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Do doctors contribute to socioeconomic inequalities in health care provision? An audit experiment in Tunisia

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ABSTRACT

In this paper, we explore an important but understudied driver of health inequalities: whether doctors treat patients from different socioeconomic backgrounds differently during a clinical encounter. We design an audit experiment in Tunisia, sending standardised patients with the same symptoms to 130 public and private primary care doctors for consultation. Informed by in-depth qualitative work, we vary the attitude and appearance of the patients so that they appear to be "poor" or "middle-class". We find no evidence that doctors manage patients differently, but they respond to the socioeconomic profile of patients by prescribing fewer expensive drugs and giving out more free drugs to poorer patients. We also show significant differences in communication between patients: doctors are more likely to provide more explanation to richer patients about the diagnosis, the drugs prescribed and the treatment plan. These differences are not explained by time constraints as doctors spent comparable time with both types of patients. To the extent that differences in communication with patients can lead to differences in patients' health decisions, our results suggest that doctors could contribute indirectly to health inequalities.

1. Introduction

People with lower socioeconomic status (SES) experience poorer health compared to those with higher SES. This is true both between and within countries. Both non-communicable and communicable diseases – and the deaths and morbidity they cause – are increasingly concentrated among poorer and less educated populations (World Health Organization, 2021; Niessen et al., 2018). Not only is the socioeconomic gradient in health a global phenomenon, it is also a persistent problem and one that is exacerbated in times of crises (Wouterse et al., 2023). Disparities arise from a complex interplay of social determinants, such as inequalities in working conditions, living environments, and lifestyle behaviours shaped by socioeconomic constraints (Kaplan, 2006). It is also widely acknowledged that the organisation of health systems – such as the private-public mix of providers and their geographic distribution, or the generosity of health insurance coverage – fuels socioeconomic inequalities in health, as richer people often receive more health care compared to poorer people with the same needs (Wagstaff, 2002). Another issue occurs when patients with different socio-economic status but identical conditions are treated differently by providers (Lagarde and Scott, 2024). While differential treatment may be appropriate if it reflects differences in patients' needs or preferences, it may fuel inequalities when driven solely by doctor's preferences or beliefs.

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The literature suggests two main ways through which healthcare professionals can 'treat' patients differently and lead to actual disparities in health outcomes: communication and clinical decisions (Das et al., 2018; Balsa and McGuire, 2003). First, providers may communicate or behave differently with patients from different socioeconomic groups, because of differences in social proximity. In turn, poor communication or attitude can translate into worse experiences of care for the disadvantaged group, leading to distrust of doctors, and reduce or delay future access to care. More pragmatically, worse communication can lead to patients misunderstanding when to return for care, or why and how to adhere to a treatment protocol. Second, providers may also recommend different treatment to different patients with similar conditions because their biases affect their clinical judgment, explicitly or implicitly, making them wrongly infer that the patients have different needs when they do not. Existing empirical studies on inequalities tend to examine communication or clinical decision, but rarely both issues simultaneously. Moreover, most studies lack rigour in being able to isolate the role of provider decisions. Studies using administrative records are unable to measure communication and cannot rule out the possibility that differences in treatment reflect patients' preferences or other unobservable characteristics (Institute of Medicine, 2003; Brekke et al., 2018). Some studies have sought to overcome these concerns by relying on patients' self-reports (Shavers et al., 2012; FitzGerald and Hurst, 2017) or direct observations of consultations (Das and sohnesen, 2007). Yet, these approaches introduce new concerns, such as differential recall (Institute of Medicine, 2003), presentation bias and Hawthorne effect (Leonard and Masatu, 2006).

In this paper, we seek to overcome these challenges and explore whether primary care doctors treat and communicate differently with patients of different socio-economic groups. We use an experimental audit study, an approach increasingly used by researchers to study provider discrimination (Burger, 2019; Charles and Guryan, 2011). The idea is to train fieldworkers to present the same clinical case but exogenously alter one characteristic of interest, such as ethnic background (Planas et al., 2015), income (Gottschalk et al., 2020), or patient presentation of the case (Kovacs et al., 2022). Our study is set in Tunisia, a middle-income country where socio-economic and health inequalities are growing. Informed by in-depth qualitative work, we train fieldworkers to present typical physical, linguistic and behavioural traits of individuals coming from a "poor" or "middle-class" background. We then send a pair of standardised patients (SPs), portraying the two SES cases, to 130 public and private primary care doctors where they seek a consultation for an identical set of symptoms. We use the recommended treatment and management of the patient to construct a measure of the clinical quality and cost of care. Fieldworkers are also trained to record detailed aspects of the consultation, including the effort exerted, advice provided, and various dimensions of effective communication.

Our study yields three main findings. First, we find no evidence that doctors are more likely to provide correct treatment to or exert greater effort for middle-class patients than their poorer counterparts. Second, we show that poorer patients are more likely to receive an unnecessary drug compared to the better-off driven by donations of drugs free of charge. As a result, the value of prescribed drugs is lower for poorer patients. Third, we show notable differences in how doctors communicate with patients. They are more likely to offer to middle-class patients' explanations of their diagnosis, information about the recommended treatment, and advice about future recommendations. Overall, our findings suggest that doctors in Tunisia are unlikely to contribute *directly* to socioeconomic inequalities in health. However, if differences in how doctors communicate with patients influence their health decisions, doctors' behaviours could *indirectly* play a role in health inequalities.

Our paper connects to the empirical literature on quality of primary care in low- and middle-income countries. It adds to the growing number of health audit studies that have sought to identify the causal effect of patients' characteristics on doctor behaviour. These papers employ a similar design to ours, training standardised patients to present a specific case, but varying exogenously one attribute of the patient. Some studies have found no difference in the way providers treat men and women in India (Daniels et al., 2019), insured or uninsured patients in South Africa (Lagarde and Blaauw, 2022) or women from different ethnic groups in Peru (Planas et al., 2015). On the other hand, studies have found that profit incentives leads to over-prescription, especially when patients are less informed (Currie et al., 2014; King et al., 2022), or insured (Lu, 2014). Our study contributes to this body of research in several ways. We consider the effect of the socio-economic profile of patients, an important area of research in high-income countries,[1] but, to date, one that has been under-studied in LMICs, despite growing socio-economic inequalities. We develop the patient SES cases in a rigorous manner, drawing on our own in-depth qualitative research to inform several dimensions of the patients' profiles. Finally, we explore whether private and public providers react differently to patients from different socio-economic backgrounds. Such a comparison is key to inform the debate on the contribution of the private sector in healthcare provision (Coarasa et al., 2017). Yet, it has rarely been done in audit studies (Lagarde and Blaauw, 2023) and, to our knowledge, never in an experimental one.

Our paper also relates to the literature on provider bias in health care decision making. Most studies have been conducted in high-income settings and primarily focus on the effects of race and gender, with less attention given to the impact of socio-economic status (Hall et al., 2015). Some studies have highlighted that doctors tend to use a more controlling and less collaborative communication style with disadvantaged patients compared to those who are more affluent, offering them less information and emotional support (Willems et al., 2005). In a rare example of causal work, a study in Denmark examined the impact of clinic closures and found that patients had lower mortality rates when treated by doctors who shared a similar low socio-economic background (Kristiansen and Sheng, 2022). To our knowledge, ours is the first study to take place in a middle-income country, where both health and socio-economic inequalities are growing. Unlike previous work, we rely on an experimental design which allows us to isolate the role of providers, free of concern that differences in treatment could be the combined product of patients' and providers' attitudes and preferences. Finally, we simultaneously study the effect of patient socioeconomic status on communication and clinical decisions.

[1] This literature includes one experimental audit study, undertaken in Switzerland, which isolates the effect of patient income on dentists' treatment (Gottschalk et al., 2020).

2. Study setting

Our study takes place in Tunisia, a lower middle-income country with a GDP per capita of USD 3750 (World Bank, 2023). Data collection took place in "Grand Tunis", the main metropolitan area in the country. It includes the capital city, and accounts for 25 % of the country population and nearly a third of the urban population (World Bank, 2021). The region is also characterised by wide social and health inequalities (Boutayeb and Helmert, 2011; Romdhane and Grenier, 2009; Chahed and Arfa, 2014).

The Tunisian health system is mixed, with a historically dominant public sector and a growing for-profit private sector that is concentrated in urban areas (Klouz and Brayek, 2015). In the public sector, patients can receive primary care services in health centres and district hospitals that are staffed by publicly employed and salaried doctors, called General Practitioners (GPs). This represent the main option for the population, accounting for two-thirds of primary care visits (Achour, 2011). In the private sector, primary care is provided in solo clinics by self-employed GPs who charge a consultation fee (10 to 15 USD). Private GPs are commonly visited by people dissatisfied with the perceived low quality of care provided in overcrowded and under-resourced public facilities (Ben Abdelaziz, 2021).

Two-thirds of the population in Tunisia is covered by a social health insurance (SHI) scheme giving them access to public or private health services free at the point of use (Achour, 2011). The poorest and most vulnerable, accounting for almost a quarter of the population, are covered by subsidised programmes, giving them access to public services only (Arfa and Elgazzar, 2013). Despite this programme, low-income populations often choose to use the private sector where they pay the consultation fee out-of-pocket and purchase medicines in private pharmacies. This is due to frequent drug stock-outs in public facilities. In this study, for ethical and feasibility reasons, SPs did not use the SHI or subsidised programme and did not actually purchase prescribed drugs in pharmacies. Instead, they paid out-of-pockets (OOP) for consultations, that are fixed at 7 Tunisian dinars in public facilities and range from 20 to 45 Tunisian dinars at private GP practices. We estimated the cost of drugs prescribed using local price data.[2]

Doctors, in both sectors, prescribe but do not sell medicines, hence there is no profit incentive to prescribe more drugs. In the public sector, drugs are dispensed for free to subsidised and SHI patients, while other patients pay for them. In the private sector, doctors write a prescription to patients who then pay at private pharmacies. There is also the practice of doctors giving patients free drug samples, obtained from pharmaceutical representatives for marketing purposes (Caïd Essebsi, 2021).

3. Study design

3.1. Audit study

To investigate doctors' behaviours during consultations, we conducted an audit study with standardized patients (SPs). SPs are healthy individuals who, acting as new patients, present themselves unannounced and unknown to doctors who have previously consented to the study. SPs are trained to consistently simulate the historical, physical, and emotional features of a real patient with a pre-defined condition. After each encounter with a doctor, SPs recorded the clinical and behavioural measures of care in a detailed structured questionnaire (Wiseman et al., 2019). This approach mitigates methodological issues that have affected most studies on discrimination by controlling for patients' self-selection of providers, underlying conditions, and other characteristics – except for their socio-economic status.

To limit differences in observable characteristics, we recruited 13 enumerators of a similar age and height and trained them for 10 days to portray the SPs accurately. A significant portion of the training focused on ensuring that SPs followed a standardised script, providing answers only to questions asked by doctors while avoiding giving unsolicited information about their clinical and personal history. The script was based on previous studies and adapted to the local context with input from local experts[3] and insights gained from a small pilot conducted outside of the study sites.

The SPs presented themselves as new, uninsured[4] patients with the following complaint: "*I have had a bad cold, and now my chest is bothering me, and I am coughing a lot*". A persistent cough can indicate several illnesses, but further examination and questioning would reveal a productive cough with clear mucus and an absence of other symptoms typically associated with more serious conditions. The lack of fever, yellow-green sputum, blood, or shortness of breath should help the doctor rule out bacterial infections, tuberculosis, and pneumonia, leading to a diagnosis of a self-limiting viral respiratory tract infection.

We selected this case for several reasons. First, it is well suited to the Tunisian context where cough (the primary symptom in this scenario) is the most common reason for adult outpatient consultations. Additionally, acute bronchitis, the expected diagnosis, is the second most frequently reported condition in primary care after throat infection (Ajmi et al., 2011). Second, managing acute bronchitis does not require follow-up visits, allowing us to capture a reliable clinical treatment within a single interaction. Finally, the case is both technically and ethically feasible for trained SPs, as it can be presented using mild, easily simulated symptoms and has a low likelihood of prompting invasive examinations or procedures.

Individual informed consent for the study was obtained from the heads of sampled public-sector facilities and from each private

[2] In the public sector, OOP patients are free to purchase drugs from the public pharmacy in the facility or from a private pharmacy.

[3] The local experts were two public health doctors working at the Directorate of Primary Health Care at the Ministry of Health and one national expert in respiratory diseases assigned by the directorate.

[4] OOP (uninsured or unsubsidised) patients pay the same (regulated) price for drugs whether in the public and private pharmacies. This means with our SPs who are uninsured, we can compare the cost of care in the two sectors.

GPs. They were informed that individuals posing as real patients would visit their practice in the next six months. Four weeks after all SP visits had been completed, we contacted each provider by phone to ask if they had suspected any patient of being an SP. The detection rate was very low, with an SP being recognised in only two in 260 visits (0.77 % of all visits), a result consistent with SP studies conducted in urban areas (Daniels et al., 2019, 2019). Further details on the design in figure A2 and appendix A-2.

3.2. Experimental variation: socio-economic profiles

The audit study was combined with an experimental approach to introduce exogenous variation in the socio-economic profile of the patient. We contrasted two patient profiles: 'poor' and 'middle-class. A poor background was defined as an individual earning an income close to the absolute poverty line (USD1.9 per day, as defined by the World Bank), typically unemployed or engaged in informal, casual work such as domestic labour or construction. This group represents nearly 45 % of Tunisia's population (Boughzala et al., 2020). To contrast with the poor profile, we depicted an individual from Tunisia's average middle class, the country's largest socio-economic category (Diwan, 2013).[5] This profile typically included individuals with secure employment in the government or private sector, such as teachers or bank employees.

Varying SES through clothing alone, as done in a previous audit study in Switzerland (Gottschalk et al., 2020), would not have captured the complexity and nuances of socioeconomic classes in Tunisia. Therefore, we conducted extensive qualitative research to inform the development of the SES profiles. Drawing on the literature about doctors' perceptions of patients' socioeconomic status (Willems et al., 2005; Loignon et al., 2014; Chatelard et al., 2014), we first identified how doctors might perceive the two groups. Additionally, we created video and photo visual aids depicting different patient profiles. The objective was to elicit doctors' responses and identify potentially sensitive characteristics associated with stigma and labelling (Pain, 2012). More details on the content and development of the visual aids can be found in Appendix A-1.

Using a structured topic guide informed by the literature and visual aid prompts, we interviewed 10 doctors to explore their perceptions of both patient groups. The qualitative analysis identified three key dimensions or signals that doctors use to assess a patient's socioeconomic status upon first meeting them: language (fluency and use of French or local dialect), clothing and other aspects of physical appearance, and patients' assertiveness in their general demeanour (Table 1). More details can be found in Appendix A-1. Additionally, Figure A4 (Appendix A-3) includes photographs of fieldworkers portraying both profiles, highlighting differences in physical attributes.

4. Data and empirical approach

4.1. Provider sample

To determine the sample of providers visited, we drew on a list including all public facilities from the Grand Tunis region and from an up-to-date list of private GPs registered (and practicing) with the national medical council in the same region. In the public sector, we restricted our sampling frame to the facilities providing outpatient care (basic and intermediary healthcare centres). To avoid detection of SPs, we excluded a small number of facilities (i) where doctors worked rotations in other facilities on the sampling frame list and (ii) that were located in very remote areas where doctors would know local patients. This left a total of 153 public facilities and 1045 private practices. Our random sample includes 130 public and private primary care providers (61 public facilities and 69 private GPs). See details about the sampling process in appendix A-2.

Table 2 presents the characteristics of the public and private doctors who were visited by SPs. In private clinics, all 69 private doctors were visited twice by both the middle-class and poor SPs. In public health facilities, 94 doctors were visited (of which 28 were visited by both SPs, 33 received the middle-class SPs only and 33 received the poor SPs only. Public doctors who received both visits were overall not different from those who only received one visit; see table A2 in appendix A-2 for more details on the public doctor characteristics). Nearly 60 % of all doctors were female with more than two-thirds practicing in the public sector compared to only 38 % in the private sector. Similarly, over 61 % of doctors were aged between 41 and 55 years. Most of the public doctors visited by the SPs (76 %) were in this age group, while the age distribution of private doctors was more balanced across age groups, with a third aged 55 and over and more than a quarter aged between 25 and 40. Overall, the doctors had about the same level of knowledge. For the 153 doctors who responded to clinical vignettes presenting the same SP case, knowledge of correct case management amongst the public and private doctors was almost identical. Two-thirds of doctors recommended not to prescribe antibiotics for acute bronchitis in the vignettes. Finally, most doctors had participated in at least one certified or noncertified continuing medical training activity in the last five years.

4.2. Data collection

Ethics approval was granted from the London School of Hygiene and Tropical Medicine ethics committee (LSHTM ethics reference 12,274) in London and from the Ministry of Health (document reference 2017/10,237) in Tunisia. Informed consent was sought from the doctor head of sampled facilities in the public sector and from the sampled individual GPs in the private sector. We notified the

[5] Depicting an individuals from the upper classes would not have been realistic as they rarely use the public sector when seeking care (World Bank, 2010).

Table 1
Socio-economic attributes in both patient profiles.

Dimensions varied		Middle-class profile	Poor profile
Language	- Dialect and accent	- Of the city of Tunis	- Rural
	- Code-switching	- Frequent use of French	- Rare or no use of French
	- Command of language, use of words	- Confident, decisive	- Hesitant, inarticulate
Physical appearance	- Clothing quality	- High quality/ ironed	- Low quality/ worn out
	- Hygiene of hands and nails	- Well-groomed	- Ungroomed
	- Looking after appearance: care to hair (and beard, for males)	- Careful	- Negligent
Attitude	- Movements: walking and body language	- Assertive	- Shy
	- Posture: when standing up, seated		

Table 2
Doctor characteristics.

	All	Public	Private	P-value of difference between public and private
Female	0.60	0.76	0.38	0.000
Age				
Between 25 and 40 years old	0.14	0.04	0.26	0.000
Between 41 and 55 years old	0.61	0.76	0.41	
>55 years old	0.25	0.19	0.32	
Knowledge in vignettes	0.68	0.67	0.69	0.961
Continuing training	0.84	0.90	0.76	0.057
Observations	163	94	69	

Notes: Values are % for all characteristics. Percentages represent the proportions of doctors having that characteristic.
All variables derive from an individual doctor survey administered along with clinical vignettes four months before the SP data. collection started. See table A1 in Appendix A-2 for an explanation of all the variables.

providers that they would be visited by SPs "sometime in the next six months" without any further details about SP ailment or profile. SPs fieldworkers were trained to protect themselves from potential harms related to detection or invasive procedures.

We first visited the study health facilities in November and December 2017 to collect data on basic demographic characteristics and clinical knowledge of all GPs present on the day. The audit field experiment was conducted in two rounds of data collection between March 7 and May 31, 2018. SPs first visited providers while portraying the middle-class profile, followed by visits in the poor profile five weeks later.[6] While this delay presents some drawbacks including temporal variation (systematic difference in timing of the visits are confounding the profiles), these were outweighed by benefits of a separate and in-depth training for the poor profile before the second round of visits.[7] In practice, significant temporal changes (seasonal variation in illnesses) are unlikely to have occurred in such a short period of time. Each study facility received two (middle-class and poor) SPs.

Immediately after each consultation, SPs recorded details of the visit on a structured paper questionnaire. The questionnaire covered the time and duration of the appointment; questions asked by the doctor; physical examinations performed; details about effective communication and advice given by the doctors, details of the treatment plan (drugs or prescriptions given) and cost of the visit. Soon after, supervisors debriefed the SP and entered all information in an electronic questionnaire, drawing on their medical knowledge to code the drugs. See Appendix A-2 for further details on data collection.

4.3. Outcomes

We measured three types of outcomes: (1) quality of clinical care; (2) cost of care; and (3) doctor communication.

4.3.1. Quality of clinical care

It encompassed clinical care and doctor effort. Clinical care included three measures: correct case management, unnecessary care, and number of drugs received. Based on national treatment guidelines and expert input, correct case management was coded as 1 if the SP was not prescribed or given antibiotics free of charge, and 0 otherwise. We used a lenient definition of correct case management, coding any treatment received (i.e. prescribed or given for free to the patient) other than an antibiotic as correct (1), even if it was unnecessary or potentially harmful. Unnecessary care[8] was coded as 1 if the SP received (i.e. prescribed or given for free to the patient) unnecessary or potentially harmful drugs, such as steroids, antihistamines, or bronchodilators (table A3 in the appendix A-2 provides

[6] In this second round of data collection, we used five SP fieldworkers, all of whom had presented the middle-class profile. We ensured that no one individual would re-visit the same health facility to limit the risk of detection.

[7] The poor profile required thorough, separate training, including an introduction to acting techniques, which, if delivered simultaneously with that of the middle-class profile, would have confused fieldworkers and compromised the learning and presentation of each role.

[8] Unnecessary care includes only unnecessary drugs, as doctors did not prescribe or give for free any diagnostic test, which would have been considered unnecessary care if given.

the full list of unnecessary drugs for acute bronchitis, as well as the full list of the drugs classified as palliative and hence not unnecessary). Finally, we recorded the total number of drugs received as treatment (i.e. prescribed or given for free to the patient).

Doctor effort was measured by the duration of the consultation in minutes; the proportion of recommended questions asked by the doctor; and the proportion of recommended examination items performed on the SP. The latter two were based on a pre-defined list of questions and examinations developed with medical local experts (table A4 in the appendix A-2 for the full list of recommended history questions and examination items).

4.3.2. Cost of care

To capture cost of care, we used four outcomes. First, we measured the consultation fee. Second, we measured the cost of any prescribed drugs, which was computed by looking up their price from the central pharmacy of Tunisia's website, or from a private pharmacy if unavailable on the website.[9] Third, we reported whether the doctor gave any drugs free of charge to SPs and last, any drugs free of charge that were unnecessary.

4.3.3. Communication

Finally, to capture the doctor's quality of communication, we used six items from the SP debriefing questionnaire: whether the doctor (1) offered a diagnosis, (2) explained what the symptoms or aetiology of the illness was, (3) explained why drugs were prescribed, (4) explained the treatment plan, (5) advised the patient to come back if there was no improvement of the symptoms; and (6) offered a sick note to justify possible absence from work. To address the problem of multiple outcomes and reduce the risk of Type I errors, we created an index of effective communication combining the six mentioned indicators, measured by the proportion of communication items done.

4.4. Empirical specification

Our aim is to identify whether providers treat the poor patient differently. Due to the design and the hierarchical nature of the data, as each provider saw two patients, we estimate the following fixed-effects model:

$$Y_{isp} = \beta_0 + \beta_1 POOR_{isp} + \gamma_s + \delta_p + \varepsilon_{isp} \tag{1}$$

Where we regress each outcome measure (clinical quality, provider effort, cost, communication), Y in consultation i of SP s visiting provider p (public facility or private doctor), on a dummy indicator denoting the patient socioeconomic status profile, $POOR_i$, with β_1 being the coefficient of interest. γ_s is a vector of the SP fieldworker's fixed effects capturing unobserved characteristics, and δ_p denotes a vector of the provider's fixed effects. Since the experimental variation is at the provider level, which is the doctor level for the private sector and the facility level for the public sector, we cluster the standard errors at the provider level in these models.

Next, we consider whether providers' differential behaviours and treatment towards poor patients were different across the public and private sector by decomposing the treatment effects into two components:

$$Y_{isp} = \beta_0 + \beta_1 POOR_{isp} \times PUBLIC + \beta_2 POOR_{isp} \times PRIVATE + +\beta_3\ PUBLIC + \gamma_s + \delta_p + \varepsilon_{isp} \tag{2}$$

where β_1 (β_2) captures whether the provider treats poor patients differently from middle-class patients in the public (private) sector. We perform an F-test of the difference between the two coefficients of interest and report the p-value. Eq. (2) includes a dummy for the public sector but note that this drops out with the inclusion of provider fixed effects.

5. Results

5.1. Clinical quality and doctor effort

Table 3 reports findings showing differences between poor and middle-class patients in the quality of care received and measures of doctor effort. We interpret these results as the causal effect of patient SES on doctor behaviour. In all regressions, we control for provider and SP fixed effects. Here, and in subsequent tables, we present results in two panels. Panel A shows the average effect on outcomes of the SP presenting as a poor patient compared with a middle-class patient. Panel B presents subgroup effects by sector. The study was conducted in both public and private health facilities, allowing us to explore whether doctor behaviour in response to the SES of patients varies by sector. We estimate the subgroup effects following Eq. (2) in the Methods and conduct an F-test of the equality of the two coefficients.

In Panel A, column 1, we find no evidence that being poor has an effect on the probability of receiving correct case management. Poor patients are 4.0 percentage point more likely to receive correct case management (compared to 34 % amongst middle-class patients) but the estimate is not significant at the 5 % level ($p = 0.630$). In column 2, poor patients are more likely to receive an unnecessary drug, by 7.5 percentage points relative to 93 % for middle-class patients ($p = 0.059$). The extent of overprovision, regardless of SES, is important to note: almost all interactions with SPs involved the provision of wasteful care. In column 3, we see that

[9] Drug prices are highly regulated in Tunisia: they are determined by the central pharmacy and do not vary from one private pharmacy to another (World Health Organization, 2003).

Table 3
Patient SES differences in clinical care and doctor effort.

	Clinical care			Doctor effort		
	Correct case management (1)	Received any unnecessary drug (2)	Number of total drugs received (3)	Time spent (min) (4)	% of recommended questions asked (5)	% of recommended examinations performed (6)
Panel A: Effect of patient SES						
Poor patient	0.040	0.075*	−0.212	−0.273	0.018	−0.005
	(0.083)	(0.040)	(0.404)	(0.604)	(0.019)	(0.020)
	[−0.124, 0.203]	[−0.003, 0.154]	[−1.011, 0.588]	[−1.469, 0.923]	[−0.020, 0.057]	[−0.045, 0.036]
Control mean	0.338	0.931	3.892	7.715	0.394	0.408
# of providers	130	130	130	130	130	130
# of obs	260	260	260	260	260	260
R-squared	0.082	0.100	0.034	0.194	0.374	0.206
Panel B: Effect of patient SES by sector						
Poor patient X public	−0.016	0.107**	−0.282	−0.529	−0.002	−0.019
	(0.105)	(0.050)	(0.516)	(0.770)	(0.025)	(0.026)
	[−0.224, 0.192]	[0.007, 0.207]	[−1.303, 0.740]	[−2.055, 0.997]	[−0.051, 0.046]	[−0.071, 0.033]
Poor patient X private	0.079	0.053	−0.163	−0.093	0.032	0.005
	(0.094)	(0.045)	(0.463)	(0.691)	(0.022)	(0.023)
	[−0.108, 0.266]	[−0.036, 0.143]	[−1.079, 0.754]	[−1.463, 1.276]	[−0.011, 0.076]	[−0.041, 0.052]
P value public=private	0.392	0.312	0.827	0.591	0.181	0.376
# of providers	130	130	130	130	130	130
# of obs	260	260	260	260	260	260
R-squared	0.088	0.108	0.035	0.196	0.384	0.211

Notes: Each column corresponds to results of a linear regression including provider and patient (fieldworker) fixed effects. Observations are at the Patient-provider. interaction level. Standard errors clustered at the provider level are in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. 95 % Confidence intervals are in brackets.

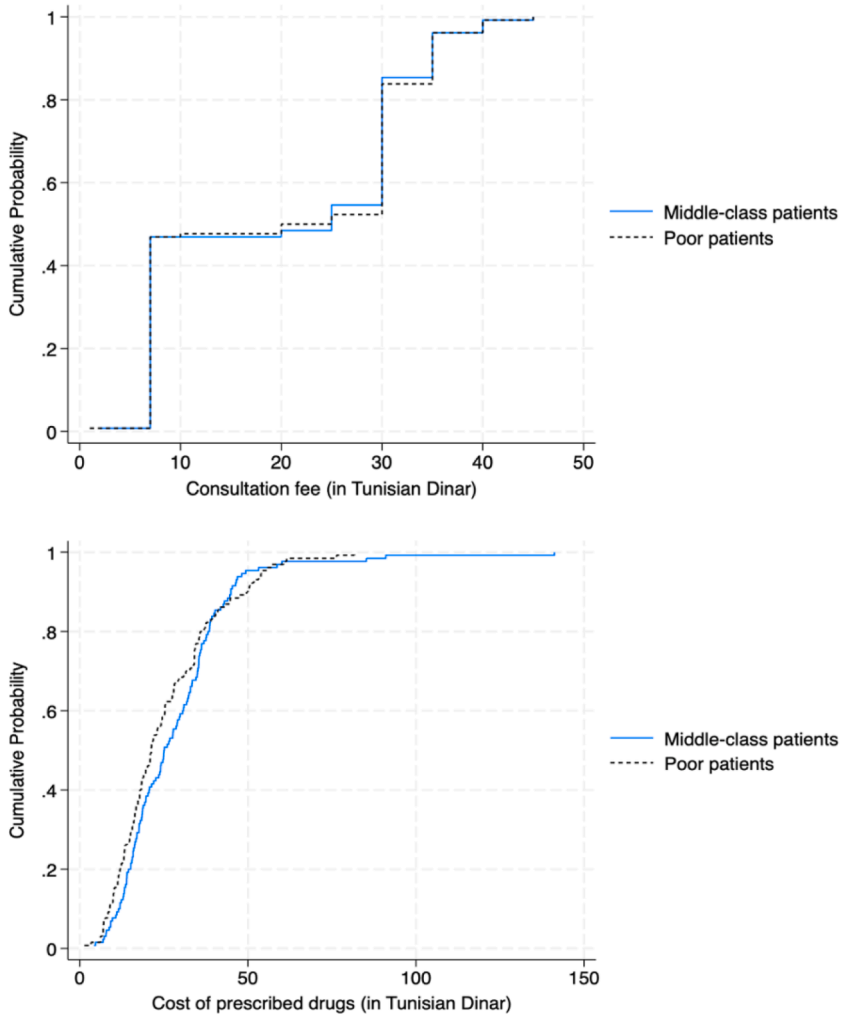

Fig. 1. Distribution of the consultation fees (top) and cost of prescribed drugs (bottom).

there is no significant effect of being poor on the number of drugs received, implying that the inequality in unnecessary drugs is driven by changes in the type of drugs rather than the number of drugs received.

In Panel A, columns 4–6, we find no evidence of SES differences in doctor effort, as measured by the consultation time spent with the patient, the percentage of recommended questions asked and the percentage of recommended examinations performed. These findings are consistent with the result on correct case management, insofar as these measures of doctor effort are on the pathway to more accurate diagnosis and better treatment decisions. We note that doctors in our sample perform only 40 % of recommended history taking questions and examinations, suggesting that there is substantial room for improvement in the process of care. The average time spent with patients is 7.7 min, markedly longer than typical visits to public and private providers in India, based on audit studies. For example, one study found that providers in urban Mumbai spent an average of 4.0 min with patients (Daniels et al., 2022), while another study reported that providers in rural areas of Madhya Pradesh spent only 3.6 min per visit (Das et al., 2016).

In Panel B, we turn to the subgroup effects by sector. Across the clinical quality and doctor effort outcomes, we find no evidence of heterogeneous effects with respect to public versus private health facilities. There is a positive effect of patient SES on receiving an unnecessary drug in public health facilities and no significant effect in the private sector. However, the difference is not statistically significant ($p = 0.312$). It is worth noting that 97 % of patients in private facilities received an unnecessary drug (result not shown), limiting the scope for SES-differences to emerge.

5.2. Cost of care

We next examine whether there are SES differences in treatment costs. We consider the effects on consultation fees actually paid by the SP and the value of drugs prescribed by the doctor. In Fig. 1, using the raw data, we plot the cumulative distribution functions of both measures for poor and middle-class patients, and test for whether the two distributions differ with a Kolmogorov-Smirnov [K–S]

Table 4
Patient SES differences in cost of care.

	Consultation fees (TND) (1)	Cost of prescribed drugs (TND) (2)	Given any drug free of charge (3)	Given any unnecessary drug free of charge (4)
Panel A: Effect of patient SES				
Poor patient	−0.060	−5.983**	0.220***	0.159***
	(0.388)	(2.863)	(0.059)	(0.057)
	[−0.828, 0.708]	[−11.652, −0.314]	[0.104, 0.336]	[0.047, 0.272]
Control mean	19.669	28.140	0.062	0.054
# of providers	130	130	130	130
# of obs	260	260	260	260
R-squared	0.199	0.141	0.273	0.148
Panel B: Effect of patient SES by sector				
Poor patient X public	−0.312	−4.499	0.037	0.029
	(0.494)	(3.651)	(0.070)	(0.070)
	[−1.290, 0.666]	[−11.729, 2.731]	[−0.102, 0.175]	[−0.109, 0.168]
Poor patient X private	0.116	−7.023**	0.349***	0.250***
	(0.443)	(3.276)	(0.063)	(0.063)
	[−0.761, 0.994]	[−13.512, −0.534]	[0.225, 0.473]	[0.126, 0.375]
P value public=private	0.410	0.512	0.000	0.003
# of providers	130	130	130	130
# of obs	260	260	260	260
R-squared	0.203	0.144	0.371	0.210

Notes: Each column corresponds to results of a linear regression including provider and patient (fieldworker) fixed effects. Observations are at the Patient-provider interaction level. Standard errors clustered at the provider level are in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. 95 % confidence intervals are in brackets.

test of first-order stochastic dominance. For consultation fees, there is no difference in the distribution between poor and middle-class patients (K-S test, $p = 1.000$). For the cost of drugs, the distribution seems higher for the middle-class than the poor patients but the difference is not statistically significant (K-S test, $p = 0.216$).

Table 4 shows regression estimates of SES differences for the same two cost of treatment outcomes, as well as whether the patient was given any free drugs and any free unnecessary drugs. In Panel A, patient SES has no significant effect on consultation fees (column 1) and a large negative effect on the cost of prescribed drugs (column 2). The cost of prescribed drugs for poor patients is almost 6 TND (21 %) lower than the cost for middle-class patients ($p = 0.039$). Column 3 gives a strong clue as to what may be driving this result. Poor patients are much more likely to be given a free drug during the consultation, presumably reducing the need for the doctor to prescribe as many drugs. The majority of these free drugs, however, are unnecessary. As shown in column 4, the coefficient estimate for any unnecessary free drug indicates an increase of 16 percentage points, which compares with 22 percentage points for any free drug. So while poorer patients appear to be benefiting financially from free handouts of drugs, the clinical benefit of the drugs is questionnable.

In Panel B, column 1, the subgroup estimates show that poor patients did not face significantly lower consultation fees than middle-class patients in either public or private health facilites (nor was there a significant difference ($p = 0.410$) between sectors. In column 2, we also see there is no evidence of subgroup differences. Finally, columns 3–4 show that there are subgroup differences by sector: poor patients are much more likely than middle-class patients to be given a free drug and an unnecessary free drug in the private sector but not in the public sector.

5.3. Doctor communication

How well a doctor communciates can have consequences for a patient's health. It is also a key aspect of experience of care, which is considered an important outcome in itself. Table 5 reports results on SES differences across six indicators of effective communication.

The results in Panel A show that poorer patients receive worse communication from doctors on four indicators. Doctors are less likely to describe the illness (19 percentage points, $p = 0.006$), explain the reasons for prescribing drugs (22 percentage points, $p = 0.001$), explain the treatment plan (18 percentage points, $p = 0.017$), and offer a sicknote (30 percentage points, $p = 0.000$) to poor patients compared with middle-class patients. For the other two indicators, there are no signficant SES differences (column 1 and column 5). To address the problem of multiple outcomes and reduce the risk of type 1 errors, we create an index of doctor communication, measuring the proportion of communication items done. In column 7, we find that the communication index is substantially lower for poorer patients ($p < 0.001$).

In Panel B, the evidence on heterogeneity suggests that the effects of patient SES, where they exist, are larger in private health facilities than public health facilities. For two of the indicators, subgroup differences are statistically significant, suggesting that doctors in the private sector appear to communicate particularly badly when faced with a poor patient rather than a middle-class patient. For the two indicators in which we found no evidence of an effect of SES, there are no signficant differences by sector. Overall, when we combine the six indicators into an index, we find that private GPs perform worse in communicating effectively with poorer patients (p value of the difference between sectors is 0.071).

Table 5
Patient SES differences in doctor communication.

	Doctor offered a diagnosis before the patient asked (1)	Doctor explained what the illness is (2)	Doctor explained why drugs were prescribed (3)	Doctor explained treatment plan (4)	Doctor advised patient to come back if no improvement (5)	Doctor offered a sicknote (6)	Effective communication index (7)
Panel A: Effect of patient SES							
Poor patient	−0.000	−0.186***	−0.217***	−0.181**	0.084	−0.305***	−0.134***
	(0.082)	(0.067)	(0.063)	(0.075)	(0.075)	(0.068)	(0.037)
	[−0.162, 0.162]	[−0.318, −0.054]	[−0342, −0.092]	[−0.329, −0.033]	[−0.065, 0.232]	[−0.440, −0.169]	[−0.207, −0.061]
Control mean	0.515	0.393	0.338	0.431	0.300	0.323	0.383
# of providers	130	130	130	130	130	130	130
# of obs	260	260	260	260	260	260	260
R-squared	0.211	0.376	0.338	0.321	0.131	0.279	0.344
Panel B: Effect of patient SES by sector							
Poor patient X public	−0.042	−0.068	−0.189**	−0.120	0.135	−0.208**	−0.082*
	(0.105)	(0.083)	(0.080)	(0.095)	(0.096)	(0.086)	(0.047)
	[−0.249, 0.166]	[−0.233, 0.097]	[−0.348, −0.029]	[−0.308, 0.069]	[−0.054, 0.325]	[−0.379, −0.038]	[−0.174, −0.010]
Poor patient X private	0.029	−0.269***	−0.237***	−0.223**	0.048	−0.372***	−0.171***
	(0.094)	(0.075)	(0.072)	(0.085)	(0.086)	(0.077)	(0.042)
	[−0.157, 0.215]	[−0.417, −0.121]	[−0.380, −0.094]	[−0.392, −0.054]	[−0.122, 0.218]	[−0.526, −0.219]	[−0.254, −0.088]
P value public=private	0.523	0.024	0.565	0.302	0.385	0.072	0.071
# of providers	130	130	130	130	130	130	130
# of obs	260	260	260	260	260	260	260
R-squared	0.214	0.403	0.340	0.327	0.137	0.299	0.362

Notes: Each line corresponds to results of a linear regression including provider and patient (fieldworker) fixed effects. Observations are at the Patient-provider interaction level. Standard errors clustered at the provider level are in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. 95 % confidence intervals are in brackets.

5.4. Robustness

We run a range of robustness checks, reported in online appendix A-4 (table A7). First, recall that in public health facilities it was not always possible for the pair of SPs (poor and middle-class) to see the same doctor because requesting so would have aroused undue suspicion. We therefore limit the analysis to the sample of health care providers for whom the same doctor saw both SPs. The fixed effects are therefore capturing heterogeneity specific to each doctor. The results are largely consistent with those from the main analysis (table A7, column 2). Due to the smaller sample size, the standard errors are larger, resulting in some reduction in statistical significance for the cost of prescribing drugs and doctor explained the treatment plan.

Second, recall that some SP fieldworkers portrayed middle-class patients only, generating an imbalance in the characteristics of the fieldworkers by SES group. We address this issue by limiting the analysis to observations involving the five (of total 13) SP fieldworkers who portrayed both poor and middle-class patients. The results again remain similar, despite the loss of sample (table A7, column 3).

Third, we run regressions in which we exclude the SP fieldworker fixed effects. The results remain qualitatively similar, with the exception of the cost of prescribed drugs, which no longer shows a significant difference between the two types of patients (table A7, column 4).

Fourth, we present results from a multi-level mixed effects model in which we specify a random effect, rather than a fixed effect, at the health provider level. We find that the results are robust to this alternative specification and largely of the same magnitude (table A7, column 5).

Fifth, we address the problem of a chance finding with multiple outcomes in Table 4 and Table 5 by adjusting for multiple hypothesis testing. We apply the Benjamini and Hochberg (1995) approach to each set of outcomes (grouped according to cost of care and communication indicators) and report the critical p value, which is the adjusted significance threshold, for each outcome. The results, reported in Appendix Tables A8 and A9, show that most results are robust. The p-value – for those <0.05 – remains below the critical p-value for most outcomes.

Finally, we comment on whether the study was powered to detect meaningful effects by reporting the ex-post minimal detectable effects in Appendix Table A10. These results show that, for correct case management, the study was not powered to rule out small effects and indeed some of the minimal detectable effects are quite large – such as 17 percentage points (relative to the mean of 34 % for middle-class patients). However, the study was sufficiently powered to make robust conclusions about SES differences in the cost of care and doctor communication, and to rule out large SES differences in clinical care.

6. Discussion

Using a field audit experiment, we test whether primary care doctors in Tunisia treated poorer patients differently from middle-class patients. We report three key findings. First, we find no significant differences in correct case management, correct diagnosis, or the level of effort (measured by consultation time and clinical tasks). Second, we find that poorer patients are more likely to receive unnecessary drugs, mainly due to doctors providing free medications. This pro-poor decision results in lower drug costs for poor patients. Our last finding reveals that communication is less effective with poorer patients compared to wealthier ones, particularly in how doctors explain the illness, the rationale for prescribed medications, and the treatment plan. This disparity is especially pronounced in the private sector.

The lack of differences in clinical care between patient groups is consistent with the only LMIC study that attempted to examine SES-based inequalities in health care by observing doctors' effort during public sector consultations in Paraguay (Das and sohnesen, 2007). These findings also echo two other audit studies, which reported no differential quality of care between men and women in India (Daniels et al., 2019), and indigenous and non-indigenous women in Peru (Planas et al., 2015). Moreover, these findings reveal suboptimal quality of clinical care for acute respiratory infections in Tunisia. In the "middle-class" profile visits, only about one-third of cases were correctly managed, while over 93 % received unnecessary treatments, primarily antibiotics or steroids, for a condition that requires neither. This rate is among the highest reported in LMICs. For comparison, in South Africa, 72 % of SPs with bronchitis received unnecessary antibiotics from private doctors (Lagarde and Blaauw, 2022), a figure similar to what we observed among the private doctors in our study (results not shown). However, caution is warranted in interpreting our measure of correct case management, as it hinges on the non-prescription of antibiotics. While such prescribing is clearly inappropriate, it is often driven by habits and the perception that patients expect or value this type of treatment (Sulis et al., 2020).

Why might doctors give out free drugs to poorer patients? There may be prosocial motivations for doing so, though likely reinforced by the Tunisia's context— pharmaceutical representatives routinely supply free drugs as a marketing strategy. One plausible explanation for why the private doctors are driving this result is that these reps are most active in giving out free drugs in the private health care sector (Caïd Essebsi, 2021). Notably, this willingness to help the poor is limited to the distribution of free drug samples but does not extend to lower fees. Therefore, this can be better interpreted as benevolence —a willingness to do good— rather than altruism, which involves a personal cost (Besley and Ghatak, 2018).

While effective doctor-patient communication is essential for building trust (Roter and Hall, 2009), promoting treatment adherence (Zolnierek and Dimatteo, 2009), and ultimately improving health outcomes, our study reveals concerning patterns in this regard. Inadequate communication with certain patients may stem from various factors, including differences in patients' communication abilities or underlying biases on the part of doctors (Balsa and McGuire, 2003). In our setting, the language used by poorer patients seems to create a barrier, prompting doctors to avoid overly technical explanations. Since doctors spend similar amounts of time with both poor and middle-class patients across sectors, time constraints do not explain the gap. Instead, it appears that doctors believe explaining complex information to poorer patients demands extra effort, so they steer clear of such discussions. Another possibility, as

noted in a Swiss study (Gottschalk et al., 2020), is that private sector doctors tailor their communication to patients with a higher capacity to pay, who are more likely to return.

This study has several limitations. First, our findings may not reflect the behavior of all Tunisian doctors, particularly specialists who have moonlighting incentives. In public hospitals, doctors may "cream-skim" by prioritizing wealthier, more profitable patients, potentially leading to lower quality care for poorer patients. Second, focusing solely on bronchitis limits our insights into under-treatment—a significant issue in LMIC healthcare quality (Glasziou et al., 2017). Third, while prescribing antibiotics for bronchitis is an example of incorrect case management, this practice is complex, influenced by doctors' habits and their perceptions of what constitutes "good" care (Sulis et al., 2020). Overall, further research is needed to assess doctors' contributions to healthcare inequalities across other illnesses and specialised care settings in Tunisia and LMICs.

One methodological limitation is that the two SPs (poor and middle-class) visited doctors at different times, which may introduce temporal effects. Several reasons make our sequential design unlikely to be affected by time-varying confounders. Firstly, the short gap between rounds (only five weeks) minimises changes over time. Secondly, supply-side factors are unlikely to have altered care: providers were unaware of the treatment details, visit order, or research objectives. They agreed to visits over a six-month period without knowing the specific dates, patient profiles, or study aims, and the symptoms presented were common enough not to raise suspicion. Finally, demand-side changes were also controlled. Extensive training, performance checks, and systematic health and background monitoring of SPs ensured consistency (Appendix A-2), and no provider had prior contact with any SP or supervisor before the study.

Our study advances understanding of what drives healthcare inequalities and has important implications for policy. Our results suggest that doctors may contribute to inequalities through their communication with disadvantaged patients. When communicating with disadvantaged patients requires extra effort, and doctors withhold useful information, patient trust erodes. As a result, patients who feel treated unfairly may avoid care, fail to follow treatment plans, or engage in unhealthy behaviours (Larson et al., 2017) worsening their health and deepening health inequalities (Arrow, 1973; Rosenthal and Jacobson, 1968). The health authorities could emphasize the importance of patient-centred care *and* communication, starting from medical education and continuing throughout practice (World Health Organization, 2016). Training that develops both technical and communication skills can reduce communication problems in healthcare and their adverse impact on health inequalities. De-biasing techniques can also help correct misconceptions in medical decision making (Ludolph and Schulz, 2018). These strategies should be combined with others such as fostering long-term relationships between patients and primary care doctors to improve communication and reduce stereotype-driven decisions, which are more likely to be common in single encounters than in repeated episodes of care.

7. Conclusion

Like other countries, addressing health care inequalities is high in the current Tunisian policy agenda (Chatelard et al., 2014). However, prioritisation is largely given to rural-urban disparities. The risk is that such a focus could overshadow inequalities in the provision of care within urban areas that need to be addressed, as suggested by our findings. Establishing patient-centred care is an effective and timely option that should be considered, as Tunisian medical institutions are currently redesigning their medical education curriculum. Furthermore, overprescribing remains a crucial problem, regardless of patient background and practice setting, and this should be addressed as a priority in Tunisia.

Declaration of use of a generative AI tool

"During the preparation of this work the author(s) used ChatGPT in order to help summarising a longer version of the Appendix A-1 to this article. After using this tool, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication."

Data availabilty statement

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CRediT authorship contribution statement

Rym Ghouma: Writing – review & editing, Writing – original draft, Visualization, Software, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Mylène Lagarde:** Writing – review & editing, Validation, Supervision, Methodology, Funding acquisition, Conceptualization. **Timothy Powell-Jackson:** Writing – review & editing, Validation, Supervision, Methodology, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Supplementary materials

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