and 4% of inpatient admissions (Amarasinghe *et al.* 2013; Department of Census and Statistics and Ministry of Finance and Planning 2011). Qualified healthcare professionals provide almost all private care.

Overall utilization of outpatient services is high for a lower-middle income country, averaging 4–5 outpatient consultations with physicians per person a year, higher than some Organization for Economic Co-operation and Development (OECD) nations (OECD/World Health Organization 2012). There is a positive income gradient in use of private providers for outpatient care, with the richest quintile of people accounting for 32% of all private sector visits. However, utilization of public sector outpatient services is pro-poor, with the poorest quintile accounting for 28% of all outpatient visits (Amarasinghe *et al.* 2013).

In government hospitals and clinics, doctors, nurses and other staff are all paid fixed salaries, and the price for routine outpatient treatment is zero. MOH healthcare institutions have fixed operating budgets, and major inputs such as clinical personnel; medicines and supplies are largely determined centrally and provided to them.

Most private outpatient primary care is provided by private ambulatory clinics, with the rest provided by private hospitals. Government medical officers doing private practice in their off-duty hours provide the bulk of private primary outpatient care, but they are supplemented by a smaller number of full-time private general practitioners, who were estimated to number around 1200 in 2000 (Rannan-Eliya *et al.* 2003)—no reliable, more recent estimates being available. Specialist outpatient care is also available in the private sector, chiefly in private hospitals, with staffing being similarly dominated by government medical officers. Private patients pay private doctors and hospitals on a fee-for-service basis, with most also dispensing medicines. Most private clinics are operated on a solo practitioner basis (Rannan-Eliya *et al.* 2003).

Medical and dental professionals in Sri Lanka must be registered with the Sri Lanka Medical Council to practice, and this is enforced in practice. In contrast, the health ministry generally has a laissez-faire attitude to private sector provision, and the main regulatory function has been delegated to a joint government-industry regulatory authority, where there is evidence of industry capture (Amarasinghe *et al.* 2013). This authority—the Private Health Services Regulatory Council (PHSRC)—requires private sector clinics and hospitals to be licensed, but the reality is that the PHSRC makes minimal effort to enforce compliance, and large numbers of providers do not obtain or renew their licenses as required.

Methods

Development of quality indicators

We assessed the quality of outpatient primary medical care by measuring a range of quality indicators in the treatment of individual patients, and across samples of patients treated by individual providers. Data for these indicators were collected prospectively by direct observation of actual patient consultations, and by conducting exit interviews of patients. We opted for direct observation rather than looking at medical records, since many doctors do not keep consultation records, and when they do their content is neither standardized nor detailed.

Data about observed patient consultations were collected using a patient encounter record (PER) instrument (available upon request from the author), which was a modified version of a form developed earlier in the Sri Lanka Private Clinic Survey (SLPCS) 2000, which was a survey of general practices in 2000 by Rannan-Eliya *et al.* (2003). The SLPCS PER was based on forms used in the Bettering the Evaluation and Care of Health (BEACH) survey, the Australian National Survey of Outpatient Morbidity (Australian Institute of Health and Welfare 2001), and in the United States (US) National Ambulatory Medical Care Survey (National Center for Health Statistics 2002), and the SLPCS adaptation proved feasible and relevant to the Sri Lankan context. The PER collected data on the reasons for encounter (RFE) as expressed by the patient, diagnoses by the physician, physician actions such as examination and education, investigations ordered and medications prescribed. Additionally, to aid comparisons with recent studies of quality of primary care providers in India (Das and Hammer 2004; Das *et al.* 2012), data on whether physicians asked specific history questions were collected for patients with diarrhoea and cough.

Although one of our motivations was to compare quality with other countries, a major methodological problem that we encountered was that a comprehensive literature review was unable to identify any previous, similar studies in a developing country that looked at quality of clinical treatment across all conditions and patients in the outpatient setting, so we were not able to make use of an existing set of quality measures. As we wanted to identify indicators that could be determined from the PER for conditions commonly encountered in primary care, we looked for potential quality indicators by extensively reviewing indicators listed in the United States National Quality Measures Clearinghouse (Agency for Healthcare Research and Quality 2012), and identified indicators, which covered diabetes, hypertension, asthma and pregnancy. As shown in Supplementary Table S1, these conditions were expected to have reasonable numbers of patients, based on data from the SLPCS. In 2000, 13% of all patient RFEs were due to cough, and 1.8% were due to diarrhoea. Asthma comprised 6.6%, hypertension 4.8%, diabetes 1.7% and conditions related to pregnancy 1.1% of all physician diagnoses. We also obtained drug prescribing indicators from the widely used Beer's criteria for potentially inappropriate medication use in older adults (Fick *et al.* 2003); from a study of polypharmacy in the elderly (Gnjidic *et al.* 2012); and from indicators proposed in the International Network for Rational Use of Drugs (INRUD) guidelines (Shankar 2009). Where available, we confirmed that indicators were consistent with national guidelines developed by the Sri Lanka Medical Association and the Ministry of Healthcare and Nutrition (2007). A panel of Sri Lankan physicians then reviewed the short-listed quality indicators to determine whether they were relevant to the Sri Lankan context.

Following completion of the fieldwork, we became aware of a series of studies in the United States (McGlynn *et al.* 2003; Asch *et al.* 2004), England (Steel *et al.* 2008) and Australia (Runciman *et al.* 2012) that used the RAND Quality Assessment Tools system (Kerr 2000a,b; McGlynn, Damberg, *et al.* 2000; McGlynn, Kerr, *et al.* 2000). The RAND tool is methodologically comparable to our study design and several of the indicators from these studies could be applied to our study from the data we had collected, so we were able to expand the number of conditions covered to include upper respiratory tract infections (URTI), tonsillitis, hypercholesterolemia, pregnancy, dyspepsia and lower back pain. Although this represents a modification of the study's original analysis plan, this should not introduce any bias or negative-impact interpretation of the results, because the RAND study design is essentially identical to ours, and all this did was to increase the number of conditions for which indicators could be generated from the already collected data.

There were 39 indicators that were used in the final analysis. Of these, 34 covered what we term conditions, which consisted

of specific symptoms, complaints or diagnoses (diarrhoea 7, cough 4, hypertension 7, diabetes 6, asthma 3, pregnancy 2, and 1 each for URTI, tonsillitis, dyspepsia, lower back pain and hypercholesterolemia), and 5 were drug prescribing indicators. When categorized by clinical function, six of the indicators were related to history taking, seven to examination, 20 to investigation, management and drug prescribing and six to patient education. An example indicator is shown for each diagnosis and clinical area in Table 1, with the full details of all the indicators given in Supplementary Table S2.

Patient satisfaction

We conducted exit interviews of the patients whose consultations we observed, after they completed their encounter with the doctor and if they were willing to participate. We used a structured questionnaire to ask about their satisfaction with three domains of care: technical, interpersonal and system, and to collect information about their demographics and household characteristics, including assets owned. The questions for the three patient satisfaction domains were developed from other patient surveys in Australia, United Kingdom and Cyprus (State Government of Victoria 2011; NHS 2011; Hanson *et al.* 2004). The questions were pilot-tested to check comprehensibility and relevance before being finalized. The final patient satisfaction indicators used are shown in Table 2.

Sampling

Given budget constraints, a fully nationally representative study of quality of outpatient care covering all regions and major provider types in the country was not feasible, so we restricted our study scope to look only at outpatient primary care, and adopted a convenience sampling design to reflect as much of the most important variations in health service delivery context in Sri Lanka. Part of our motivation was to demonstrate that systematic assessment of quality of care would be feasible at the national level.

The study was conducted in three districts (out of 24) located in two provinces (out of nine) of Sri Lanka. These consisted of Colombo, the largely urban and most developed district of the country in which the capital is located, and the one with the largest population (11%); Gampaha, the neighbouring, semi-urban and next most populated (11%) district; and Galle, a mostly rural district in the south of the country with 5% of the national population, and where average incomes are just less than and the poverty headcount just greater than the national average (Department of Census and Statistics and Ministry of Finance and Planning 2011). These allowed us to sample three of the major ecological settings (high income/urban; high income/semi-urban and average income/rural) in which health services are delivered in Sri Lanka. The excluded settings included the less developed parts of the central hill zone, and the eastern, northern and north-central parts of the country's dry zone, which together account for one quarter of the country's population. Whilst the sample cannot be said to be nationally representative, the findings can be taken as indicative of the quality of healthcare received by the bulk of Sri Lanka's population, i.e. those living in the urban, semi-urban and typical rural areas.

To ensure that we were looking at comparable public and private providers, we restricted our study to private practitioner clinics in the private sector, and general outpatient department (GOPD) clinics in public sector teaching and base hospitals, both of which provide outpatient primary care. This excluded specialist clinics in public and private hospitals. The provider types we chose account for three-quarters of all outpatient consultations in the three districts, and the bulk of all outpatient primary care in the country. We were unable to cover districts elsewhere in the country or lower-level MOH providers due to budgetary constraints.

We sampled 66 private general practitioner clinics from a list of private clinics that had ever registered with the PHSRC, which was obtained from an analysis of the PHSRC's licensing records. Sampling was stratified by district, and by whether the clinic was registered as a full-time private practitioner clinic, or part-time practitioner clinic (which in most cases will be a government medical officer engaged in private practice). Although compliance with the PHSRC annual registration requirements is poorly enforced, most private clinics have obtained a license at least once.

To obtain a comparable set of public clinics, we first stratified all MOH hospitals by type, size and complexity (large general—MOH teaching hospitals; intermediate general—MOH base hospitals; obstetric; paediatric; all other specialist and lower level MOH hospitals) and selected a sample of 10 MOH hospitals by district from the first two strata through stratified random sampling. In these hospitals, we systematically sampled patients using the GOPD clinics, excluding patients visiting specialist clinics.

The MOH endorsed the study, and requested sampled hospitals and clinics to participate. Any sampled public hospital or private practitioner clinic that refused to participate was replaced by another provider randomly sampled from the same stratum, but only one public hospital and eight private practitioner clinics refused to participate. Clinics at a total of 10 public hospitals and 66 private practitioner clinics were eventually sampled and included in the study. Full details of the provider strata and final samples are given in Table 3 and Table 4.

Data collection

Field investigators, who were pre-intern medical graduates, systematically sampled the next available patient waiting at sampled clinics, prior to them being seen by the doctor, to obtain informed consent to include them in the study. The sex and estimated age of the few who refused were noted. For those who agreed, the investigator accompanied them into the consultation and observed the proceedings without participation. Following the consultation with the physician, the same investigator conducted an exit interview of the same patient after they had left the consultation room. Typically, investigators sampled patients at each clinic throughout one half-day session. All fieldwork was conducted during September to November 2012.

Investigators collected data using Apple iPad tablet computers, which allowed for pre-coding of patient RFEs and common conditions, use of a medicines database to look up and rapidly enter names of medicines, and standard data validity checks. Once the data were collected, a physician reviewed and

Table 1 Examples of quality of care indicators used in study

Condition	Indicator	Clinical area
Diarrhoea	Patient asked about fever	History
Cough	Physician performed a physical examination	Examination
Hypertension	Advice on compliance to medications	Education
Diabetes	Physician gave dietary advice	Education
Hypercholesterolemia	Statin prescribed	Investigation and management
Asthma	Peak expiratory flow rate measured	Investigation and management
Pregnancy	Advice on pregnancy given	Education
Dyspepsia	Prescribed a proton pump inhibitor	Investigation and management
Lower back pain	Patients with acute lower back pain not prescribed any of: dexamethasone, oral steroids, colchicine or antidepressants	Investigation and management
Other	Patients 65 years or older prescribed <5 drugs	Investigation and management

Note: A full list of all indicators is included in Supplementary Table S2.

Table 2 Indicators of patient satisfaction used in survey

Indicator of satisfaction	Possible answers
Technical domain	
Satisfaction that doctor knew enough about illness	very dissatisfied, dissatisfied, neither satisfied nor dissatisfied, **satisfied, very satisfied**
Satisfaction that the doctor gave the correct treatment or performed the correct action	very dissatisfied, dissatisfied, neither satisfied nor dissatisfied, **satisfied, very satisfied**
Interpersonal domain	
Doctor answered questions asked	none of my questions, some of my questions, **all of my questions**
Felt able to ask as many questions as needed	**yes**, no
Rating of doctor's explanation of treatment	very poor, poor, fair, **good, very good**
Doctor's ability to communicate in a language understood by the patient	very poor, poor, fair, **good, very good**
Rating of the courtesy of the doctor	very poor, poor, fair, **good, very good**
System domain	
Appropriateness of time spent with doctor	too little time, too much time, **right amount of time**
Rating of overall cleanliness of facility	very poor, poor, fair, **good, very good**
Satisfaction overall with visit	very dissatisfied, dissatisfied, neither satisfied nor dissatisfied, **satisfied, very satisfied**

Note: Possible answers in bold were taken as meaning the patient was 'satisfied' with the indicator.

Table 3 Size of provider strata and study samples nationally and by district

Strata	All facilities				Sampled facilities			
	National	Colombo	Gampaha	Galle	Colombo	Gampaha	Galle	Total
Public large	9	2	1	1	1	1	1	**3**
Public intermediate	20	3	1	2	2	1	1	**4**
Public obstetric	4	2	0	1	1	0	1	**2**
Public paediatric	2	1	0	0	1	0	0	**1**
Public other specialist and lower level	962	42	67	47				
All public sector clinics	**997**	**50**	**69**	**51**	**5**	**2**	**3**	**10**
All registered private sector clinics	**1667**	**404**	**237**	**75**	**27**	**25**	**14**	**66**

Source: Management Development and Planning Unit (2011) and Amarasinghe *et al.* (2013).

Table 4 Comparative statistics of public sector outpatient services in sampled facility strata and all public facilities in study districts, 2011

Strata	Number	Outpatient consultations /year (million)	Mean cost per consultation (rupees)
Colombo	8	5.5	314
Gampaha	2	2.0	216
Galle	4	1.6	354
All public hospital OPD in the 3 districts	171	11.8	328

Source: Management Development and Planning Unit (2011) and Institute for Health Policy (2013).

Note: OPD = outpatient department. District-level data for sampled hospitals refer to public hospital outpatient departments in sampled strata (large, intermediate, obstetric and paediatric facilities only) and includes general OPD clinics and specialist clinics. The combined three district aggregates refer to all public facilities in the three districts, including hospitals from non-sampled strata. Cost per consultation refers to budgetary outpatient expenditures for public facilities.

recoded, if necessary, the patient RFEs and physician diagnoses using the International Classification of Primary Care, version 2 (ICPC-2; World Organization of National Colleges Academies and Academic Associations of General Practitioners/Family Physicians Classification Committee 1998), and a second physician independently verified this coding.

The study design was reviewed and received ethical clearance by the Institute for Health Policy's Institutional Ethical Review Committee (ERC Decision Number 06 B/2012).

Statistical analysis

All analyses were performed using Stata, version 12.1 (StataCorp 2011). Each opportunity that a patient could potentially receive the care recommended by our list of indicators was called a 'quality instance'. We determined whether the recommended care had taken place for each quality instance. For patient satisfaction indicators, we counted each time a patient recorded a positive response.

Whilst this produces a large number of scored individual quality instances, we need to aggregate them to assess overall quality. However, there is no single, simple way of generating a composite score for a group of quality indicators. Many methods exist, some involving the application of advanced statistical methods, such as item-response modeling (Campbell *et al.* 2001), but no method is ideal in terms of robustness, consistency and ease of interpretability (Reeves *et al.* 2007). In the absence of an ideal approach in the literature to constructing a composite indicator, we followed the method of Asch *et al.* (2004), and calculated aggregate indicator scores for types of care by dividing the total number of times recommended care was given for each quality instance relevant to the type of care by the total number of quality instances relevant to the type of care. This method, also called the 'Overall Percentage' method has been assessed to be the best for comparing different healthcare organizations if the patient mix is similar or if comparing similar types of care (Reeves *et al.* 2007).

Scores were expressed as percentages (0–100%), and we calculated standard errors using bootstrap methods as our data was clustered. Bootstrapping is a simple way of estimating measures of accuracy, such as standard error, by resampling from the dataset, when a formula-based or parametric approach is not feasible. A similar method was used for producing aggregate patient satisfaction scores.

Sampling weights were applied to patients in the public sector to represent all GOPD patients in the sampled hospital strata in the three districts from which the samples were drawn. For the private sector, sampling weights were applied to represent the total estimated number of patients visiting private general practitioners in the three districts. When making public–private comparisons, we also used weights to standardize the private sector sample to match the public sector sample, by gender and by age categories (0–4, 5–14, 15–29, 30–44, 45–59, 60–74 and >75 years). We did not standardize for disease type, as we wanted quality indicators to be inherently weighted by how often each quality instance occurred when calculating aggregate scores.

We used the data on household assets to estimate the relative level of socioeconomic status (SES) of each patient. This was done by applying principle components analysis to the same list of household assets collected in the Household Income and Expenditure Survey (HIES) 2009–10 (Department of Census and Statistics 2009), to estimate appropriate weights for each asset. These weights, which were estimated using only data from the three districts, were then applied to the assets collected in the exit interviews to estimate the relative SES ranking of the sampled patients in reference to the combined population of the three districts.

We used *t*-tests to compare aggregate quality scores between the public sector and standardized private sector samples for overall quality and subsets of quality indicators associated with history; examination; investigation and management; and patient education.

Results

Characteristics of the study sample

Of the patients who were approached, 1005 (97.9%) out of 1027 public sector patients and 943 (99.9%) out of 944 private sector patients agreed to have their consultation observed. Of these, 989 (98.4%) in the public sector and 915 (97.0%) in the private sector also agreed to participate in the exit interview. Analysis of the estimated age and sex of patients who refused to

Table 5 Characteristics of public and private sector patient samples

Characteristic	Weighted, unstandardized		Weighted, standardized		Standardized *P* value
	Public Sector ($n = 1027$)	Private Sector ($n = 944$)	Public Sector ($n = 1027$)	Private Sector ($n = 944$)	
Average age (years)	32.2	35.4	32.2	32.1	0.99
Male sex (%)	35.2	45.6	35.2	35.3	0.97
Commonest diagnoses by physician (%)					
Upper respiratory infection acute	11.2	19.7	11.2	20.1	0.02
Fever	15.1	9.2	15.1	8.8	0.06
Hypertension uncomplicated	6.4	3.2	6.4	4.2	0.48
Muscle pain	7.1	1.3	7.1	1.3	0.03
Diabetes non-insulin dependent	5.3	2.3	5.3	2.7	0.35
Asthma	2.9	4.0	2.9	5.1	0.18
Cystitis/urinary infection other	5.3	1.0	5.3	0.9	0.01
Abdominal pain epigastric	3.4	2.3	3.4	1.7	0.05
Gastroenteritis presumed infection	2.1	3.5	2.1	2.9	0.58
Cough	4.6	0.2	4.6	0.1	0.01
Conditions of interest (%)					
Diarrhoea	1.9	3.5	1.9	2.5	0.70
Cough	20.8	23.4	20.8	23.8	0.52
Hypertension	6.8	5.5	6.8	6.4	0.88
Diabetes	5.3	2.7	5.3	3.0	0.35
Asthma	2.9	4.0	2.9	5.1	0.17
Pregnancy	5.9	0.7	5.9	0.7	0.28
Upper respiratory tract infection	11.2	18.9	11.2	19.9	0.03
Tonsillitis	0.5	0.3	0.5	0.2	0.42
Hypercholesterolemia	2.5	0.1	2.5	0.1	0.04
Dyspepsia	0.1	0.6	0.1	0.6	0.09
Back pain	0.8	2.1	0.8	2.3	0.02
Any conditions of interest	41.2	42.7	41.2	44.5	0.61
SES (%)					
Poorest SES tertile	29.1	14.2	29.1	14.1	0.01
Middle SES tertile	42.2	37.2	42.2	38.8	0.39
Richest SES tertile	28.6	48.6	28.6	47.1	0.00
Ethnicity (%)					
Sinhala	84.2	72.3	84.2	72.0	0.02
Tamil	4.3	14.4	4.3	13.1	0.02
Muslim	3.7	6.5	3.7	8.7	0.18
Length of consultation (min)	3.1	7.8	3.1	7.8	0.00

Note: Conditions of interest refer to those symptoms, complaints or diagnoses for which the study had quality indicators, and include patient reasons for encounter for cough, diarrhoea, hypertension, diabetes and pregnancy. The percentages of physician diagnoses coded as cough or hypertension differ from the percentages shown in 'conditions of interest' because the latter also includes both patient reasons for encounter and actual diagnoses, which do not have to be consistent. Some patients may have more than one condition of interest, so the total for any condition is not equal to the sum of individual conditions. *P* values calculated using bootstrapped standard errors.

participate did not find any significant differences from those who did participate.

A total of 1971 patients were finally included in the study, and their characteristics by sector are shown in Table 5. More patients in the public sector were from lower socioeconomic groups and more patients in the private sector were from higher socioeconomic groups. After standardization, there were no significant differences in age, sex or ethnicity. The top two

Table 6 Comparison of quality of clinical care between public and private sectors in weighted, standardized samples

Indicator category	Indicators, *n*	Public			Private			Difference (95% CI) *percentage points*
		Patients, *n*	Eligible Events, *n*	Mean score, %	Patients, *n*	Eligible Events, *n*	Mean score, %	
Overall	39	475	2239	65.1	477	2038	64.5	0.6 (−6.8 to 8.0)
Disease category								
Diarrhoea	7	20	134	77.8	24	161	58.5	19.2 (0.0 to 38.5)
Cough	4	214	807	75.2	225	839	65.6	9.6 (−0.2 to 19.4)
Hypertension	7	79	401	67.9	71	303	72.4	−4.4 (−12.9 to 4.0)
Diabetes	6	54	326	33.8	28	169	54.7	−20.9 (−34.8 to −7.1)**
Asthma	3	30	89	58.9	48	145	53.7	5.2 (−7.3 to 17.6)
Pregnancy	2	61	122	48.7	7	14	48.2	0.6 (−41.4 to 42.5)
URTI	1	115	115	32.4	188	188	40.7	−8.3 (−36.1 to 19.5)
Other specific conditions	4	39	39	78.9	30	30	87.3	−8.4 (−30.1 to 13.3)
Clinical area								
History	6	234	653	72.1	247	684	65.2	6.9 (−5.9 to 19.7)
Examination	7	399	478	86.2	362	440	69.4	16.8 (7.4 to 26.2)***
Investigation and management	20	321	745	71.6	431	703	63.0	8.5 (1.1 to 15.9)*
Education	6	157	364	11.8	86	211	56.9	−45.2 (−61.7 to −28.6)***

Note: Weighted and standardized for age and sex. Significance of difference indicated by $*P < 0.05$, $**P < 0.01$, $***P < 0.001$. 95% confidence intervals (CI) calculated using bootstrapped standard errors.

diagnoses (ICPC-2 categories) identified by physicians were acute upper respiratory infection and fever in both sectors, although the distribution varied. There were no significant differences in the distribution of patients by conditions of interest, except for URTI, hypercholesterolemia and back pain ($P < 0.05$). The mean length of consultation in the private sector (7.8 min) was more than double that in the public sector (3.1 min). Out of the 1971 patients surveyed, quality indicators could be generated for 952 (48%). They yielded a total of 4277 quality instances, based on 39 indicators.

Comparisons of quality of clinical care between public and private sectors

Amalgamated quality scores, with comparisons between the public sector sample and the private sector sample, which were standardized for age and gender to match the public sector sample, are shown in Table 6. The overall quality aggregate was the same in both sectors (65%). Performance was mixed for aggregate scores by patient condition, with the public sector performing better for patients with diarrhoea, cough and asthma, while the private sector performed better for patients with hypertension, diabetes and URTI. However, none of these differences were statistically significant, with the exception of diabetes ($P < 0.01$).

The public sector performed better than the private sector in the domains of history taking (72 vs 65%) and investigation and management (72 vs 63%), but only the latter was statistically significant ($P < 0.05$). The public sector performed much better in patient examination (86 vs 69%; $P < 0.001$). A much larger opposite difference was seen in patient education, with private sector patients far more likely to receive information and education on their diagnosed condition and its management than public sector patients (57 vs 12%; $P < 0.001$).

Since disparities in quality of care can be an important component of overall disparities in access to care, we examined how quality of care differs by SES level and by ethnicity. In general, the same quality differences between public and private sectors observed overall and in specific clinical domains were also replicated in patients of different SES levels and in patients of different ethnic groups. Overall quality is similar in both sectors for all SES tertiles and ethnic groups (Table 7), and the same differences also exist in specific domains, with quality of examination and investigation better in the public sector for all groups, and substantially worse for patient education.

When quality disparities between patients of different SES tertiles were examined within each sector, some interesting differences emerge (Table 8). In the public sector, patients from the richest tertile received worse quality in several clinical areas, resulting in their overall score being 5% less than that of the lowest tertile in the public sector ($P < 0.01$). No such systematic differences were seen when quality of care was analysed within sectors by ethnicity (Supplementary Table S3).

We further investigated whether the observed differences in levels of patient education provided in the two sectors was related to the differences in patient mix by using regression analysis to control for observable patient characteristics. This found that the relationship demonstrated between higher patient education scores and being treated in the private sector remained statistically highly significant even after

Table 7 Differences in quality of clinical care between public and private sectors by patient SES and ethnicity

Indicator category and tertile of SES	Indicators, *n*	Public			Private			Difference (95% CI) *percentage points*
		Patients, *n*	Eligible Events, *n*	Mean score, %	Patients, *n*	Eligible Events, *n*	Mean score, %	
Examination								
Poorest SES tertile	7	100	114	92.5	50	65	69.1	23.4 (8.6 to 38.2)**
Middle SES tertile	7	173	212	88.6	147	188	64.3	24.4 (14.2 to 34.5)***
Richest SES tertile	7	126	152	78.0	165	188	74.6	3.4 (−14.1 to 20.9)
Sinhala	7	329	400	85.7	264	308	65.2	20.5 (6.7 to 34.4)**
Tamil	7	22	24	90.8	51	62	79.3	11.5 (−19.0 to 42.1)
Muslim	7	21	22	90.5	31	50	75.0	15.5 (−2.2 to 33.2)
Investigation and management								
Poorest SES tertile	20	84	195	76.9	56	94	57.2	19.7 (2.4 to 37.1)*
Middle SES tertile	20	153	347	70.3	191	290	62.3	8.0 (−3.3 to 19.3)
Richest SES tertile	20	84	203	68.6	184	318	65.5	3.1 (−4.9 to 11.2)
Sinhala	20	288	679	70.9	307	499	64.4	6.5 (−2.0 to 15.0)
Tamil	20	6	16	64.6	61	114	48.8	15.8 (−16.1 to 47.7)
Muslim	20	16	33	81.0	42	60	82.0	−0.9 (−21.7 to 19.8)
Education								
Poorest SES tertile	6	38	88	12.4	11	30	40.7	−38.8 (−60.4 to −17.2)***
Middle SES tertile	6	67	163	11.3	33	81	61.2	−46.7 (−74.0 to −19.4)**
Richest SES tertile	6	52	112	11.9	42	100	58.3	−46.4 (−67.4 to −25.4)***
Sinhala	6	146	345	12.2	56	130	58.9	−46.7 (−64.4 to −28.9)***
Tamil	6	2	5	9.9	17	52	61.2	−51.3 (−94.5 to −8.2)*
Muslim	6	6	10	0.0	3	5	68.9	−68.9 (−121.4 to −16.4)*
Overall								
Poorest SES tertile	39	130	556	69.1	62	286	59.0	10.1 (−3.6 to 23.8)
Middle SES tertile	39	197	1015	63.6	208	819	65.2	−1.6 (−8.9 to 5.7)
Richest SES tertile	39	148	669	64.1	206	933	65.6	−1.5 (−10.3 to 7.4)
Sinhala	39	401	1926	63.3	336	1453	65.3	−1.9 (−8.7 to 4.9)
Tamil	39	22	101	73.1	65	318	61.6	11.4 (−5.8 to 28.7)
Muslim	39	23	103	72.0	52	178	67.7	4.3 (−14.3 to 23.0)

Note: Weighted and standardized for age and sex. Significance of difference indicated by $*P < 0.05$, $**P < 0.01$, $***P < 0.001$. 95% confidence intervals calculated using bootstrapped standard errors. Differences in history domain not shown, but none were significant at $P < 0.05$.

controlling for patient's age, sex, SES, education level and consultation time (detailed results in Supplementary Table S4). This suggests that the greater level of patient education provided is intrinsic to the private sector, and not a function of the different patient mix in each sector.

Comparisons of quality of clinical care between districts

Amalgamated quality scores, with comparisons between the three districts for each of the two sectors, having standardized the private sector sample for age and gender to match the public sector sample, are shown in Table 9.

The overall public sector quality score was marginally worse in Gampaha than in Colombo (difference of 11.3%, $P < 0.05$), but the difference in Galle was not statistically significant. There were no significant differences detected in any of the process domains. In contrast, the overall private sector quality score was significantly better in Galle than Colombo (difference of 14.9%; $P < 0.01$), with no difference in Gampaha. The higher scores in Galle were driven by better scores across the three domains of history taking, examination and investigation.

Table 8 Differences in quality of care within public and private sectors by patient status

Indicator category	Indicators, *n*	SES Tertile	Public			Private		
			Patients, *n*	Eligible Events, *n*	Difference in score from reference group, % (95% CI)	Patients, *n*	Eligible Events, *n*	Difference in score from reference group, % (95% CI)
History	6	Poorest	59	158	0.0	34	97	0.0
		Middle	103	293	−7.8 (−14.6 to −0.9)*	95	260	10.6 (0.4 to 20.8)*
		Richest	72	202	3.5 (−8.4 to 15.3)	118	327	2.9 (−12.7 to 18.5)
Examination	7	Poorest	100	114	0.0	50	65	0.0
		Middle	173	212	−3.8 (−7.3 to −0.4)*	147	188	−4.8 (−21.3 to 11.7)
		Richest	126	152	−14.5 (−27.0 to −2.0)*	165	188	5.5 (−14.5 to 25.5)
Investigation and management	20	Poorest	84	195	0.0	56	94	0.0
		Middle	153	347	−6.6 (−20.0 to 6.8)	191	290	5.1 (−12.5 to 22.7)
		Richest	84	203	−8.2 (−15.8 to −0.7)*	184	318	8.3 (−8.1 to 24.8)
Education	6	Poorest	38	88	0.0	11	30	0.0
		Middle	67	163	−1.0 (−9.7 to 7.6)	33	81	20.4 (−17.3 to 58.1)
		Richest	52	112	−0.5 (−10.0 to 9.1)	42	100	17.6 (−11.5 to 46.6)
Overall	39	Poorest	130	556	0.0	62	286	0.0
		Middle	197	1015	−5.5 (−12.8 to 1.7)	208	819	6.2 (−3.9 to 16.2)
		Richest	148	669	−5.0 (−8.5 to −1.6)**	206	933	6.5 (−3.6 to 16.7)

Note: Weighted and standardized for age and sex. Significance of difference indicated by $*P < 0.05$, $**P < 0.01$, $***P < 0.001$. 95% confidence intervals calculated using bootstrapped standard errors.

Table 9 Differences in quality of care within public and private sectors by district of facility

Indicator category	Indicators, *n*	District	Public			Private		
			Patients, *n*	Eligible Events, *n*	Difference in score from reference group, % (95% CI)	Patients, *n*	Eligible Events, *n*	Difference in score from reference group, % (95% CI)
History	6	Colombo (reference)	165	454	0.0	152	415	0.0
		Gampaha	51	147	−2.2 (−40.1 to 35.7)	81	226	26.6 (13.8 to 39.5)***
		Galle	18	52	−6.7 (−41.6 to 28.3)	15	43	26.3 (10.6 to 41.9)**
Examination	7	Colombo (reference)	212	233	0.0	218	273	0.0
		Gampaha	99	136	−16.8 (−46.4 to 12.8)	115	132	−48.3 (−64.0 to −32.7)***
		Galle	88	109	1.3 (−9.8 to 12.4)	30	35	10.3 (0.3 to 20.2)*
Investigation and management	20	Colombo (reference)	155	283	0.0	277	426	0.0
		Gampaha	103	276	6.6 (−22.5 to 35.7)	112	173	−15.5 (−27.6 to −3.4)*
		Galle	63	186	6.8 (−27.9 to 41.6)	42	104	17.6 (4.8 to 30.4)**
Education	6	Colombo (reference)	44	77	0.0	48	121	0.0
		Gampaha	45	148	−5.1 (−26.5 to 16.2)	23	53	−18.7 (−51.2 to 13.8)
		Galle	67	139	−3.3 (−26.5 to 19.8)	15	37	−1.8 (−41.5 to 38.0)
Overall	39	Colombo (reference)	248	1047	0.0	302	1235	0.0
		Gampaha	124	707	−11.3 (−21.7 to −0.9)*	130	584	−7.3 (−16.7 to 2.0)
		Galle	102	485	−11.7 (−23.7 to 0.3)	45	219	14.9 (6.3 to 23.4)**

Note: Weighted and standardized for age and sex. Significance of difference indicated by $*P < 0.05$, $**P < 0.01$, $***P < 0.001$. 95% confidence intervals calculated using bootstrapped standard errors.

Table 10 Comparison of patient satisfaction between public and private sectors

Domain of satisfaction	Indicators, *n*	Public			Private			Difference (95% CI) *percentage points*
		Patients, *n*	Eligible Events, *n*	Mean score, %	Patients, *n*	Eligible Events, *n*	Mean score, %	
Technical	2	989	1909	97.7	915	1814	96.1	1.6 (0.2 to 3.0)**
Interpersonal	6	989	5825	83.6	915	5444	93.9	−10.2 (−12.6 to −7.9)***
System	2	989	1945	84.1	915	1816	94.8	−10.7 (−17.5 to −4.0)**
Overall satisfaction	1	989	956	98.4	915	907	98.5	−0.1 (−1.6 to 1.4)

Note: Weighted and standardized for age and sex. Significance of difference indicated by $*P < 0.05$, $**P < 0.01$, $***P < 0.001$. 95% confidence intervals calculated using bootstrapped standard errors.

Comparisons of patient satisfaction between public and private sectors

Patients in the public sector reported higher levels of satisfaction with the technical quality of providers than in the private sector: this difference was significant ($P < 0.05$) but small in size (98 vs 96%). However, the private sector performed better in the domains of interpersonal satisfaction (94 vs 84%; $P < 0.001$) and system satisfaction (95 vs 84%; $P < 0.01$). Overall satisfaction was high and similar (98%) in both public and private sectors (Table 10).

Similar patterns were found when differences in patient satisfaction were examined by patient SES and by ethnic group, with all groups of patients ranking the two sector similarly (Supplementary Tables S5 and S6). In addition, no systematic differences in patient satisfaction were observed between patient SES tertiles or ethnic groups within each sector (Supplementary Tables S7 and S8).

Comparisons of quality of care with other countries

By design, our PER instrument collected information on a number of indicators specific to patients with cough, diarrhoea and asthma, to permit comparisons with the results from recent studies of outpatient providers in India by Das *et al.* (2004; 2012). The Indian studies surveyed both qualified and non-qualified providers. To make appropriate comparisons, we compared our results only with the results for the Bachelor of Medicine and Bachelor of Surgery (MBBS)-qualified providers in India, which were kindly shared by Jishnu Das. This comparison revealed much higher levels of quality in the Sri Lankan providers. Providers in both public and private sectors in Sri Lanka performed substantially better that those in India when it came to appropriate history taking in cases of diarrhoea and cough, and appropriate prescribing in patients with asthma. Only in frequency of physical examination and prescription of oral rehydration solution (ORS) were the scores similar (Table 11). However, ORS is readily available over the counter in Sri Lanka, and we hypothesize that patients were either already taking ORS or were advised to do so, rather than being formally prescribed ORS. The Sri Lankan Demographic and Health Survey in 2006–07 found that over 51% of children with diarrhoea were given ORS and 97% of mothers had heard of ORS (Department of Census and Statistics (DCS) and Ministry of Healthcare and Nutrition 2009). These rates are much higher than the equivalent rates (26.0 and 73.0%) reported in the equivalent survey in India (International Institute for Population Sciences (IIPS) and Macro International 2007), which supports this hypothesis.

The comparisons with the work by Das *et al.* only provide a limited assessment of the relative quality of care in the Sri Lankan context. This is because the range of conditions covered in the Indian study was quite limited, and not necessarily representative of the general patient burden in Sri Lanka. The Indian study also used simulated patient methods, so differences might arise owing to design effects.

We also attempted to compare our findings of quality with other countries through a literature search for studies in other countries that reported on specific indicators or conditions. However, we were unable to locate any comparable studies from developing countries, and so no further comparison was possible with these countries.

In contrast, we did find a small number of relevant, although dated, studies from developed countries that allowed us to compare single indicators, and these revealed a mixed picture.

One or both sectors in Sri Lanka generally performed on par with studies from developed countries for indicators related to examination and investigations, such as ordering of fasting blood glucose for diabetics (Dunn and Pickering 1998; Goudswaard *et al.* 2003), measuring blood pressure in pregnant women (Kogan *et al.* 1994). In the area of patient education, the private sector scores were similar to developed countries for indicators relevant to diabetic patients (Reiber *et al.* 2004), but both sectors performed poorly in indicators applicable to hypertensive (Centers for Disease Control and Prevention 1994) and pregnant patients (Kogan *et al.* 1994).

The preceding comparisons use individual indicators from different studies, and do not permit direct comparisons of overall quality. For this comparison using multiple indicators is needed.

This is in fact possible with several of the studies in the USA, Australia and other countries that adopt the approach of the RAND Quality Assessment Tools system. Such a detailed comparison will be reported separately, as it is beyond the scope of this article. However, it indicates that for a common set of indicators, quality of outpatient care in the surveyed Sri Lankan providers was equivalent to the levels found by McGlynn *et al.* (2003) in the USA.

Discussion

Our overall results indicate that the quality of clinical care provided to outpatients in Sri Lanka is substantially better than

Table 11 Comparison of quality indicators in cases of diarrhoea, cough or asthma between Sri Lanka and India MBBS doctors

Indicator	Public sector					Private sector				
	Sri Lanka		India		Difference percentage points	Sri Lanka		India		Difference percentage points
	Eligible events	Mean score (%)	Eligible events	Mean score (%)		Eligible events	Mean score (%)	Eligible events	Mean score (%)	
Diarrhoea indicators										
Asked about fever	20	100.0	41	12.2	87.8***	24	84.4	88	43.1	41.3***
Asked about vomiting	20	100.0	41	14.6	85.4***	24	69.8	88	53.4	16.4
Asked about stool	20	100.0	41	17.1	82.9***	24	97.1	88	25.0	72.1***
Performed a physical examination	20	68.8	41	34.0	34.8*	24	44.0	88	82.9	−38.9***
Prescribed oral rehydration solution	20	26.8	41	39.0	−12.2	24	36.6	88	2.2	34.4***
Cough indicators										
Asked about fever	214	89.0	347	10.9	78.1***	225	80.0	162	20.3	59.7***
Asked about chest pain if older than 4 years	165	27.1	347	3.1	24.0***	163	24.4	162	11.1	13.3***
Asked about expectoration	214	82.3	347	17.3	65.0***	225	74.2	162	20.9	53.3***
Performed a physical examination	214	91.6	347	61.3	30.3***	225	72.6	162	91.9	−19.3***
Asthma indicators										
Appropriate drug prescribed [as per list given in Das (2012)]	30	87.5		31.0	56.5	48	77.3		21.0	56.3

Note: Weighted and standardized for age and sex. Significance of difference between Sri Lankan providers and Indian providers indicated by $*P < 0.05$, $**P < 0.01$, $***P < 0.001$. The India scores for diarrhoea and cough indicators are from the earlier study by Das and Hammer (2004), and the asthma indictors from the more recent Das *et al.* (2012) study. The specific scores for India are for MBBS doctors only and were kindly provided by Jishnu Das.

in India (Das and Hammer 2004; Das *et al.* 2012), but no further comparison with other developing countries was possible owing to the lack of similar studies in the published literature.

For several indicators, e.g. testing blood sugar in diabetics and measuring blood pressure (BP) in pregnant women, quality levels are comparable to those observed in developed nations, but in others falls short, e.g. patient education of hypertensive patients and pregnant patients.

Assuming that quality of care is generally better in developed countries than in developing countries, this contrasts with the general conclusions of other studies that quality of care in outpatient settings in developing countries is poor. Berendes *et al.* (2011) found in their systematic review of 22 developing country studies that had compared clinical quality in public and private ambulatory sectors that the average clinical practice scores reported were 45% in the public sector and 47% in the private sector, compared to the 65 and 64% aggregate scores found in this study in Sri Lanka, although we note that such scores are not strictly comparable. The Sri Lankan study scores also compare favourably with aggregate averages reported from similar studies in the USA and Australia of 55 and 57% of patients receiving 'recommended' or 'appropriate care' (McGlynn *et al.* 2003; Runciman *et al.* 2012), which also underline that even in developed countries doctors frequently do not do the right action. This might be considered remarkable given the low level of health expenditures in Sri Lanka (Amarasinghe *et al.* 2013), and the high volumes of patients seen by formal healthcare providers in Sri Lanka compared to other developing countries (OECD/World Health Organization 2012).

The findings of poor quality in management of some conditions, such as asthma, are of concern. They are consistent with other evidence in Sri Lanka of poor health system performance in management of asthma and other conditions (World Bank 2008). Developing strategies to improve clinical management of asthma and other problem conditions should be a high priority in Sri Lanka. The low levels of patient education imparted by public sector providers reinforces this conclusion with respect to the management of non-communicable diseases, which require effective patient education (Ala 2011). The poor performance of the public sector in this area points to one area where the public sector needs to do substantially better in order obtain better outcomes.

We speculate that two major factors contribute to the findings of similar technical quality, despite quite different financial incentives in the two sectors. The first is the fact that physicians are largely the same in both sectors, or that in the case of full-time private practitioners in Sri Lanka they have almost always trained and have undergone long apprenticeships in the public sector. The second is that physicians' clinical behaviour may heavily be determined by habit and thus persist as they cross between sectors on a daily basis. This would suggest that physician training both before and after qualification is an important area for affecting quality in health services.

Certainly, in the Sri Lankan case effective regulation of the private sector cannot be an explanation for our findings, as we have noted the public sector has demonstrated limited capacity to regulate the private sector, even failing to enforce its limited licensing requirements, and since it currently implements no interventions to monitor or influence quality in the private

sector. Weak state capacity to control the private sector is quite common in developing countries, with enforcement being the Achilles heel of regulation, pointing to the need for alternatives to direct regulation (Mills *et al.* 2006). If our speculation about the critical factors in Sri Lanka is valid, it would imply that investment in training and acculturating competent clinicians in the public sector may be one effective alternative to regulation in ensuring good quality of care in the private sector. This in turn would suggest that the policy choice in Sri Lanka is not between a high quality public and a high quality private sector, but instead that the existence of a high quality private sector depends on the establishment of a high quality public sector.

It is worth discussing some potential concerns and limitations in our study. The first concerns the potential reliability and validity of the quality indicators used. Our reliance on the published literature and a number of clinical guidelines developed through expert consensus and systematic review as the sources for our potential quality indicators provides a strong basis for the content validity of our quality indicators, which was strengthened by their review for appropriateness by local physicians. Further, many of the indicators, we used were also included or sourced directly from the RAND approach, for which a range of evidence exists for reliability and content and predictive validity (Campbell *et al.* 2002).

The method we used to assess the SES level of patients assumes that the asset weights we estimated using the HIES 2009–10 data remained valid in 2012 when we undertook our fieldwork. In practice, this will result in a small upward bias in the estimated SES level, as patterns of asset ownership would have changed (generally for the better) between 2009–10 and 2012. However, for all the assets concerned trends in ownership have been small in recent years, so the impact is considered small. The subsequent HIES 2012–13 survey would have been the ideal data source, but its data had not been released at the time of final analyses.

Another potential concern with our data is that the observations of quality might be biased because doctors might have changed their behaviour as they knew they were being observed. There is no perfect solution to this problem, since we are dependent on actual observation to record data on clinical practices of doctors, who for the most part do not maintain adequate written records in the Sri Lankan context. So collecting data on doctor practices before and after observation is not feasible. However, a study by Leonard and Masatu (2006), which demonstrated the presence of this Hawthorne Effect in clinics in Tanzania, found that the effect wanes over time. They reported that quality of care given by physicians increased when they were being observed, but returned to pre-observation levels between the 10th and 15th consultations. We cannot replicate the same analysis with our data, as we could not collect during a pre-observation phase. However, we analyzed all sessions ($N=29$) that had 15 or more patients, and investigated whether our quality scores changed according to the sequential order of each patient. This found no significant change in quality scores by order of patients in these clinics. Since it is reasonable to expect that any Hawthorne effect is likely to reduce over time and over such numbers of patients, this would be consistent with there being no significant effect, although it does not exclude the possibility. In addition, we note that the participating physicians were not informed the full list of indicators that we were observing (and in fact many indicators were not even known to the field investigators), so we consider it unlikely that they would have been able to alter their behaviour across all possible quality measures. So we conclude that the impact of any Hawthorne effect on our results was likely to be modest or minimal.

Another issue is whether our sample size (4277 quality indicators based on 39 indicators collected from 952 patients) is large enough to draw generalizable conclusions. First, we note that the number of patients is comparable to those deemed acceptable in previously published, national reference studies from developed countries, such as Australia ($N=1154$) and USA ($N=6712$; Runciman *et al.* 2012; McGlynn *et al.* 2003). In contrast, our number of indicators and quality instances is unsurprisingly far fewer (Australia: 522 and 35573; USA 439 and 98649), as this was essentially a demonstration study operating with limited budgetary resources. However, determination of optimal sample sizes is very much an empirical exercise and context specific, as it will depend on a complex set of factors, such as case mix, the specific quality indicators used and the variance in physician practices. We are not in a position to undertake the necessary modelling, as it would require even larger samples than we collected, but other studies do provide some insight. Analyses of similar quality study data by van Doorn-Klomberg *et al.* (2013) have concluded that although relatively large patient samples ($N=100$) are needed to achieve moderate precision (10% points on a performance score) when dealing with individual quality indicators, the required patient numbers decrease significantly ($N<50$) when combining multiple quality indicators into a composite score, as we have done. These findings indicate that our study does have sufficient sample size to be able to generate meaningful comparisons of quality between groups of provider or between major groupings of quality indicator.

A final issue concerns the potential generalizability of our results to the Sri Lankan context, given that data were collected in only three districts. The most likely problem is that because our sample was concentrated in areas that are more affluent, more urbanized, and better provided with health services than average, the findings will overestimate aggregate levels of quality in the country as a whole. Here we note that the analysis of district differences did not support the expectation that quality is better in the more urban and affluent districts, and in fact for private care quality was found to be better in the most rural district, Galle. The lack of substantial public sector quality differences between districts should not be too surprising, given that the centre assigns public sector doctors to districts from a national pool. Although these findings do not overcome the inherent constraints to generalizing from our sample size and design, they make it more likely that our findings do not overstate quality levels in the districts where three-quarters of Sri Lankans live.

Conclusions

Our study assessed clinical quality of outpatient primary care in public and private physician clinics in Sri Lanka, looking

specifically at the domains of history taking, examination, investigations, management and drug prescribing and patient education. This was done in three districts that we argue are likely to be representative of the care received by the bulk of Sri Lanka's population.

Our findings of (1) relatively high quality of clinical care in these three districts; (2) lack of substantial differences in clinical quality received by poor and rich patients and (3) lack of evidence of substantial differences in clinical quality between districts adds to the explanation of the long-standing observation that Sri Lanka achieves good health outcomes despite limited resources (Halstead *et al.* 1985; Rannan-Eliya and Sikurajapathy 2008). Not withstanding the low levels of overall and government health expenditure in Sri Lanka, Sri Lankans benefit from high volumes of relatively high quality outpatient primary care. This complements other research, which has identified high rates of medical service utilization as explaining good health outcomes in Sri Lanka (Caldwell *et al.* 1989; De Silva *et al.* 2001), in demonstrating the importance of curative services and physicians in Sri Lanka's exceptional health outcomes.

Overall quality of care in Sri Lanka is similar in public and private sectors, at least in the types of provider sampled. The major differences are that patients in the private sector receive more time from their physician, and are more likely to be given education and advice about their condition. Patient perceptions are largely consistent with this objective assessment of differences. Patients report better satisfaction with interpersonal quality, physician communication and the amount of time given in the private sector, but rate both sectors equal in technical competency and overall quality.

In Sri Lanka, poor patients rely mostly on public sector care, whilst rich patients rely on private treatment. Treatment expenditures are substantially higher in the private sector, and physicians can spend more time with their patients. Despite this, the overall levels of clinical quality, with the exception of patient education, received by poor patients differ little from that received by rich patients. In the public sector, we found no evidence that poor patients are provided worse quality than rich ones, and in fact our data even found that rich patients receive worse quality in some respects, a finding for which we have no obvious explanation. What private sector patients obtain is better interpersonal quality and physician communication, not necessarily better diagnosis and treatment. This can be considered a reasonable outcome. Government has limited resources, so it must ration what healthcare it finances. In Sri Lanka, it was known before that part of this rationing in outpatient care involved focusing on poorer patients, and letting the better-off voluntarily self-finance care in the private sector (Rannan-Eliya and Sikurajapathy 2008). This study shows that this segregation of patients is achieved without creating significant inequity across most components of clinical quality of care, and that what government constrains for public sector patients is the non-clinical quality aspects of treatment. In effect, government policy has maximized equity of access to quantity and clinical quality of care, at the expense of equity in access to consumer and interpersonal aspects of care. Whilst this may be the optimal outcome given the levels of government spending, it also implies that improving quality of care in domains such as interpersonal satisfaction and patient education will require much greater levels of government spending in the public sector, which poor Sri Lankans depend most on.

Supplementary Data

Supplementary data are available at *HEAPOL* online.

Acknowledgements

The authors thank Dr Ramesh Govindaraj and Dr Kumari Navaratne of the World Bank for their support of this study, Dr Kanthi Ariyaratne of the Ministry of Health for her assistance in facilitating access to the private sector, and they express their appreciation to the directors, staff and patients of the various hospitals and clinics that participated in the study for their co-operation. The authors also thank Dr P Katulanda, Dr ACA Pathirana, Dr AP de Silva, Dr I Piyadigama, Dr N Wijesinghe, Dr Z Gafoor, Dr JC Seneviratne, Dr V Jayasinghe and Dr C Hettiarachchi for reviewing the quality indicators used, and Dr Jishnu Das for supplying more detailed data from his work in India to enable comparisons.

Funding

This work was supported by the World Bank (Contract Number 7163308), which funded the development of the study design and actual data collection, by the Institute for Health Policy (IHP) Public Interest Research Fund (Grant Number PIRF-2012-01), which funded the data analysis, and by the International Development Research Centre (IDRC; Grant Number 106439-002), which funded an internship by Janaki Jayanthan at IHP. The primary funding agency, World Bank, and the Ministry of Health, which facilitated the study, did not participate in the data collection or analysis. Representatives of both did review the preliminary findings and provided comments, but neither had a say in the interpretation of the results.

Conflict of interest statement: None declared.

References

Agency for Healthcare Research and Quality. *National Quality Measures Clearinghouse*. Agency for Healthcare Research and Quality 2012. http://www.qualitymeasures.ahrq.gov, accessed 15 July 2012.

Ala A. 2011. *Global status report on noncommunicable diseases 2010*. Geneva: World Health Organization.

Amarasinghe S, De Alwis S, Saleem S *et al.* 2013. *IHP Technical Reports Series, Number 2: Private Health Sector Review 2012*. Colombo: Institute for Health Policy. http://ihp.lk/publications/technical_reports.html, accessed 10 September 2013.

Asch SM, McGlynn EA, Hogan MM *et al.* 2004. Comparison of quality of care for patients in the Veterans Health Administration and

patients in a national sample. *Annals of Internal Medicine* **141**: 938–45.

Australian Institute of Health and Welfare. 2001. *Bettering the Evaluation and Care of Health: General Practice Activity in Australia 2000–2001*. Sydney: University of Sydney.

Berendes S, Heywood P, Oliver S *et al.* 2011. Quality of private and public ambulatory health care in low and middle income countries: Systematic review of comparative studies. *PLoS Medicine* **8**: e1000433.

Campbell S, Braspenning J, Hutchinson A *et al.* 2002. Research methods used in developing and applying quality indicators in primary care. *Quality and Safety in Health Care* **11**: 358–64.

Caldwell J, Gajanayake I, Caldwell P *et al.* 1989. Sensitization to illness and the risk of death: An explanation for Sri Lanka's approach to good health for all. *Social Science and Medicine* **28**: 365–79.

Campbell SM, Hann M, Hacker J *et al.* 2001. Identifying predictors of high quality care in English general practice: observational study. *BMJ* **323**: 784.

Centers for Disease Control and Prevention. 1994. Adults Taking Action to Control Their Blood Pressure—United States, 1990. *Morbidity and Mortality Weekly Report* **43**: 509–17.

Das J, Hammer J. 2004. Strained mercy: Quality of medical care in Delhi. *Economic and Political Weekly* **39**: 951–61.

Das J, Holla A, Das V *et al.* 2012. In urban and rural India, a standardized patient study showed low levels of provider training and huge quality gaps. *Health Affairs* **31**: 2774–84.

De Silva MWA, Wijekoon A, Hornik R *et al.* 2001. Care seeking in Sri Lanka: one possible explanation for low childhood mortality. *Social Science and Medicine* **53**: 1363–72.

Department of Census and Statistics. 2009. *Household income and expenditure survey 2009/10 [Data set]*. Colombo, Sri Lanka: Ministry of Finance and Planning.

Department of Census and Statistics (DCS), Ministry of Healthcare and Nutrition (MOH). 2009. *Sri Lanka Demographic and Health Survey 2006–07*. Colombo, Sri Lanka: DCS and MOH.

Department of Census and Statistics, Ministry of Finance and Planning. 2011. Household Income and Expenditure Survey - 2009/10. *Final report*. Colombo: Department of Census and Statistics.

Department of Census and Statistics (DCS). *Census of Population and Housing 2011 – Preliminary Report (Provisional): Population of Sri Lanka by District*. DCS 2013. http://www.statistics.gov.lk/PopHouSat/CPH2011/Pages/sm/CPH2011_R1.pdf, accessed 10 September 2013.

Dunn N, Pickering R. 1998. Does good practice organization improve the outcome of care for diabetic patients? *The British Journal of General Practice* **48**: 1237.

Fick DM, Cooper JW, Wade WE *et al.* 2003. Updating the Beers criteria for potentially inappropriate medication use in older adults: Results of a US consensus panel of experts. *Archive of Internal Medicine* **163**: 2716–24.

Gnjidic D, Hilmer SN, Blyth FM *et al.* 2012. Polypharmacy cutoff and outcomes: Five or more medicines were used to identify community-dwelling older men at risk of different adverse outcomes. *Journal of Clinical Epidemiology* **65**: 989–95.

Goudswaard AN, Lam K, Stolk RP *et al.* 2003. Quality of recording of data from patients with type 2 diabetes is not a valid indicator of quality of care. A cross-sectional study. *Family Practice* **20**: 173–77.

Halstead SB, Walsh JA, Warren KS (eds). 1985. *Good Health at Low Cost*. New York, USA: Rockefeller Foundation.

Hanson K, Yip WC, Hsiao W. 2004. The impact of quality on the demand for outpatient services in Cyprus. *Health Economics* **13**: 1167–80.

Institute for Health Policy. 2013. *Private hospital database [Data set]*. Colombo: Institute for Health Policy.

International Institute for Population Sciences (IIPS), Macro International. 2007. *National Family Health Survey (NFHS-3), 2005–06: India: Volume I*. Mumbai: IIPS.

Kerr E, Asch SM, Hamilton EG *et al.* 2000a. *Quality of Care for Cardiopulmonary Conditions: A Review of the Literature and Quality Indicators*. Santa Monica, CA: RAND Health.

Kerr E, Asch SM, Hamilton EG *et al.* 2000b. *Quality of Care for General Medical Conditions: A Review of the Literature and Quality Indicators*. Santa Monica, CA: RAND Health.

Kogan MD, Alexander GR, Kotelchuck M *et al.* 1994. Comparing mothers' reports on the content of prenatal care received with recommended national guidelines for care. *Public Health Reports* **109**: 637–46.

Leonard K, Masatu MC. 2006. Outpatient process quality evaluation and the Hawthorne Effect. *Social Science and Medicine* **63**: 2330–40.

Management Development and Planning Unit. 2011. *Hospitals and Bed Strength in Sri Lanka (Government Sector)*. Colombo, Sri Lanka: Ministry of Health.

McGlynn EA, Asch SM, Adams J *et al.* 2003. The quality of health care delivered to adults in the United States. *The New England Journal of Medicine* **348**: 2635–45.

McGlynn EA, Damberg CL, Kerr EA *et al.* 2000. *Quality of Care for Children and Adolescents: A Review of Selected Clinical Conditions and Quality Indicators*. Santa Monica, CA: RAND Health.

McGlynn EA, Kerr EA, Damberg CL *et al.* 2000. *Quality of Care for Women: A Review of Selected Clinical Conditions and Quality Indicators*. Santa Monica, CA: RAND Health.

Mills A, Rasheed F, Tollman S. 2006. Chapter 3: Strengthening health systems. In: Jamison DT, Breman JG, Measham AR *et al.* (eds). *Disease Control Priorities in Developing Countries*. New York, USA: World Bank and Oxford University Press, pp. 103–18.

National Center for Health Statistics. 2002. National Ambulatory Medical Care Survey: Advance Data from Vital and Health Statistics. Hyattsville, MD.

National Health Service. 2011. National Survey Programme: Outpatients Survey. Oxford, UK: Picker Institute Europe.

OECD/World Health Organization. 2012. *Health at a glance: Asia/Pacific 2012*. Paris, France: OECD Publishing.

Rannan-Eliya RP, Anuranga C, Chandrasiri J *et al.* 2012. Impact of out-of-pocket expenditures on families and barriers to use of maternal and child health services in Asia and the Pacific: Evidence from national household surveys of healthcare use and expenditures—*Summary Technical Report*. Manila: Asian Development Bank.

Rannan-Eliya RP, Jayawardhane P, Karunaratne L. 2003. Private primary care practitioners in Sri Lanka. In: Yazbeck S, Peters DH (eds). *Health Policy Research in Asia: Guiding Reforms and Building Capacity*. Washington DC, USA: World Bank.

Rannan-Eliya RP, Sikurajapathy L. 2008. Sri Lanka: "Good Practice" in expanding health care coverage. *Good Practices in Health Financing Lessons from Reforms in Low- and Middle-Income Countries*. Washington, DC, USA: World Bank.

Reeves D, Campbell SM, Adams J *et al.* 2007. Combining multiple indicators of clinical quality: An evaluation of different analytic approaches. *Medical Care* **45**: 489–96.

Reiber GE, Koepsell TD, Maynard C *et al.* 2004. Diabetes in nonveterans, veterans, and veterans receiving Department of Veterans Affairs health care. *Diabetes Care* **27**: B3–9.

Runciman WB, Hunt TD, Hannaford NA *et al.* 2012. CareTrack: Assessing the appropriateness of health care delivery in Australia. *The Medical Journal of Australia* **197**: 100–5.

Shankar PR. 2009. Medicines use in primary care in developing and transitional countries: Fact book summarizing results from studies reported between 1990 and 2006. *Bulletin of the World Health Organization* **87**: 804.

Sri Lanka Medical Association, Ministry of Healthcare and Nutrition. 2007. *Best Practice National Guidelines*. Colombo: Ministry of Healthcare and Nutrition.

StataCorp. 2011. *Stata Statistical Software: Release 12*. College Station, TX: StataCorp LP.

State Government of Victoria. 2011. *Patient satisfaction survey*. Melbourne, Australia: Department of Human Services.

Steel N, Bachmann M, Maisey S *et al.* 2008. Self reported receipt of care consistent with 32 quality indicators: National population survey of adults aged 50 or more in England. *BMJ* **337**: a957.

van Doorn-Klomberg A, Braspenning J, Feskens R *et al.* 2013. Precision of individual and composite performance scores: The ideal number of indicators in an indicator set. *Medical care* **51**: 115–21.

World Bank. 2008. *Sri Lanka: Addressing the Needs of an Aging Population*. Colombo: World Bank.

World Bank. 2014. World Development Indicators. World Bank.

World Health Organization. 2013. *World Health Statistics 2013*. Geneva, Switzerland: World Health Organization.

World Organization of National Colleges Academies and Academic Associations of General Practitioners/Family Physicians Classification Committee. 1998. *ICPC-2: international Classification of Primary Care*. 2nd edn. Oxford: Oxford University Press.