Understanding Market Drivers of Antibiotic Misuse in Senegal and Tanzania

Research Report v.1

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Abbreviations

AMR	antimicrobial resistance
LMIC	low- and middle-income countries
OBF	outcomes-based financing
TZS	Tanzanian Shillings
XOF	West African CFA Francs
WHO	World Health Organization

Introduction

Background

Antimicrobial resistance (AMR), caused by overuse or inappropriate use of antibiotic drugs, has emerged as one of the leading public health threats of the twenty-first century. Annually, AMR claims 1.3 million lives, with projections soaring to 10 million by 2050.[1] One solution to combating AMR is to implement AMR stewardship programs, as outlined by the World Health Organization (WHO) and national AMR action plans.[2] Though normative guidance exists, it does not address the market forces and behavioral factors driving antibiotic misuse. While incentive structures to reduce AMR have been explored in high-income countries, limited research has been conducted in low- and middle-income countries (LMIC), where the burden of AMR is greatest. Global partnerships and sustained financial support are vital for effective AMR management in LMIC.

Project objective

This project will co-create and pilot an outcomes-based financing (OBF) mechanism to augment antimicrobial stewardship efforts specifically in LMIC. This financing mechanism aims to address the underlying infrastructure and health system gaps necessary for a comprehensive stewardship approach by motivating health provider networks in LMIC to test new business models and service delivery approaches that reduce the misuse of antibiotics.

If we augment stewardship efforts by addressing market and social pressures at the points where they occur along *the patient cascade of care, we can improve referral and testing rates (where sufficient health infrastructural capacity exists) and improve antibiotic dispensing practices.*

Research design

With funding from Pfizer and in partnership with the Bay Area Global Health Alliance, Healthy Brains Global Initiative, and the governments of Senegal and Tanzania, as well as several country and community stakeholders, PATH has conducted research in Senegal and Tanzania to identify and characterize when and where economic and social forces may be influencing antibiotic prescription, sale, or consumption. This was a prospective descriptive study aiming to validate the drivers of antibiotic misuse, refine our understanding of these drivers based on local context, and identify possible OBF interventions to counteract these drivers.

Semi-structured patient (N = 99 in Senegal and 100 in Tanzania) and provider (clinician, pharmacist, lab staff) interviews (N = 40 in Senegal and 48 in Tanzania) were conducted in the capital regions of each country (Dakar, Senegal, and Dar es Salaam, Tanzania). A mixture of up to 20 public and private clinics/hospitals, pharmacies, and laboratories in each country was purposively selected for participation based on location, sector, and availability of general clinical services. All participants provided informed consent prior to being interviewed and were aged 18 years or older. Health care providers (up to three per facility) were ones who are directly involved in the delivery of health care (i.e., directly providing, referring patients for, or overseeing the use of antibiotics at the facility). Patients who participated (up to five per facility) were either seeking care directly or were caregivers of someone seeking care at the facility, resided in the study catchment area, and requested/received antibiotics during the visit or within the month prior to their visit.

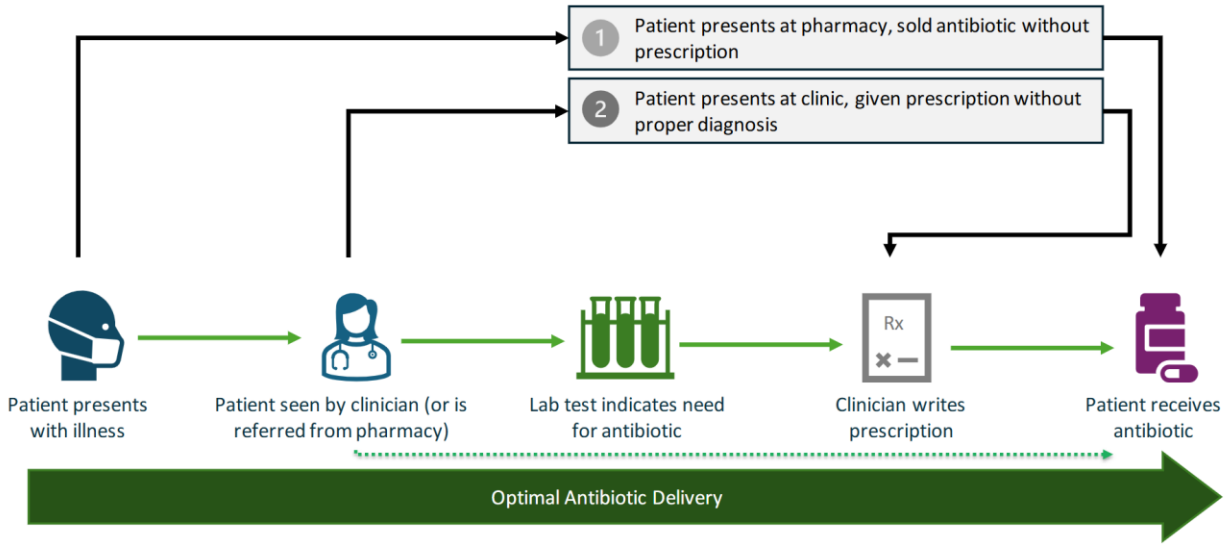
Of note, patients were interviewed at discrete care locations (lab, pharmacy, clinical care area) and coded as such even when occurring within the same facility type (e.g., patients interviewed in the hospital pharmacy were marked as being interviewed in the pharmacy, not the hospital). This unlocked location-specific questions within the questionnaire. Due to a data collection error in Tanzania, all patient interviews that occurred in public hospitals were coded as “hospital” rather than the corresponding care area; therefore, all patient data from Tanzania are presented by sector only (public or private) and not by care location.

Results: Pathway for optimal antibiotic delivery

Overview

The optimal pathway to antibiotic delivery, as well as where and why deviations occur, are represented in Figure 1.

Figure 1. Diagram of the pathway for optimal delivery of antibiotics and its deviations.



Before PATH (in partnership with other project stakeholders) can prioritize which outputs to incentivize with OBF, we must understand possible failure points and their potential drivers in the pathway to optimal antibiotic delivery:

- **Patient does not first seek clinician.**
  Possible drivers: patient cannot or does not want to wait for, pay for, and/or travel for clinician consultation.
- **Patient does not receive lab test (prior to antibiotic prescription)**.
  Possible drivers: provider recognizes some scenarios where it is okay to prescribe an antibiotic without a lab test result; patient cannot or does not want to wait for, pay for, and/or travel for lab test; lab test is unavailable; lab result is unclear or not in time to inform provider actions; patient already is seeking antibiotics from a health care provider.
- **Patient receives antibiotic without a prescription**.
  Possible drivers: patient has access to leftover antibiotics; patient receives an antibiotic directly from a clinic or pharmacy; patient receives advice from lab staff to seek an antibiotic; patient receives a different antibiotic than what was prescribed; pharmacist recognizes situations where it is okay to dispense an antibiotic without a prescription; prescription is unclear.

Patient does not first seek clinician

Main challenge to seeking clinical care (patient perspective)

The primary challenges patients face in seeking clinical care are wait times and the cost for the visit. These challenges persist regardless of income (Figure 2), though cost becomes more important among individuals with less income (Figure 3). These thresholds were chosen based on the distribution of responses indicating financial limitations to accessing health care. “Other” responses primarily included variations of cost (specifically for medications and tests) with some individuals indicating no challenge.

Figure 2. Patient-reported main challenges to seeking care (all patients).

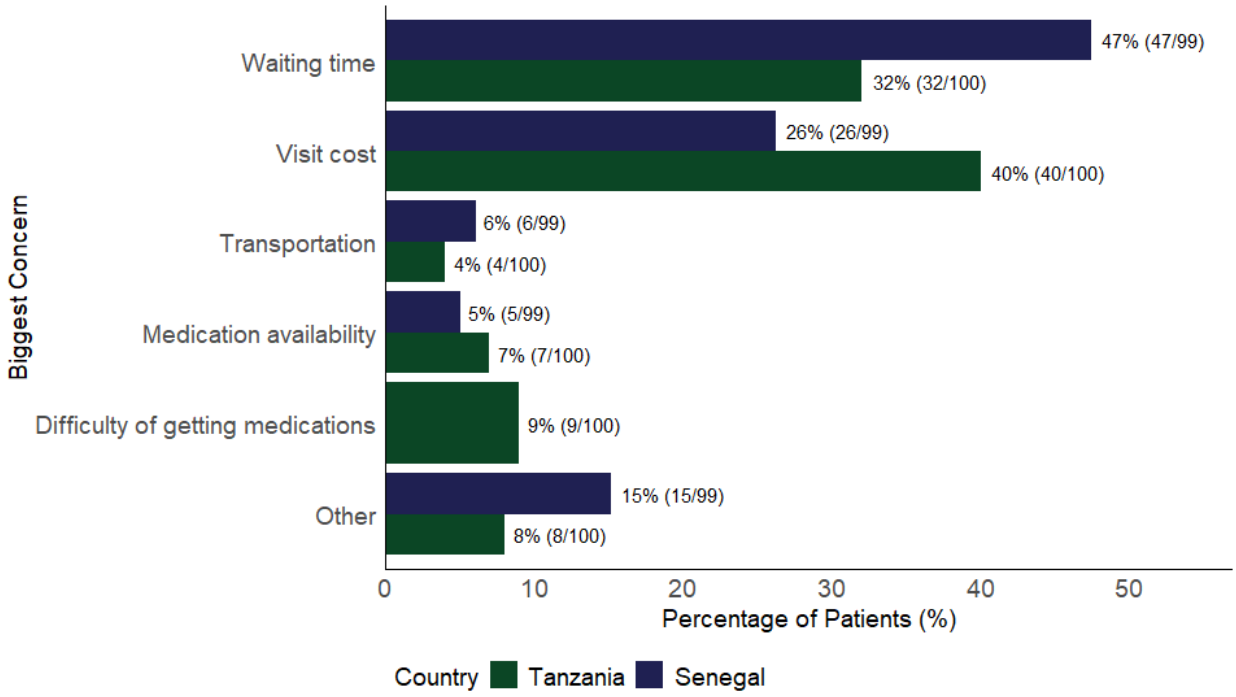
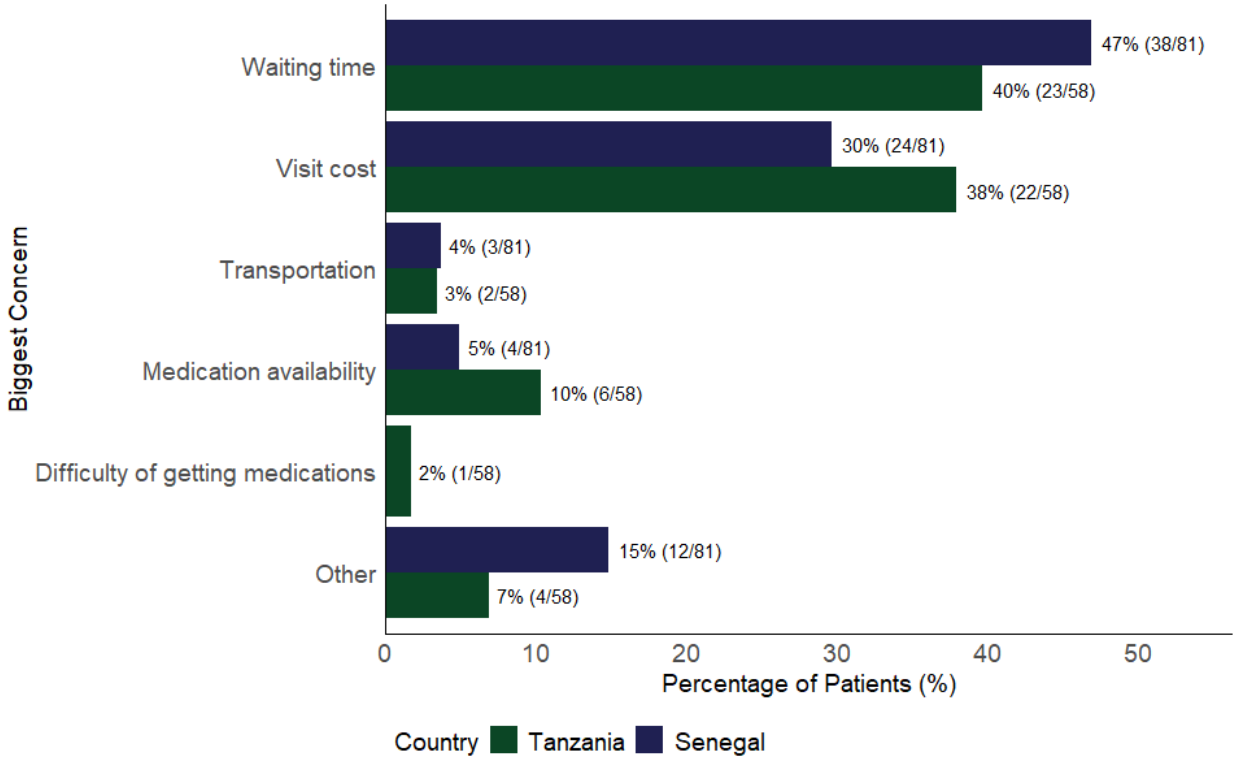


Figure 3. Patient-reported main challenges to seeking care (patients below the threshold of financial limitation).



Note: The threshold of financial limitation equals 400,000 West African CFA Francs (Senegal) or 600,000 Tanzanian Shillings.

Possible driver: Patient cannot or does not want to wait for clinician consultation

Wait times experienced in the private sector are consistent with the amount of time patients indicate they are willing to wait. Patients are not willing to wait any longer in the public sector versus the private sector. In Senegal, wait times at public-sector health facilities are higher than what patients indicate they are willing to tolerate. In Tanzania, patients experience longer wait times in public health facilities than in private ones, but willingness to wait in public facilities is very low. This arises because public facilities serve a much larger patient population, which influences patients' willingness to wait.

Figures 4 through 7 graph patient willingness to wait vs. actual wait times, by country.

Figure 4. Maximum time patients are willing to wait in health facilities in Senegal, by sector type.

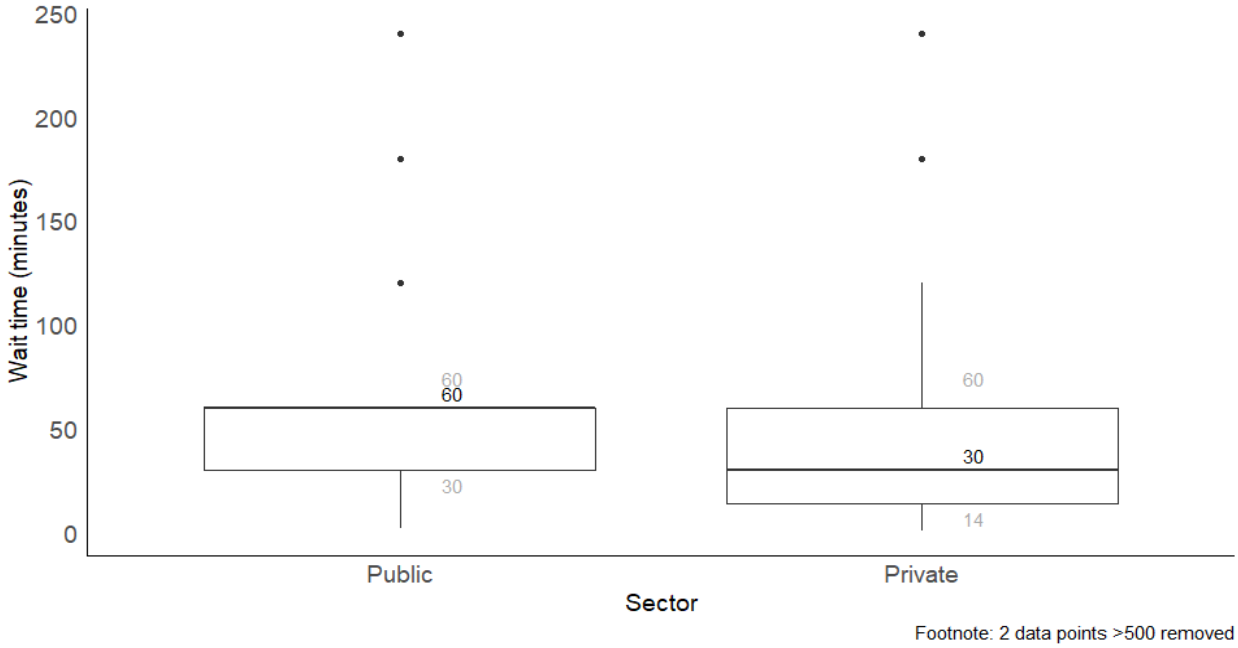


Figure 5. Actual wait time in health facilities in Senegal, by sector type.

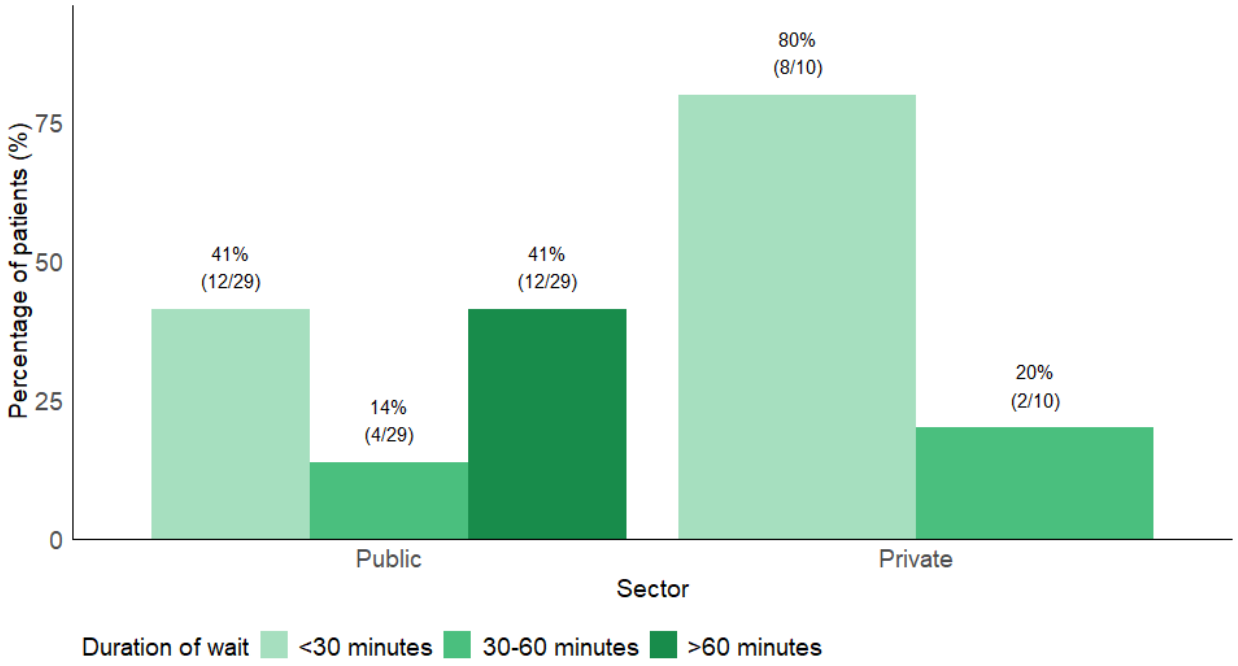


Figure 6. Maximum time patients are willing to wait in health facilities in Tanzania, by sector type.

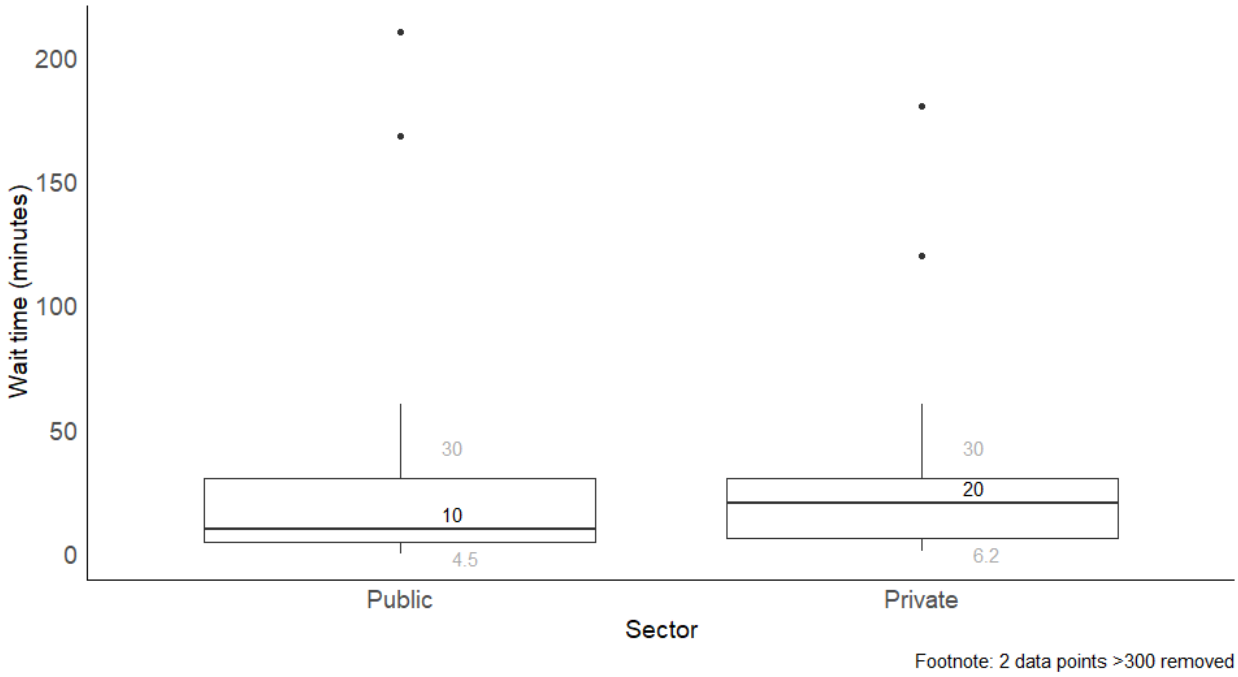
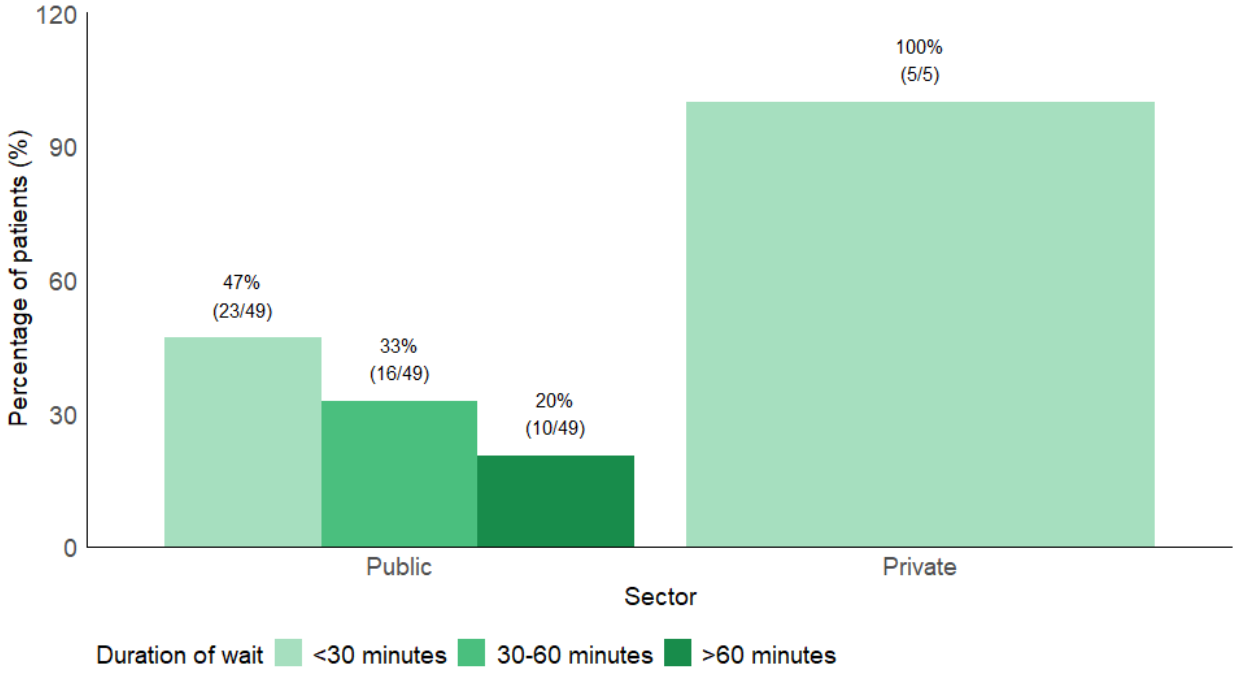


Figure 7. Actual wait time in health facilities in Tanzania, by sector type.



Possible driver: Patient cannot or does not want to pay for clinician consultation

Overview

In Senegal, **90 percent** of patients are willing to pay to see a health care provider to receive the right medication. In Tanzania, **91 percent** of patients are willing to pay to see a health care provider to receive the right medication. Actual costs incurred across both public and private sectors and across both countries are at or below what patients are willing to pay. Figures 8 and 9 summarize these data for Senegal and Tanzania, respectively. *Note that roughly half the data for actual cost of the clinic visit are missing for each country.*

Figure 8. Willingness to pay for and actual cost of clinic visit in Senegal, by sector type.

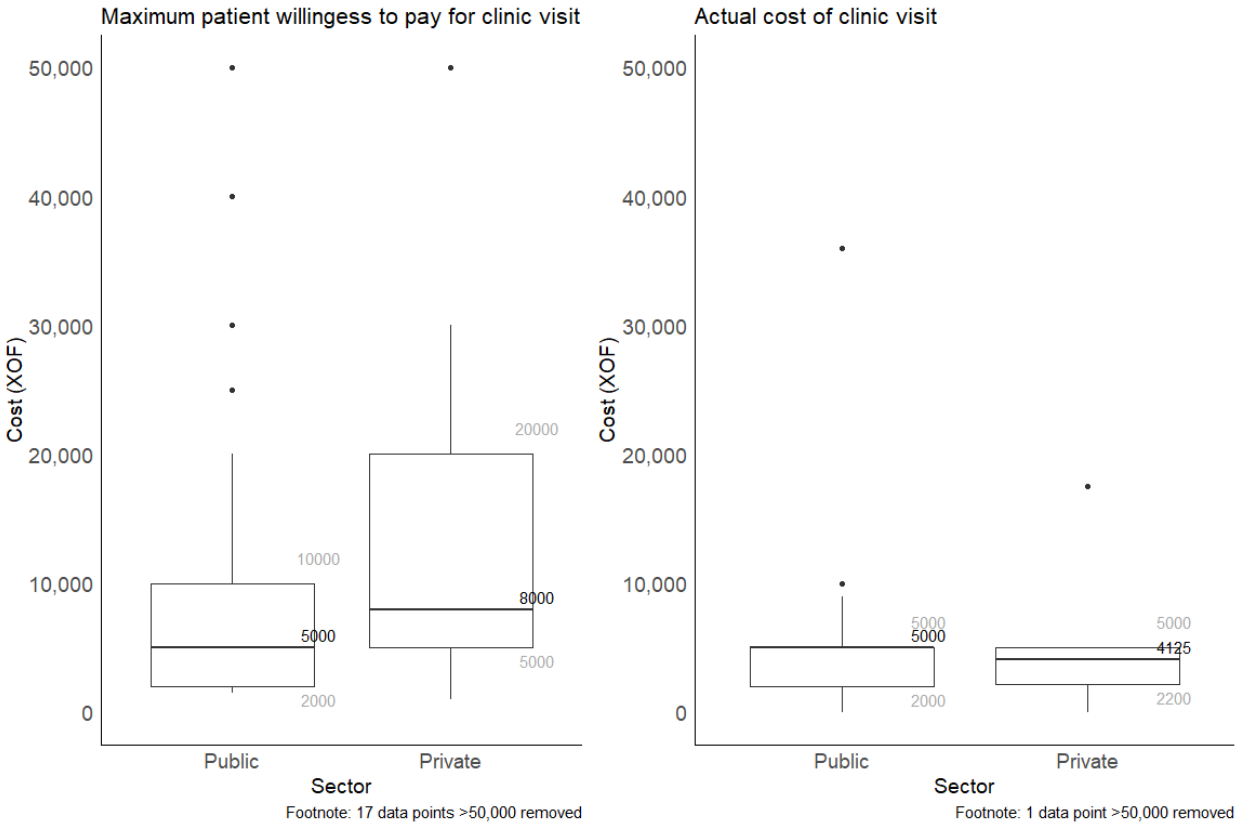
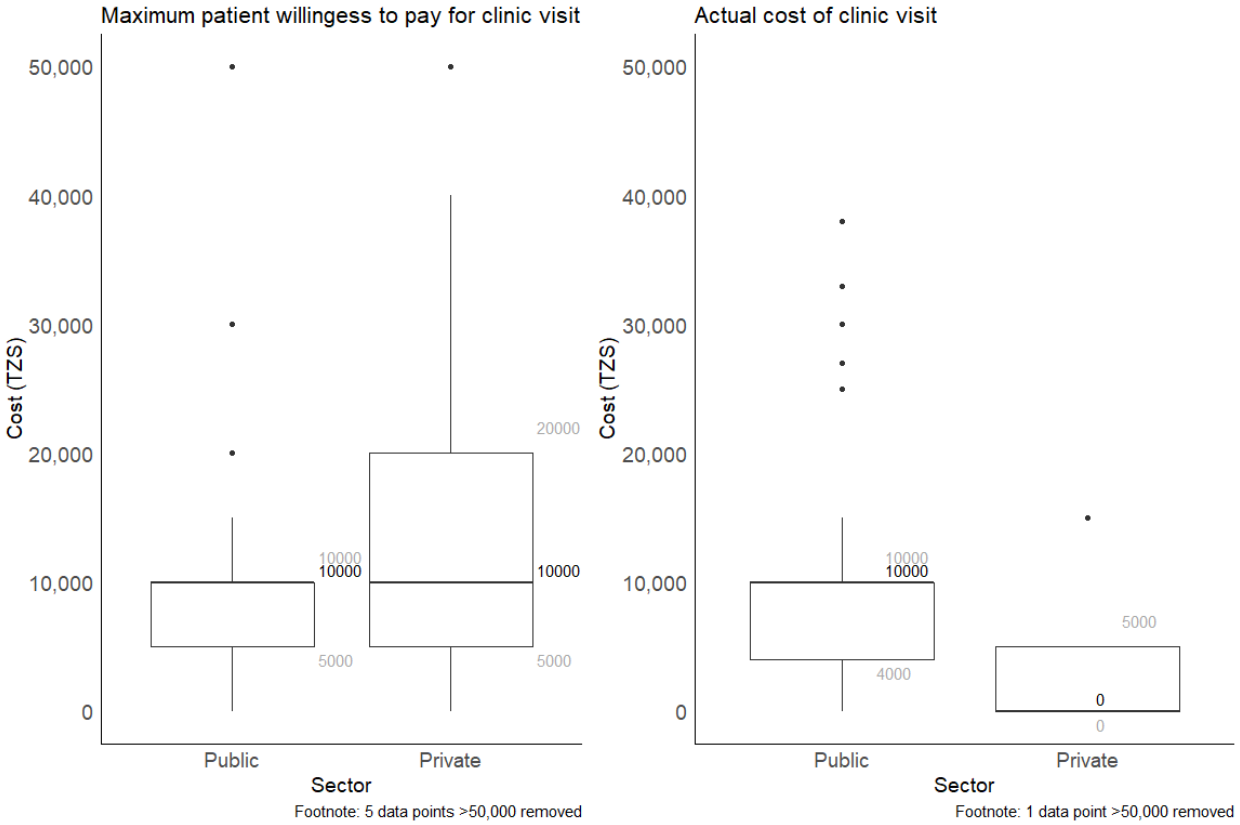


Figure 9. Willingness to pay for and actual cost of clinic visit in Tanzania, by sector type.



Financial barriers to care

Regardless of income, most people expressed feeling that their access to health care is limited by income at least some of the time. Generally speaking, people making below 400,000 West African CFA Francs in Senegal and 600,000 Tanzanian Shillings (TZS) in Tanzania feel more limited more often in their ability to access care (Figures 10 and 11, respectively).

Figure 10. Frequency at which access to care is limited by income: Senegal.

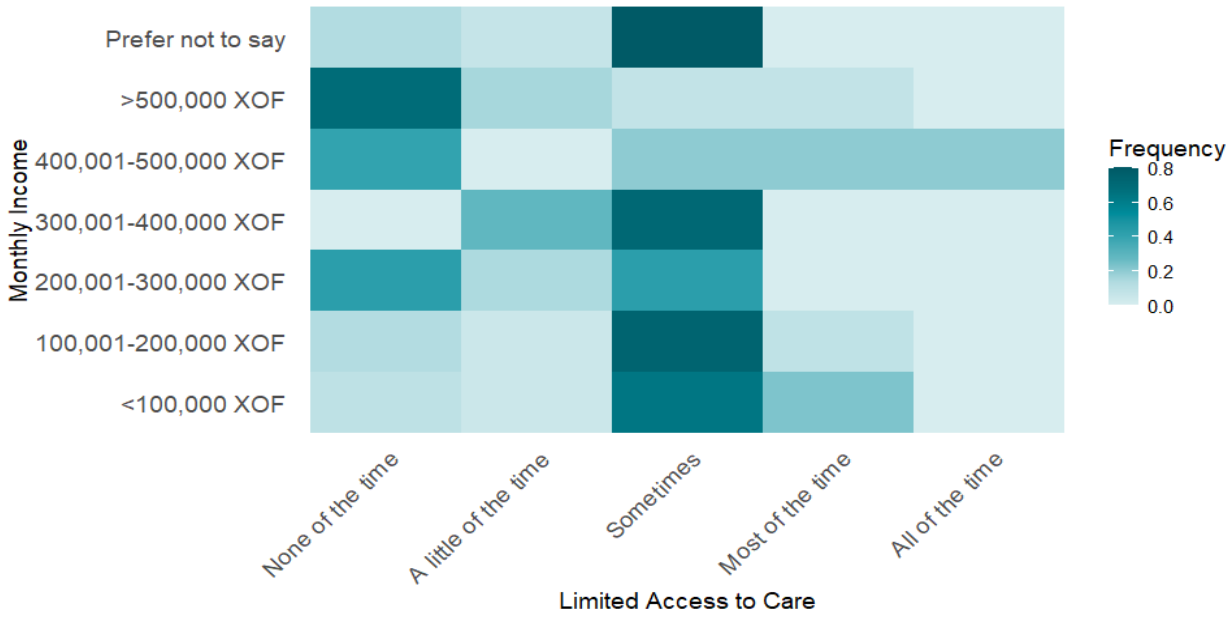
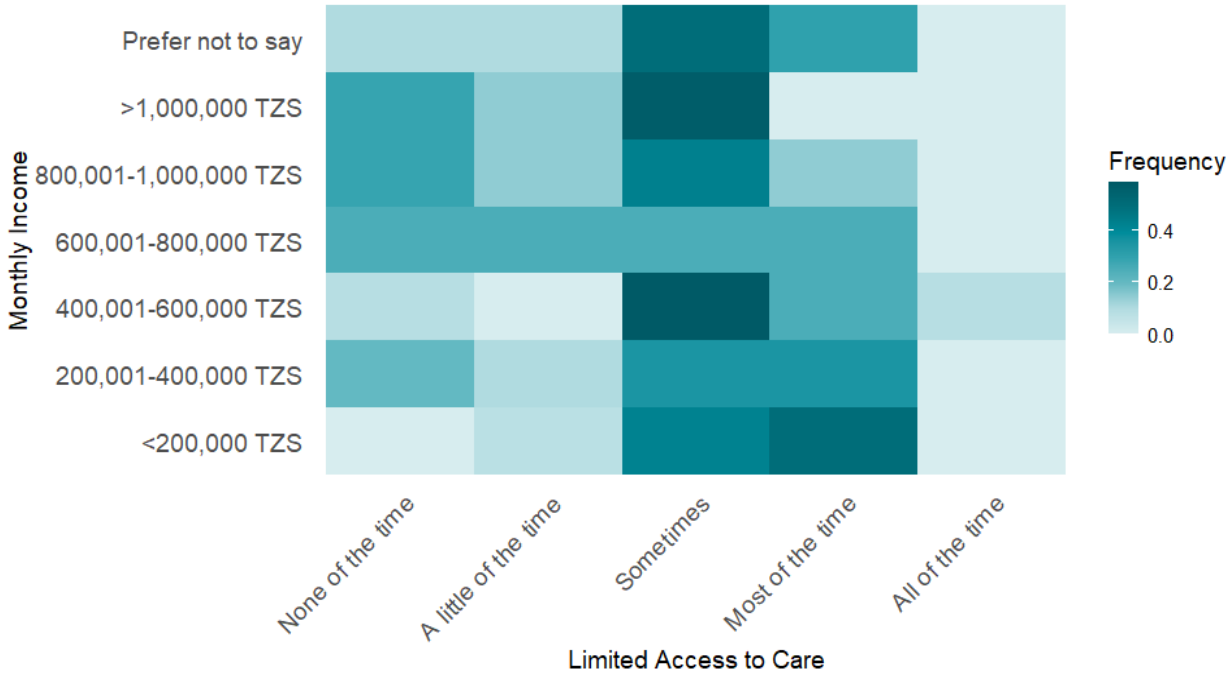


Figure 11. Frequency at which access to care is limited by income: Tanzania.



Possible driver: Patient cannot or does not want to travel for clinician consultation

Patients traveled 40 and 60 percent further in Senegal and Tanzania, respectively, to seek care at a public facility than they did when seeking care at a private one. In Senegal this is less than the distance patients are willing to travel, while in Tanzania this is on average twice the distance patients are willing to travel compared to how far they are willing to travel to seek care at a private facility—and they are willing to spend a little more for private- versus public-sector care, as well. Since more than 70 percent of health facilities in Dar es Salaam are privately owned, patients must travel farther to access public services. Figures 12 and 13 demonstrate these data.

Figure 12. Distance patients will travel for clinic visit in Senegal vs. actual distance traveled, by sector type.

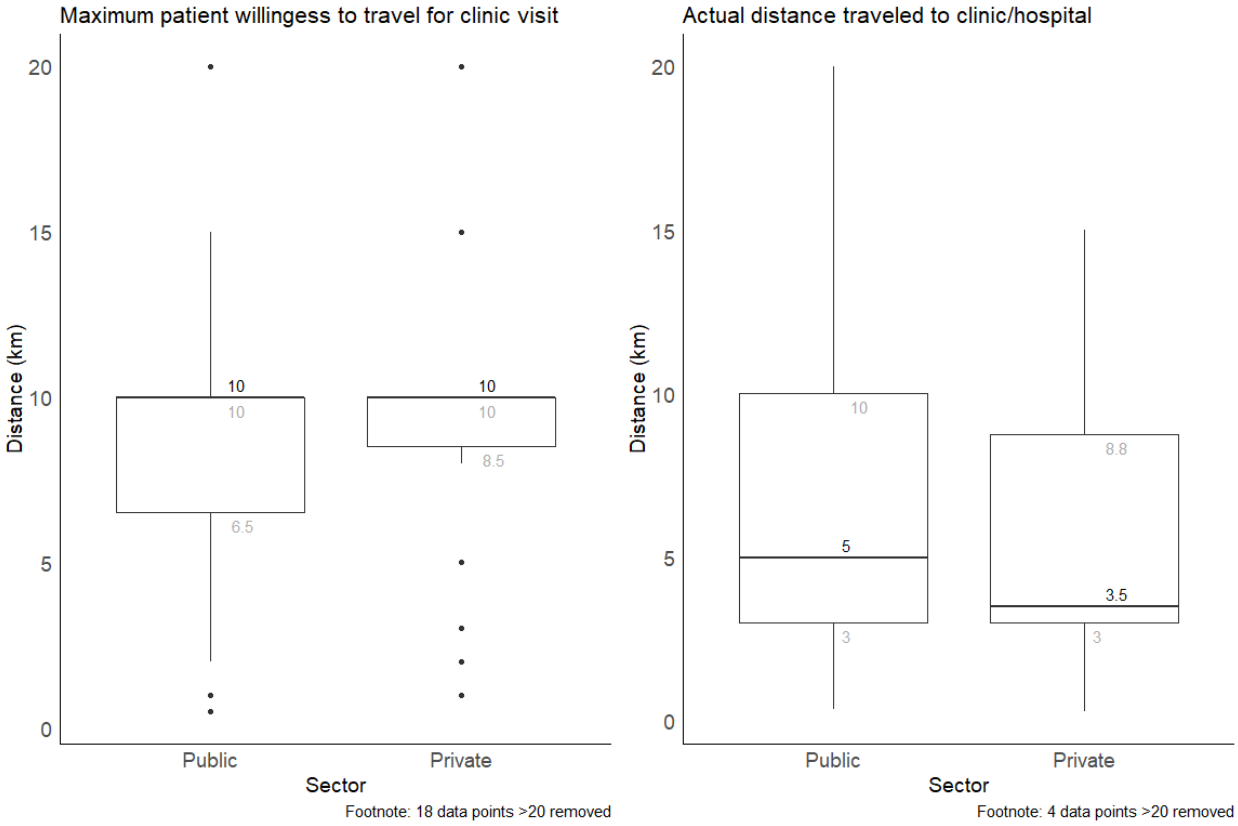
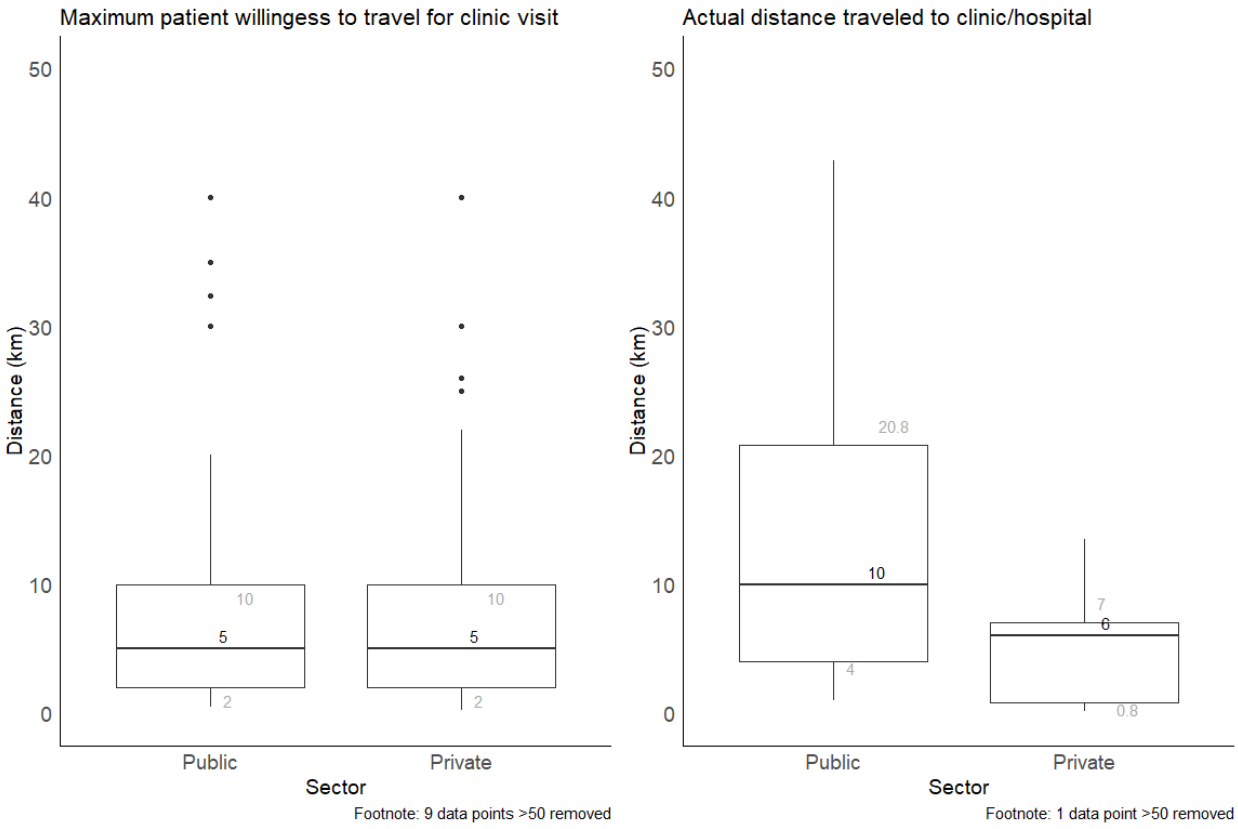


Figure 13. Distance patients will travel for clinic visit in Tanzania vs. actual distance traveled, by sector type.



Patient does not receive lab test (prior to antibiotic prescription)

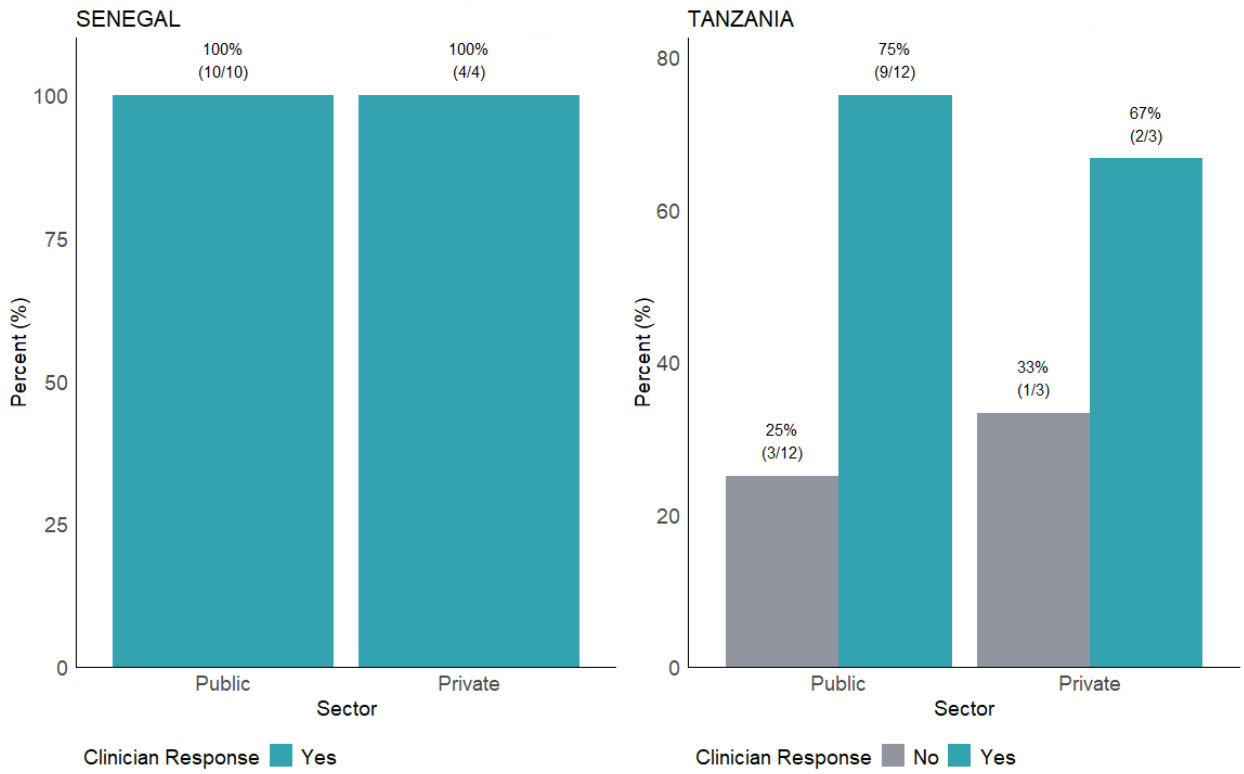
Possible driver: Provider recognizes some scenarios where it is okay to prescribe an antibiotic without a lab test result

In Senegal, reasons clinicians provided for prescribing an antibiotic without a lab result included presence of respiratory infections (including “influenza syndromes” and bronchopulmonary infection), evident outbreaks, cases in which a physical examination reveals the source of infection, cases of severe illness (e.g., sepsis, coma with infectious syndrome), suspicion of neuromeningeal damage/syndrome, emergencies, and cases in which it is “clinically evident.” This is largely consistent with clinical guidelines for prescribing antibiotics to prevent bronchopulmonary infection and avoid complications from the flu.

In Tanzania, reasons clinicians provided for prescribing an antibiotic without a lab result included cases in which testing is not available, the standard treatment guidelines indicate antibiotic treatment based on symptomology (e.g., patient with painful urination, indicating a UTI; patient with a cut; presence of pus in a wound; patient with an upper respiratory infection who previously had been prescribed amoxicillin and erythromycin but has a return of symptoms a month later, requiring a sensitivity test), an antibiotic had been prescribed but did not work (e.g., an ICU patient who still has a fever after 24 hours of treatment with an antibiotic), or the patient is being prepped for surgery. This is largely consistent with clinical guidelines that recognize reliance on symptomatic evaluation and clinical judgement when testing is not available.

Figure 14 graphs provider responses for each country as to whether prescribing antibiotics without a lab result is indicated in some scenarios, by sector type.

Figure 14. Clinician perspective on whether there are situations in which a lab result is not needed to prescribe an antibiotic, by country and sector type.



Possible driver: Patient cannot or does not want to wait for a lab test

In Senegal, 25 percent of patients are willing to wait up to 12 hours for a lab test in public-sector facilities and up to 24 hours in private-sector ones, while in Tanzania most patients are not willing to wait more than 2 hours for a lab test, regardless of the sector. Figures 15 and 16 summarize these findings for Senegal and Tanzania, respectively.

Additionally, in Tanzania over half of providers in public-sector labs report having patients leave the lab without being tested because the wait is too long, which rarely happens in Senegal—and never in the private sector for either country (Figure 17).

Figure 15. Maximum amount of time patients will wait for a lab test in Senegal, by sector type.

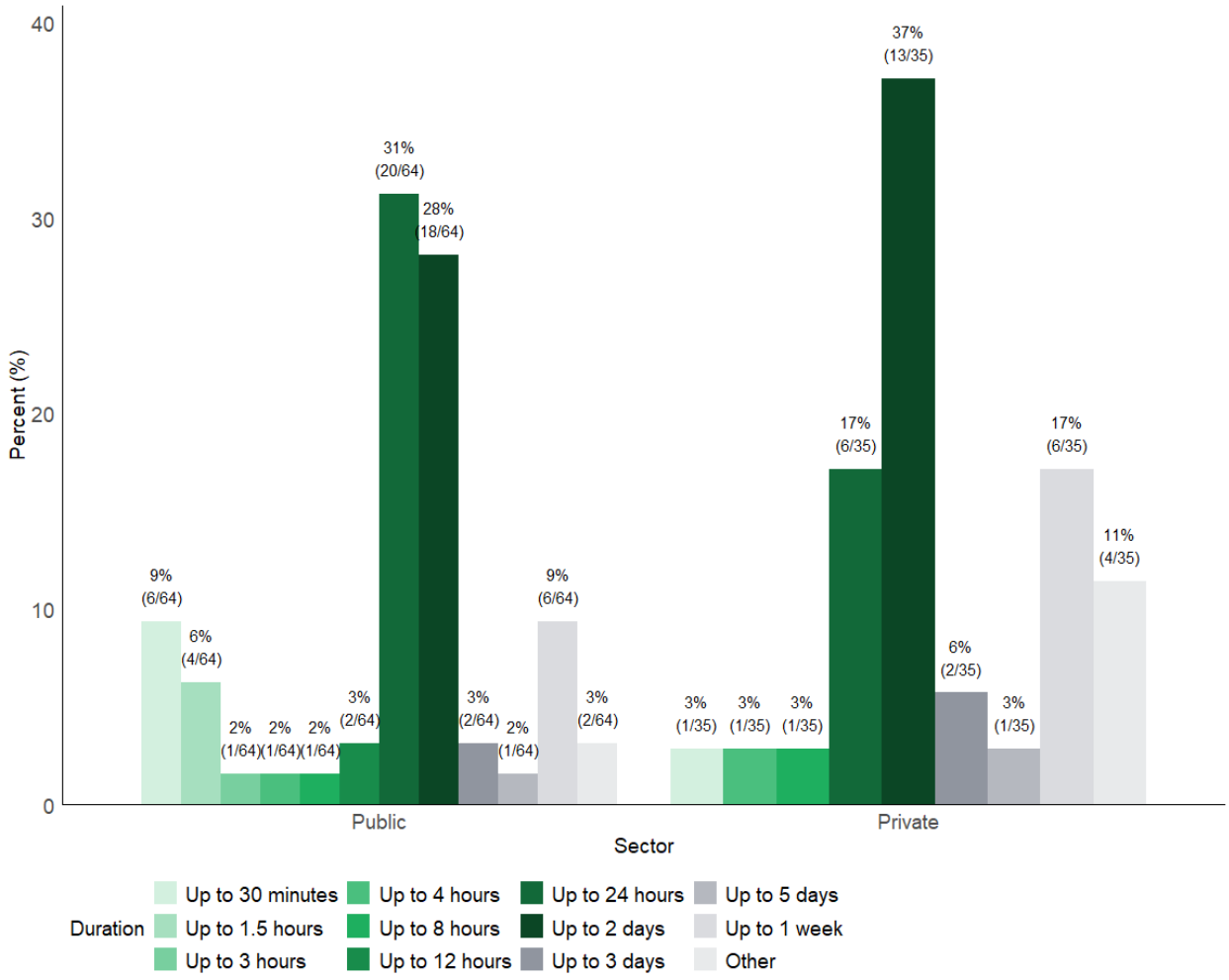


Figure 16. Maximum amount of time patients will wait for a lab test in Tanzania, by sector type.

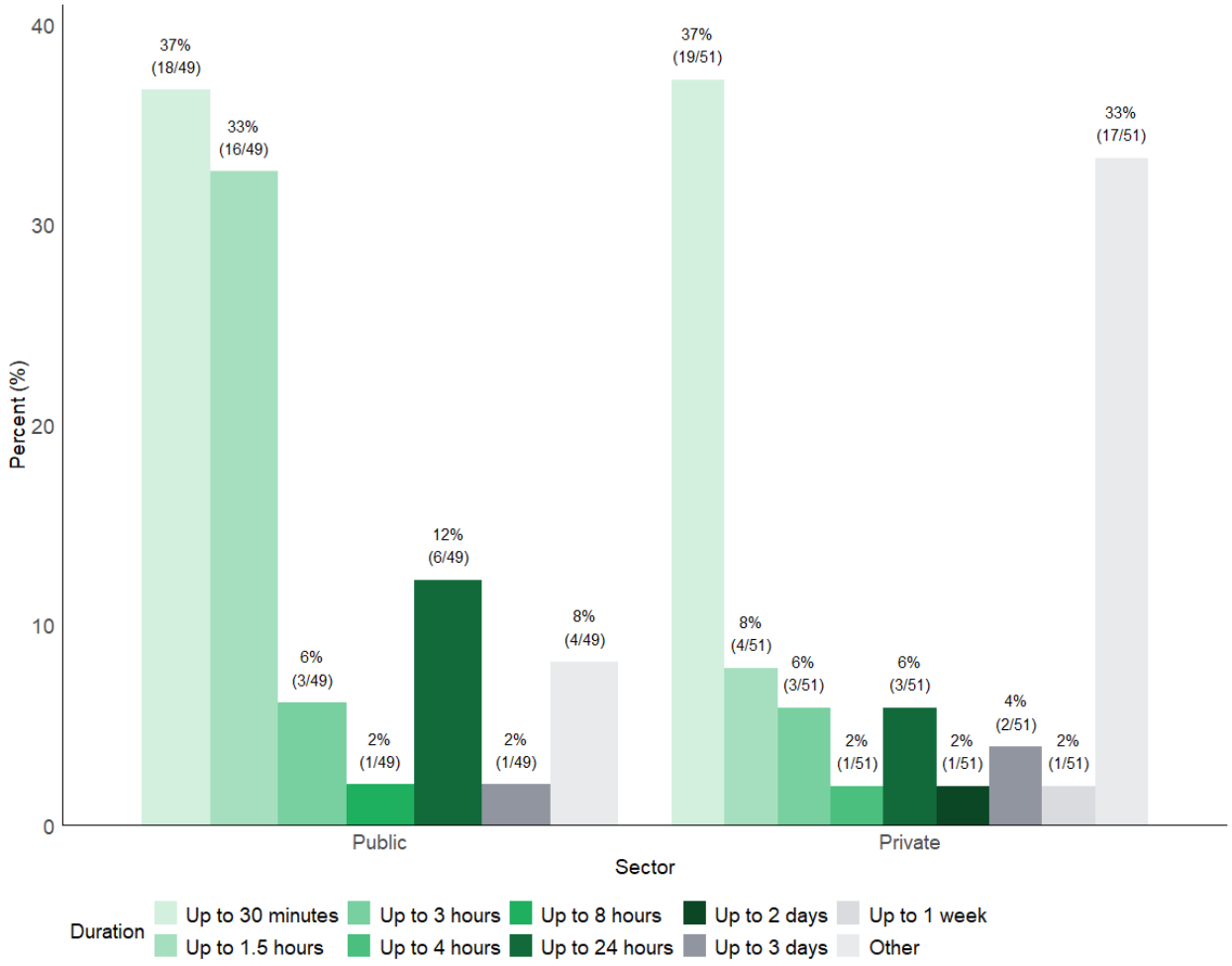
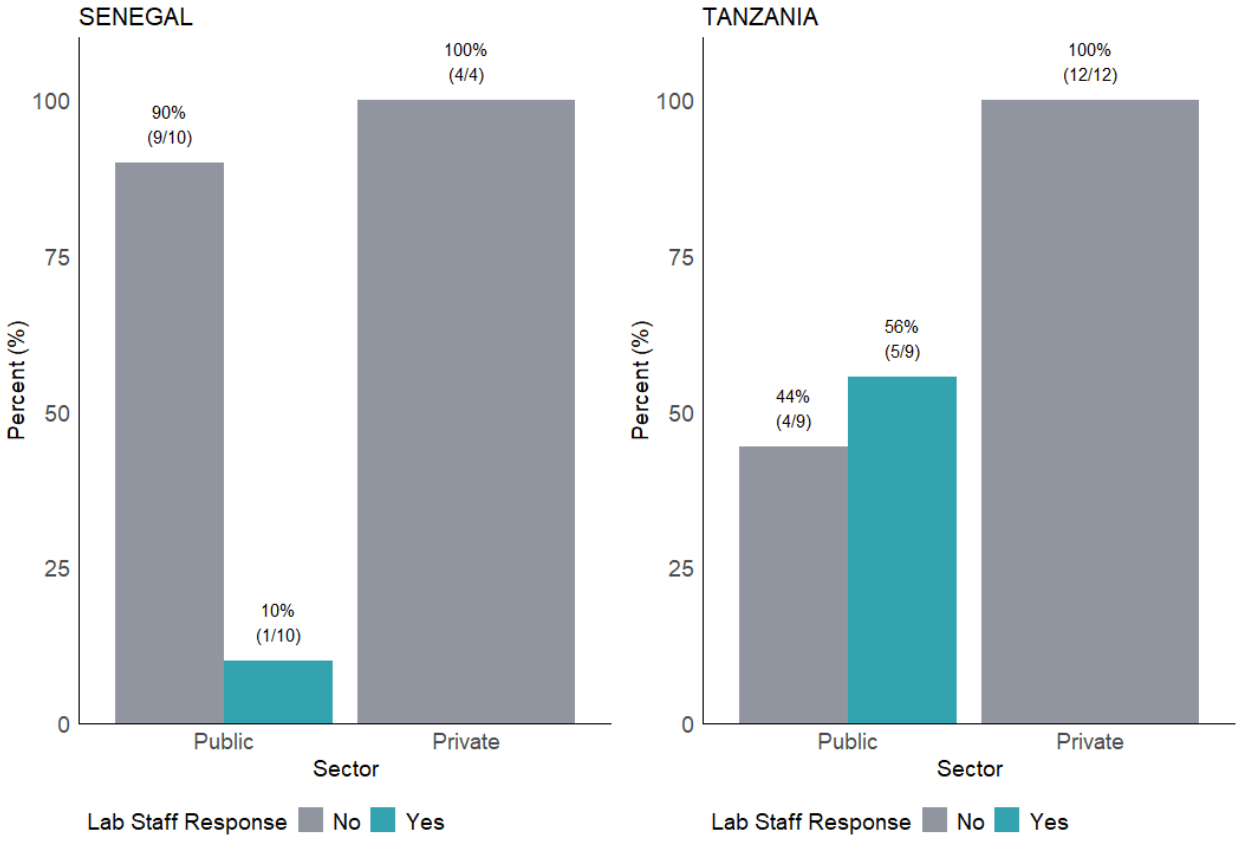


Figure 17. Lab perspective on whether patients ever leave without being tested because the wait is too long, by country and sector type.



Possible driver: Patient cannot or does not want to pay for a lab test

In Senegal, **87 percent** of patients are willing to take a lab test before receiving medication, and **92 percent** are willing to pay for it (Figure 18). In Tanzania, **99 percent** of patients are willing to take a lab test before receiving medication, and **91 percent** are willing to pay for it (Figure 19). *Note that data on how much was actually spent on a lab test are not available.*

Figure 18. Maximum amount (in West African CFA Francs) patients will pay for a lab test in Senegal, by sector type.

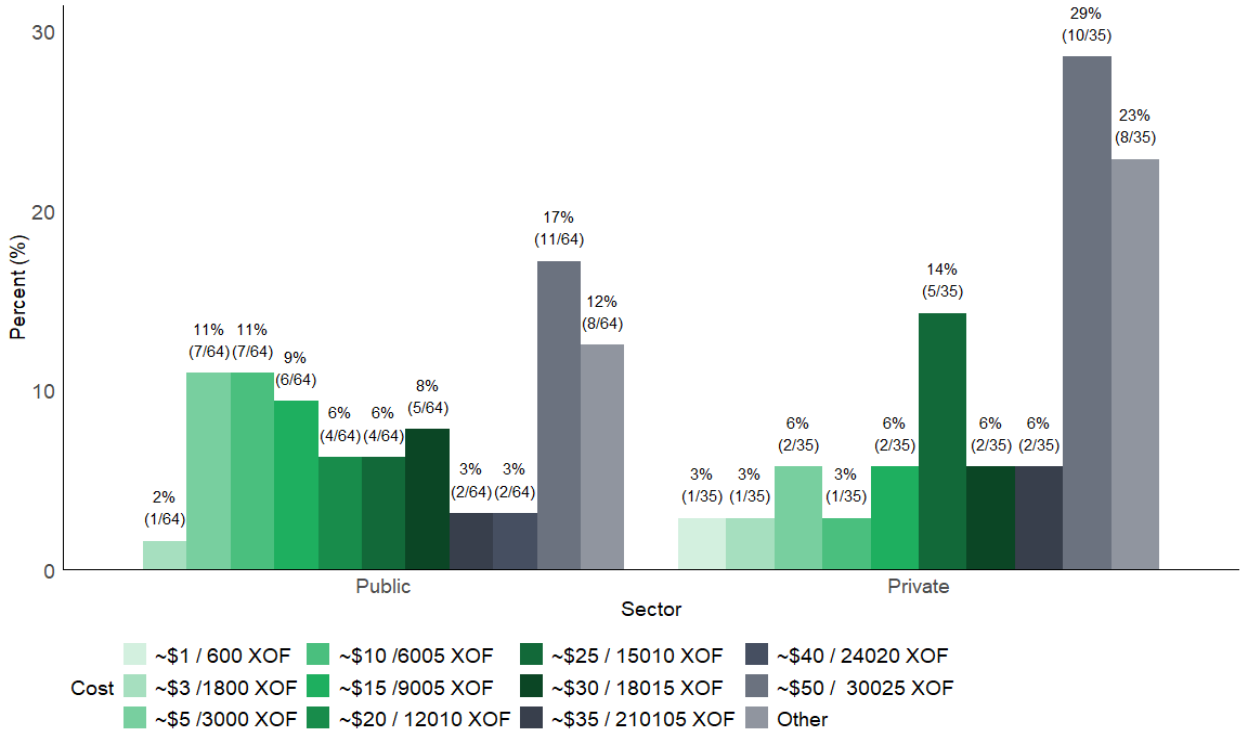
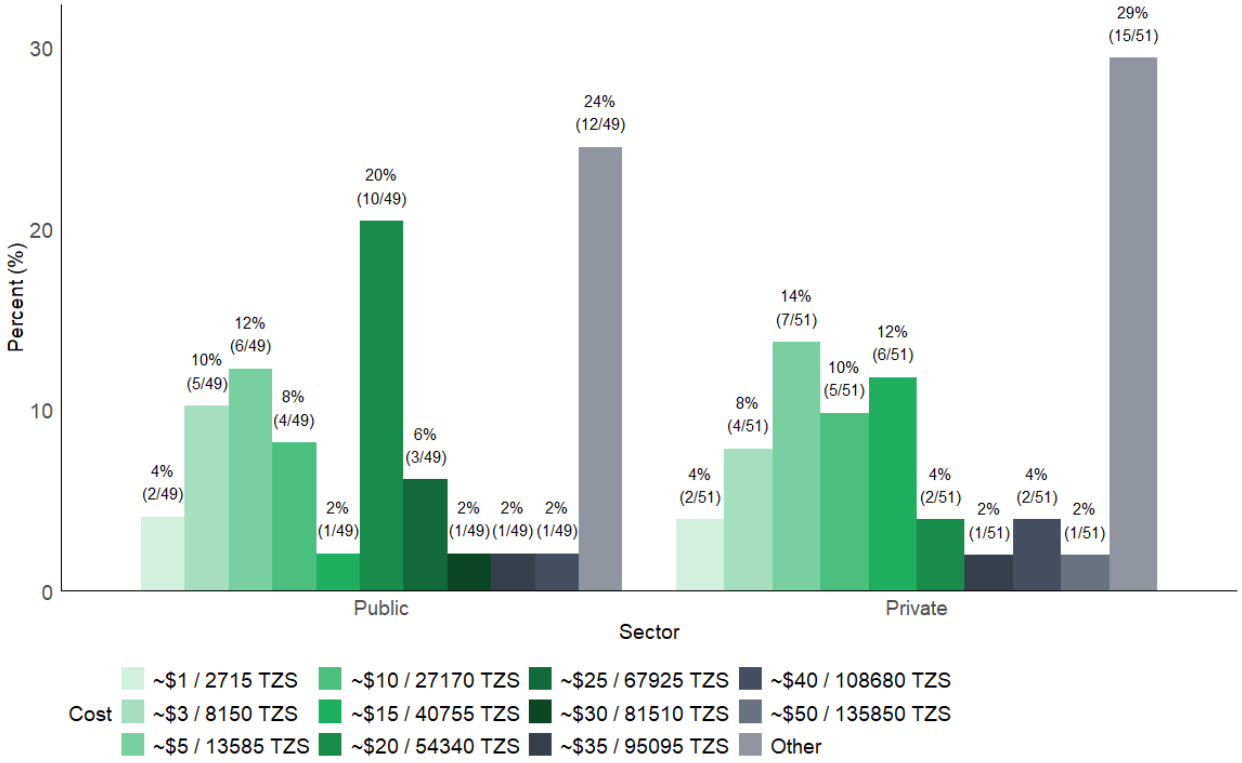


Figure 19. Maximum amount (in Tanzanian Shillings) patients will pay for a lab test in Tanzania, by sector type.



Responses for “Other” in Tanzania varied. Some respondents stated they would pay upwards of 150,000 TZS or whatever was required of them; a handful of respondents were not willing to pay more than 20,000 to 30,000 TZS; and the remaining handful were not willing to pay more than 2,000 TZS.

Possible driver: Patient cannot or does not want to travel for a lab test

Across sectors, patients traveled at or below the distance they were willing to tolerate for a lab test in both Senegal (Figure 20) and Tanzania (Figure 21).

Figure 20. Distance patients will travel for lab test in Senegal vs. actual distance traveled, by sector type.

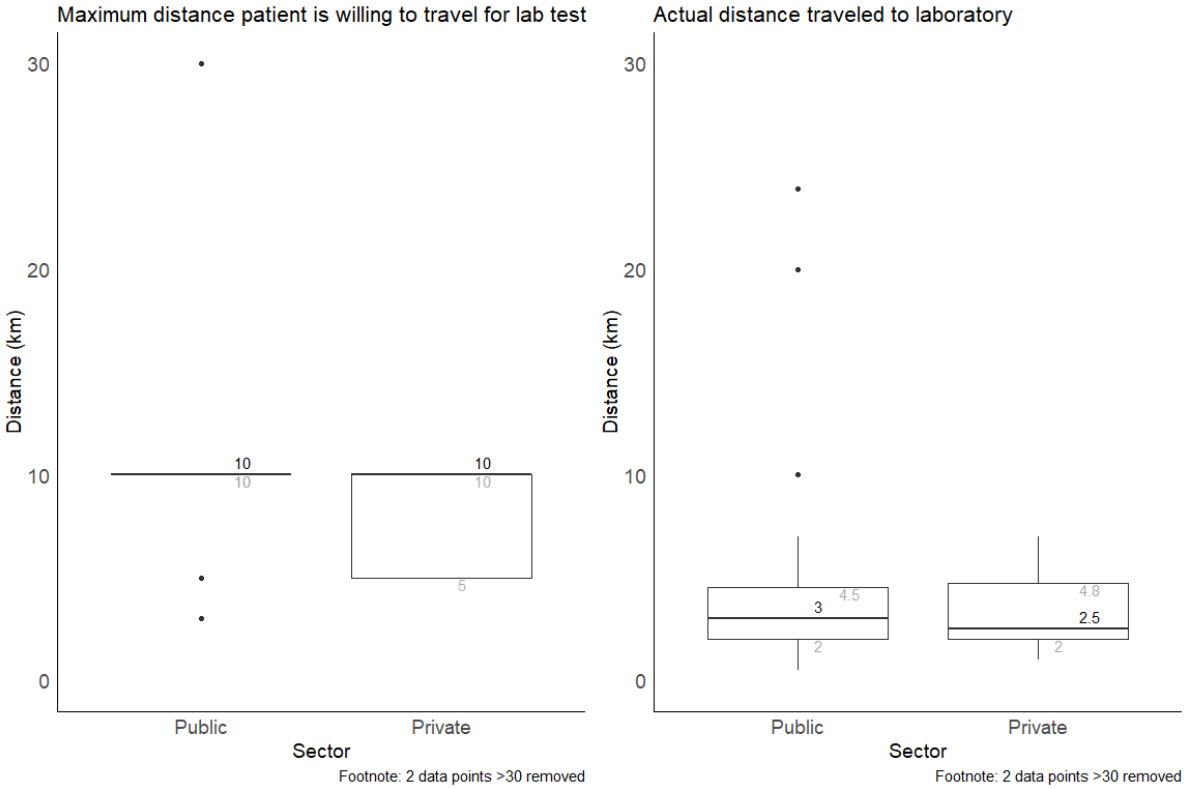
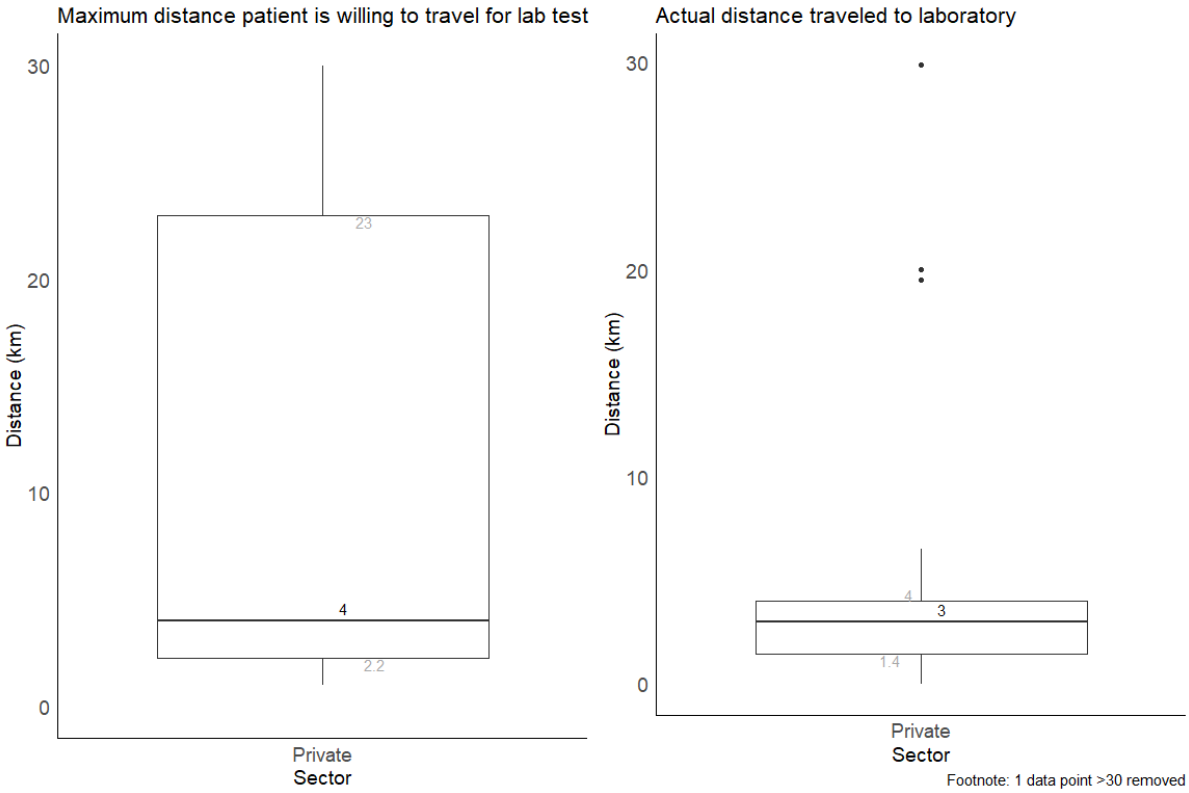


Figure 21. Distance patients will travel for lab test in Tanzania vs. actual distance traveled, by sector type.



Possible driver: Lab test is unavailable

Unavailability of a lab test does not happen frequently in either country. When a test is unavailable at a particular facility, lab techs in Senegal reported telling the patient to come back later (N=4) or referring the patient to another lab (N=9), while lab techs in Tanzania reported contacting the clinician (N=4) or either referring the patient to another center or sending the sample to another laboratory in their branch, such as in India, South Africa, or Nairobi (N=11). Lab staff also stated that when a test is no longer available, it is locked in the system so it cannot be ordered.

Possible driver: Lab result is unclear or not in time to inform provider actions

All lab tech respondents in both countries stated that lab test results are always clear, and the turnaround time for culture and drug susceptibility testing is 3 to 4 days. No other turnaround time data were obtained. Most clinicians (10/14 in Senegal and 13/15 in Tanzania) stated that results are always returned; those disagreeing said it was rare not to receive results.

In Senegal, 4 of the 14 clinicians interviewed expected to receive lab results in less than 4 hours, while 5/14 expected to receive results in 6 to 24 hours. The remaining clinicians expected results in 2 to 3 days. For results that are taking longer than expected, 4 clinicians (29 percent) stated they would prescribe an antibiotic, while 8 (57 percent) stated they would contact the lab directly.

In Tanzania, all clinicians said the turnaround time for lab results depends on the test, but all generally agreed that for simple tests (e.g., urine tests, blood chemistry), they expected results within a couple of hours. Cultures were expected to take 2 to 3 days. For results that take longer than expected, 9 clinicians (60 percent) stated they would contact the lab, and 3 (20 percent) stated they would treat the patient clinically for the result they expected while they wait for the result.

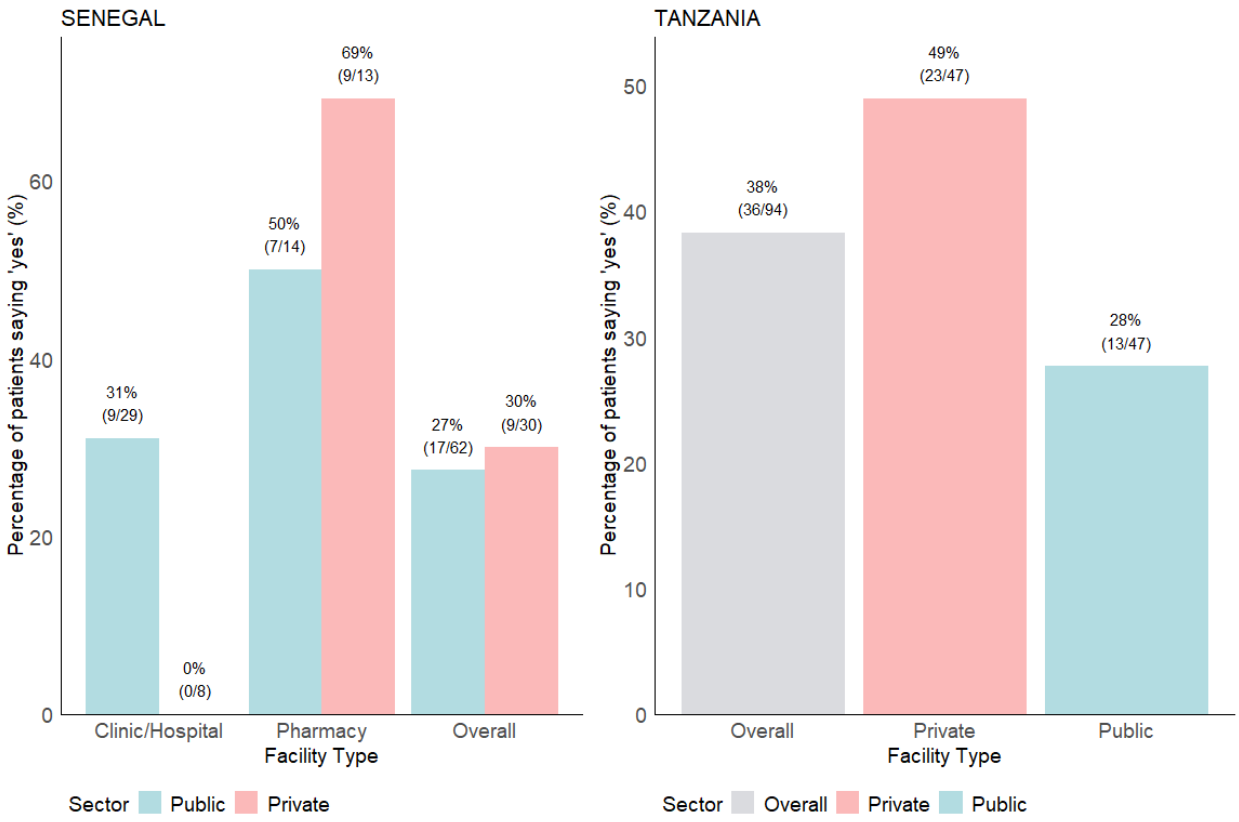
Possible driver: Patient already is seeking a specific medication

Most patients reported seeking a specific medication, though they largely reported seeking a medication that makes them “feel better” (not an antibiotic, specifically).

In Senegal, only 2 of 99 participants reported seeking specific antibiotics, while others were primarily seeking paracetamol or other pain killers and cold/flu medications. Specific antibiotics were more commonly sought in Tanzania (21 out of 100, including 3 seeking general tuberculosis drugs), while others either sought vitamins or paracetamol or else stated that they did not know what medication to seek but expected to be given something. Of the people hoping to get a specific medication, less than half actually asked the provider for it, with the exception of private pharmacies, in which approximately 75 percent of patients asked. In both countries, most physicians indicated that patients request an antibiotic when they do not meet the criteria for it (though infrequently), regardless of sector type. All private-sector pharmacists reported this happening, as well (though infrequently), but it was seldom reported by pharmacists in the public sector.

Figure 22 shows the percentage of patients in each country who asked for a specific medication.

Figure 22. Patients' perspective on whether they asked provider for specific medication, by facility type (Senegal) or sector type (Tanzania).



Figures 23 and 24 show health care provider responses to whether patients request antibiotics without meeting the criteria or having a prescription in Senegal and Tanzania, respectively.

Figure 23. Health care provider perspective on whether patients request antibiotics who either do not meet the criteria (clinicians) or do not have a prescription (pharmacists): Senegal.

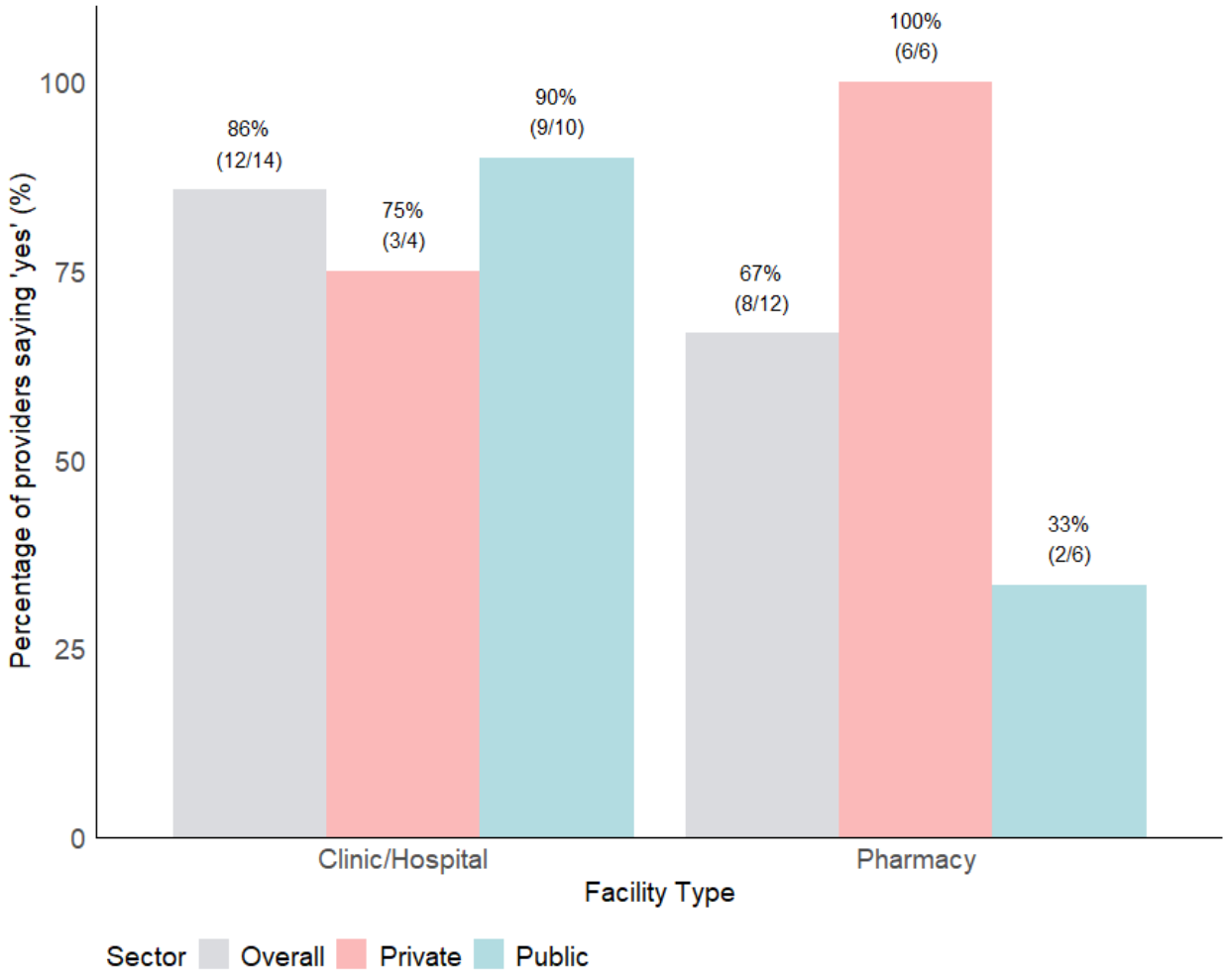
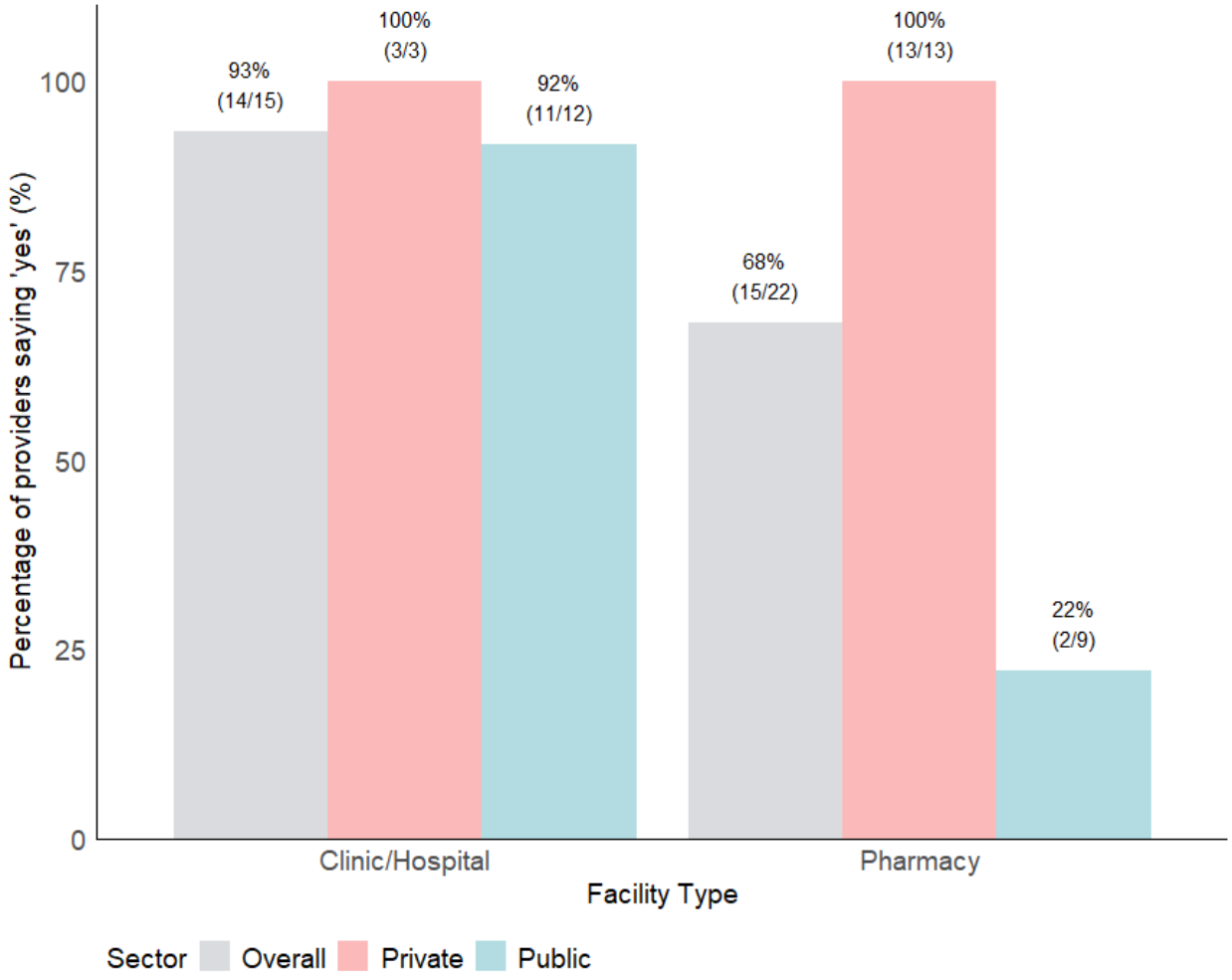


Figure 24. Health care provider perspective on whether patients request antibiotics who either do not meet the criteria (clinicians) or do not have a prescription (pharmacists): Tanzania.



Figures 25 and 26 show health care provider responses to how often patients request antibiotics without meeting the criteria or having a prescription in Senegal and Tanzania, respectively.

Figure 25. Health care provider perspective on how frequently patients request antibiotics who either do not meet the criteria (clinicians) or do not have a prescription (pharmacists): Senegal.

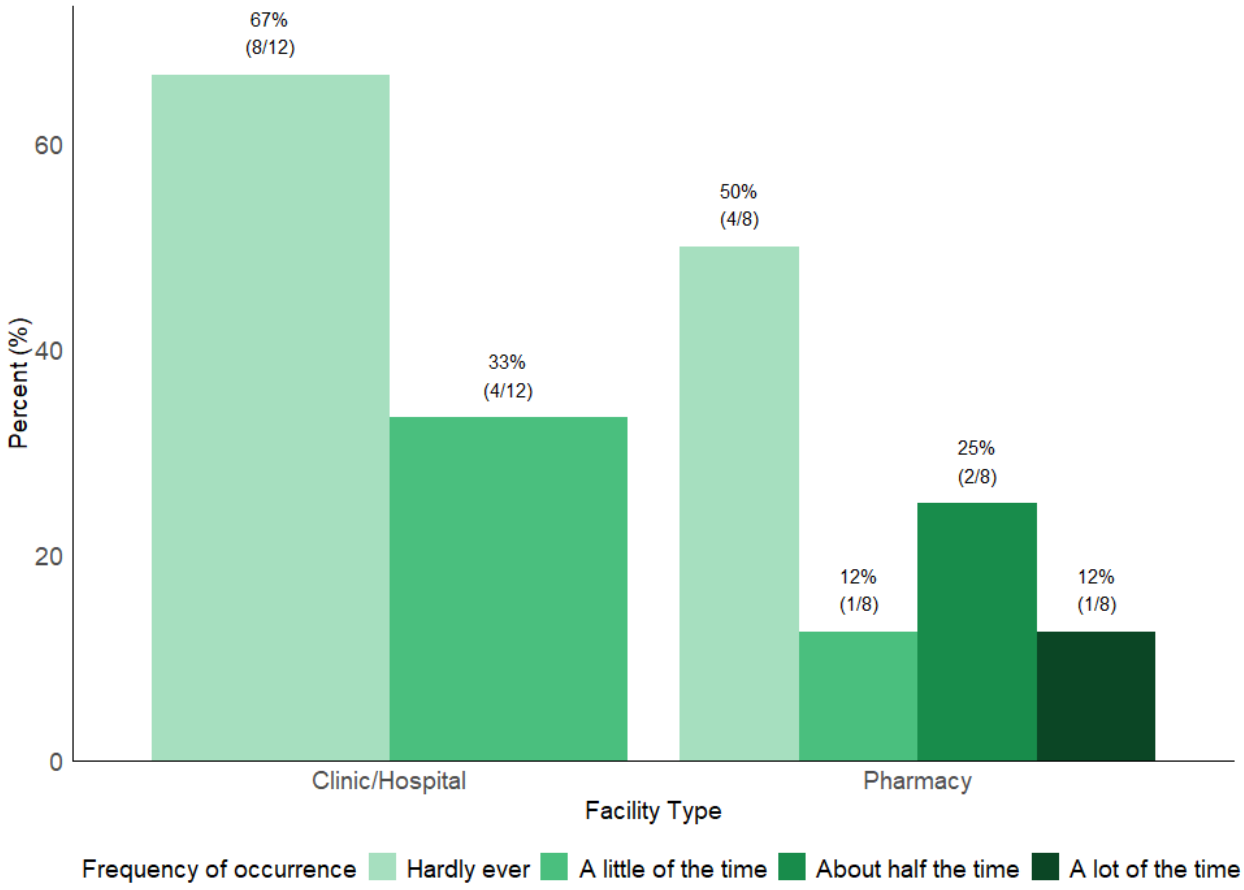
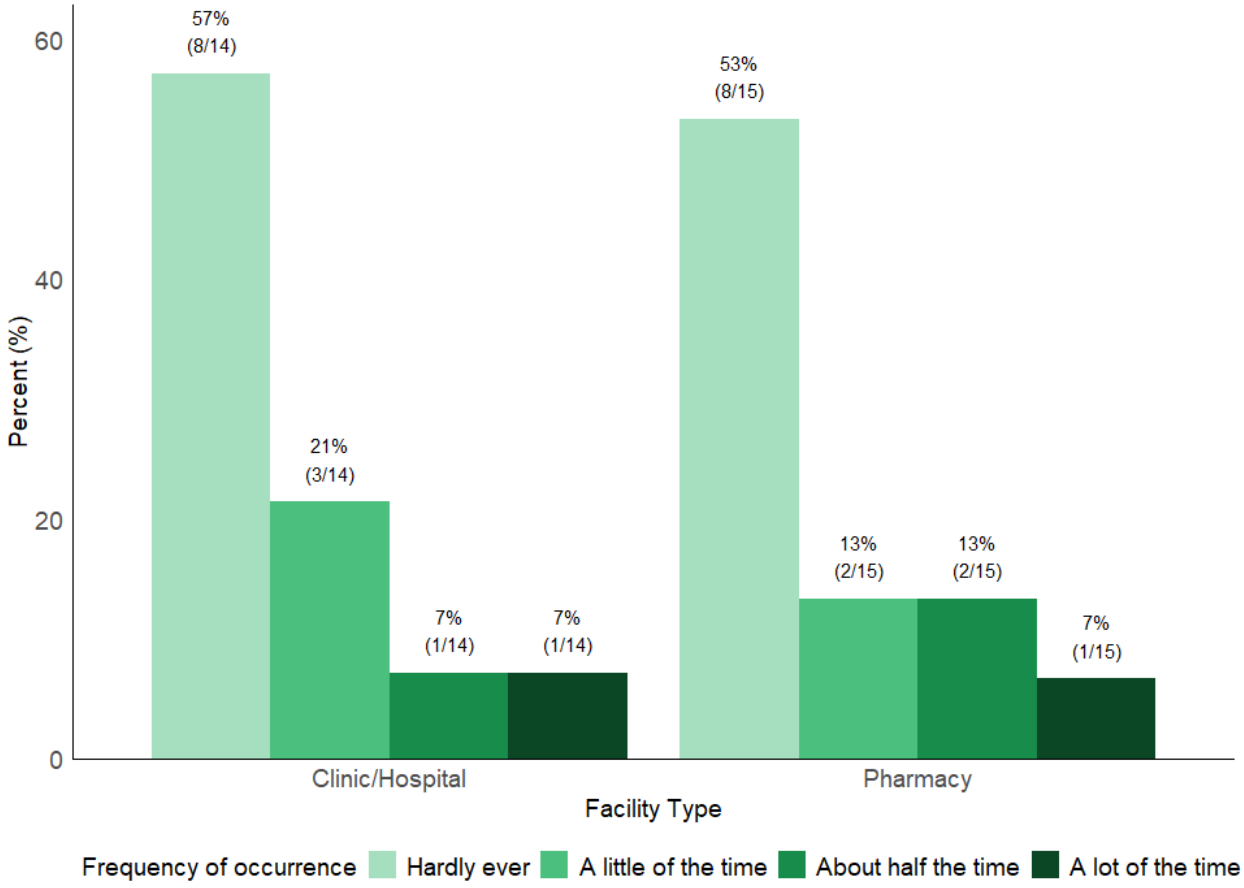


Figure 26. Health care provider perspective on how frequently patients request antibiotics who either do not meet the criteria (clinicians) or do not have a prescription (pharmacists): Tanzania.

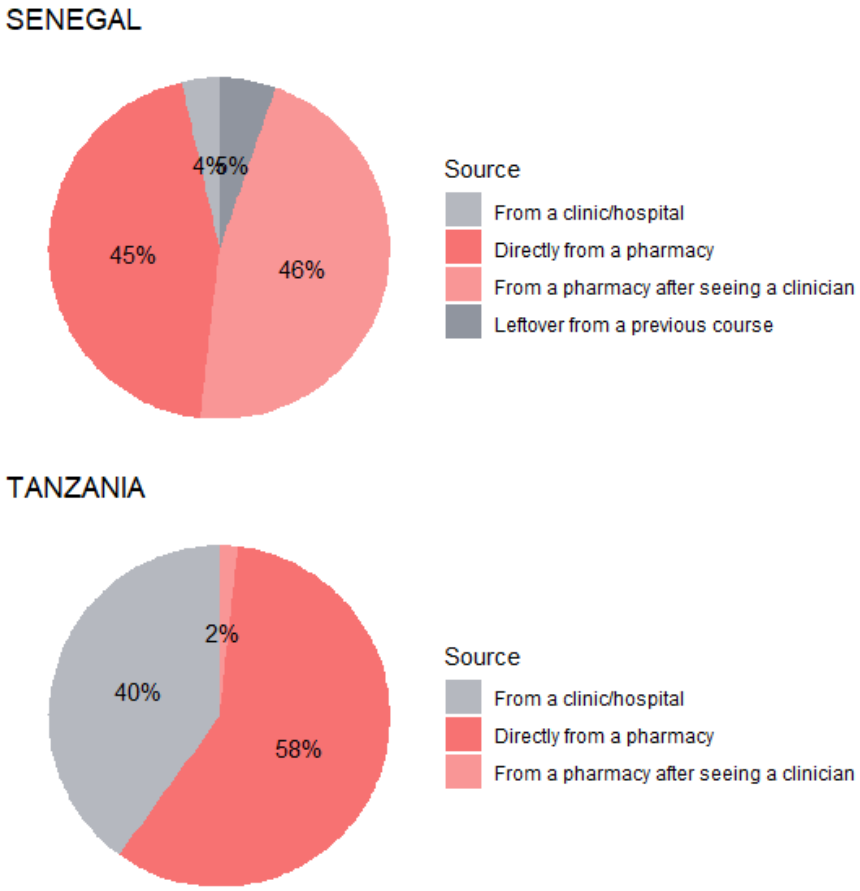


Patient receives antibiotic without a prescription

Possible driver: Patient has access to leftover antibiotics or receives them directly from a clinic or pharmacy (without a prescription)

Approximately half the time a patient gets antibiotics, they do so from a pharmacy without necessarily having a prescription (Figure 27).

Figure 27. Patients' sources of antibiotics, by country.



Possible driver: Patient receives advice from lab staff to seek an antibiotic

In Senegal, over half (N = 8) of the lab staff interviewed have given advice of some kind to patients after seeing their laboratory results. Of those, 3 (37.5 percent) reported that it sometimes includes advice to seek an antibiotic. This happens more frequently in Tanzania, where 16 (76 percent) reported giving advice to patients after seeing their laboratory results, with half of these sometimes advising patients to seek an antibiotic. Figures 28 and 29 reflect these results for Senegal and Tanzania, respectively.

Figure 28. Percentage of lab staff in Senegal who give post-test advice to patients.

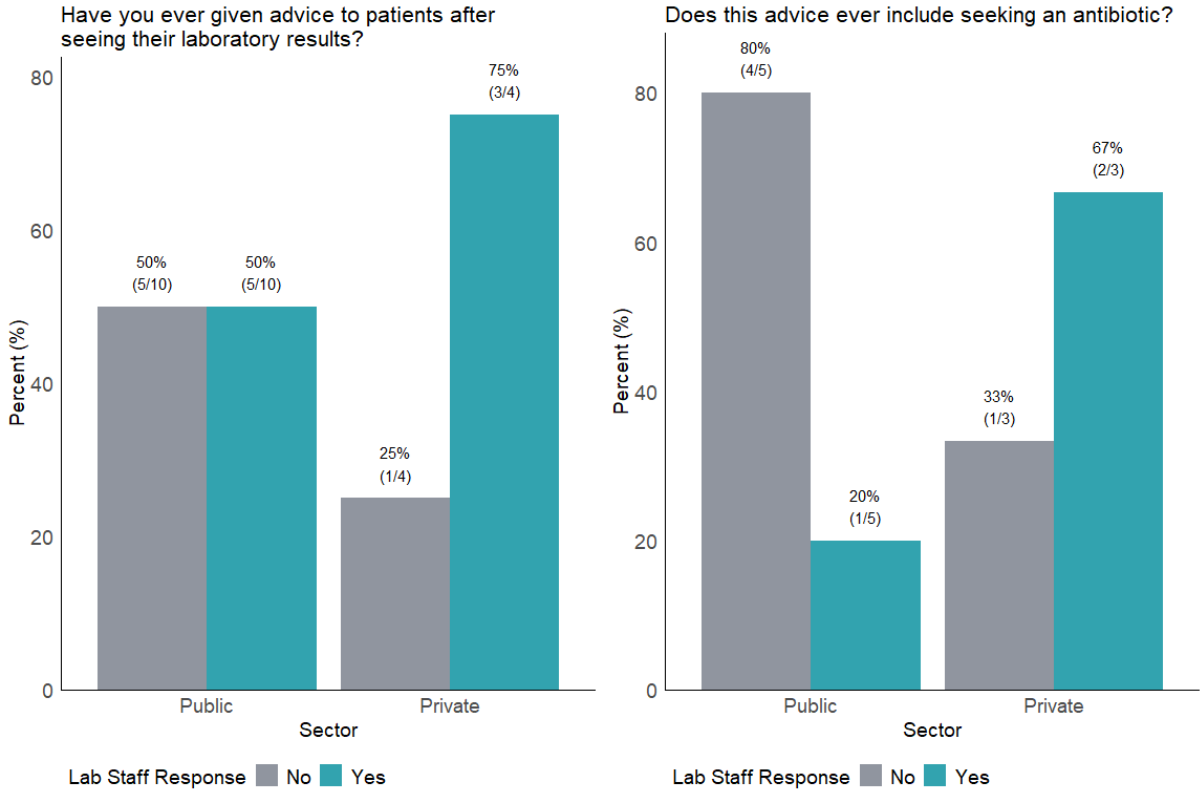
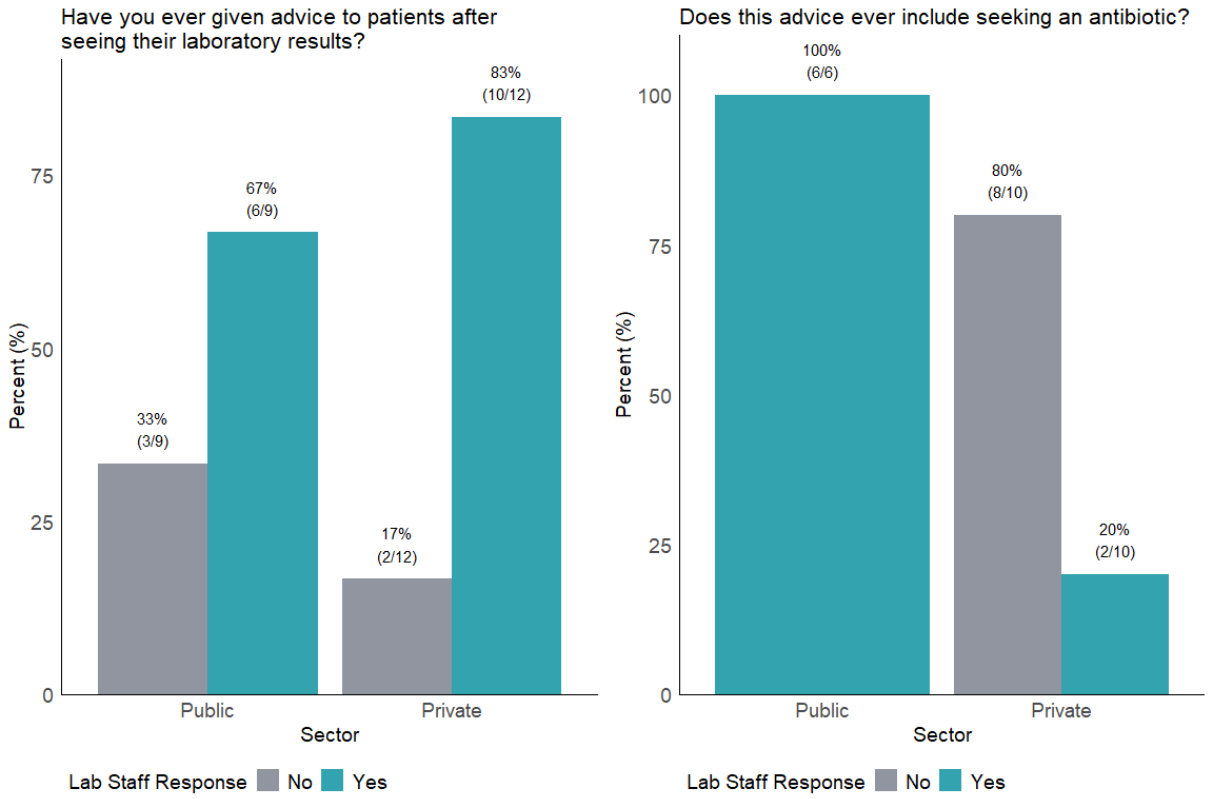


Figure 29. Percentage of lab staff in Tanzania who give post-test advice to patients.



Possible driver: Patient receives a different antibiotic than what was prescribed

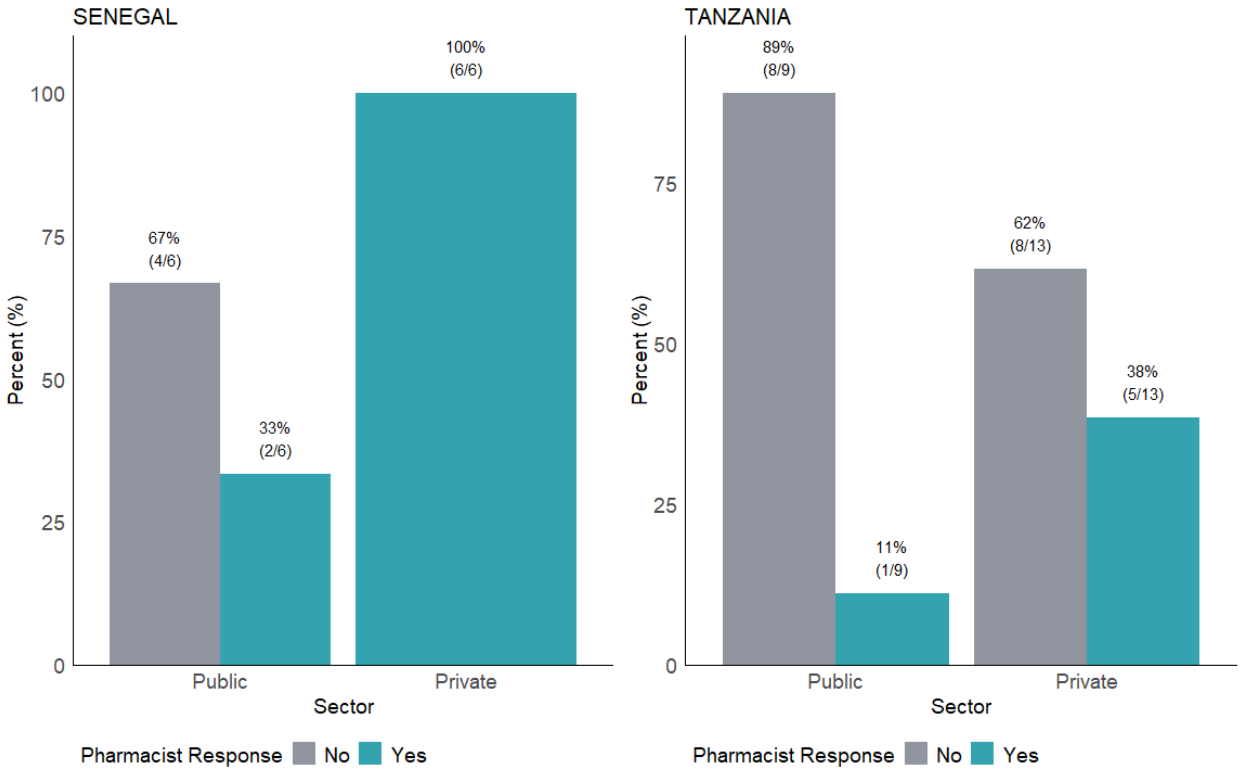
If the prescribed medication is not available at the pharmacy, most of the pharmacists in Senegal (N=10) stated they would substitute the equivalent (and of these, 5 stated they would call the practitioner first to discuss the option); the remaining respondents (N = 2) indicated they would refer the patient to the nearest private dispensary or another pharmacy.

In Tanzania, most of the pharmacists (N=13) stated they would refer the patient to another shop; the remaining respondents (N = 9) stated they would substitute an equivalent (and of these, 5 stated they would call the practitioner first to discuss the option).

Possible driver: Pharmacist recognizes situations where it is okay to dispense an antibiotic without a prescription

Figure 30 charts the percentage of pharmacists interviewed in each country who feel that there are certain situations for which it is okay to dispense an antibiotic without a prescription.

Figure 30. Pharmacist perspective on whether it is okay to dispense an antibiotic without a prescription in certain situations, by country and sector type.



The pharmacists also were asked, What process do you follow to dispense an antibiotic if a patient does not have a prescription?

In SENEGAL:

- Six pharmacists were interviewed in *public-sector* pharmacies:

- Four stated that medication is given only with a prescription.
- One stated that medication will still be registered (presumably after it is dispensed even if the patient does not have a prescription).
- One stated that dispensing an antibiotic without a prescription is acceptable if it can solve the problem after a quick examination, and the antibiotic will still be registered if it is dispensed.
- Referral to a clinician when a patient presents without a prescription hardly ever happens in the public sector.

- Six pharmacists were interviewed in *private-sector* pharmacies:
  - Two stated that he or she will find the correct antibiotic or medication.
  - One indicated a reluctance to give anything other than amoxicillin.
  - One stated that a consultation would be different for a patient who does not have a prescription but did not specify how.
  - One stated that the only difference to dispense a medication for a patient without a prescription is that you might not know the diagnosis based solely on what the patient says (i.e., if the patient does not have a prescription, the patient likely did not have a lab test).
  - One respondent stated that the process for dispensing an antibiotic is the same whether the patient has a prescription or not.
  - Referral to a clinician when a patient presents without a prescription happens slightly more often in the private sector, with four pharmacists (67 percent) reporting that they refer patients approximately 20 percent of the time this happens.

While one-third of pharmacists across both sectors believe patients will try to convince them to sell them the antibiotic anyway if referred, another third (mostly in the private sector) believe the referred patients will go the respective clinic, as instructed.

In TANZANIA:

- Nine pharmacists were interviewed in *public-sector* pharmacies (within hospitals):
  - Seven stated that they instruct the patient to return to his or her doctor because they cannot dispense medication without a prescription.
  - Two said that the question was not applicable.
  - Referrals to a clinician when a patient presents without a prescription happens sometimes in the public sector, with four pharmacists (44 percent) reporting they refer patients approximately 20 percent of the time.
- Thirteen pharmacists were interviewed from *private-sector* pharmacies:
  - Nine stated that they instruct patients to return to their doctors and advise them to get tested; of these, all stated that they cannot dispense drugs or antibiotics without a prescription, though one stated a willingness to provide pain relief medication.
  - Two stated that they would discuss with the patient his or her condition in detail and advise the patient on how to obtain the necessary testing certificate and prescription—though they also stated that for patients asking for antibiotics, they may give them a small dose (e.g., “if someone comes

and says they have a cough and asks for amoxicillin, I give it to them"; "if they come with diarrhea and don't have a certificate, I will help by giving them metronidazole or [cotrimoxazole], even if they don't have a certificate").

- One respondent indicated the practice of listening to the patient's history and symptoms and, if suspecting something specific, providing medication (particularly for patients who cannot afford testing).
- One respondent reported telling patients to get a prescription from their doctors when a medication requires it but also described a situation that occurs sometimes in which a patient goes to the hospital for testing but cannot afford the medication from the hospital pharmacy. In this situation, the patient may go to the private pharmacy and tell the pharmacist what tests had been completed and what the results indicated, according to the doctor or laboratory specialist. The pharmacist will then sell the patient the medication needed to treat the stated condition even though the patient does not have a prescription.
- Referrals in the private sector happen more frequently than in the public sector, with all 13 pharmacists stating that they sometimes refer patients to a clinician when they do not have a prescription, of which 6 (46 percent) refer patients over 40 percent of the time when this happens.

Most pharmacists (over 60 percent), regardless of sector, believe that the referred patient will follow up and go to the clinic, as instructed.

Figures 31 and 32 show how often pharmacists in Senegal and Tanzania, respectively, refer patients who come to the pharmacy without a prescription.

Figure 31. Frequency in which pharmacists in Senegal refer patients to a clinic when they do not have a prescription, by sector type.

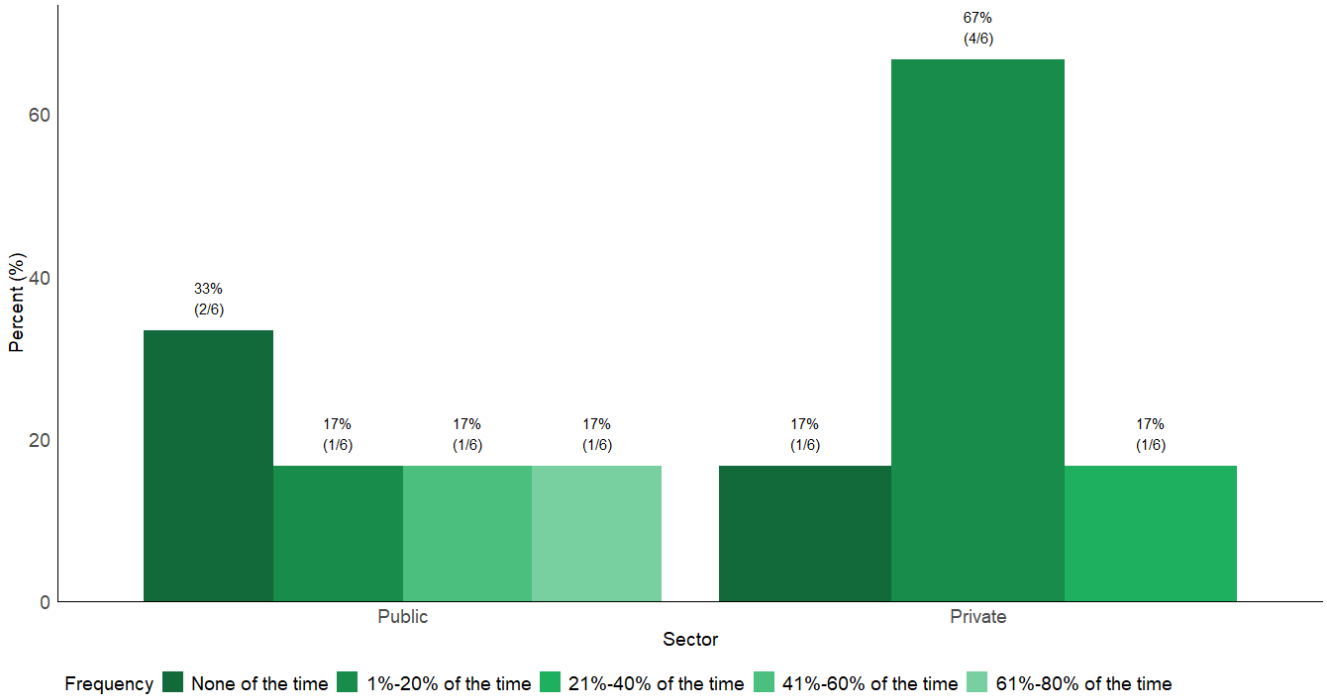
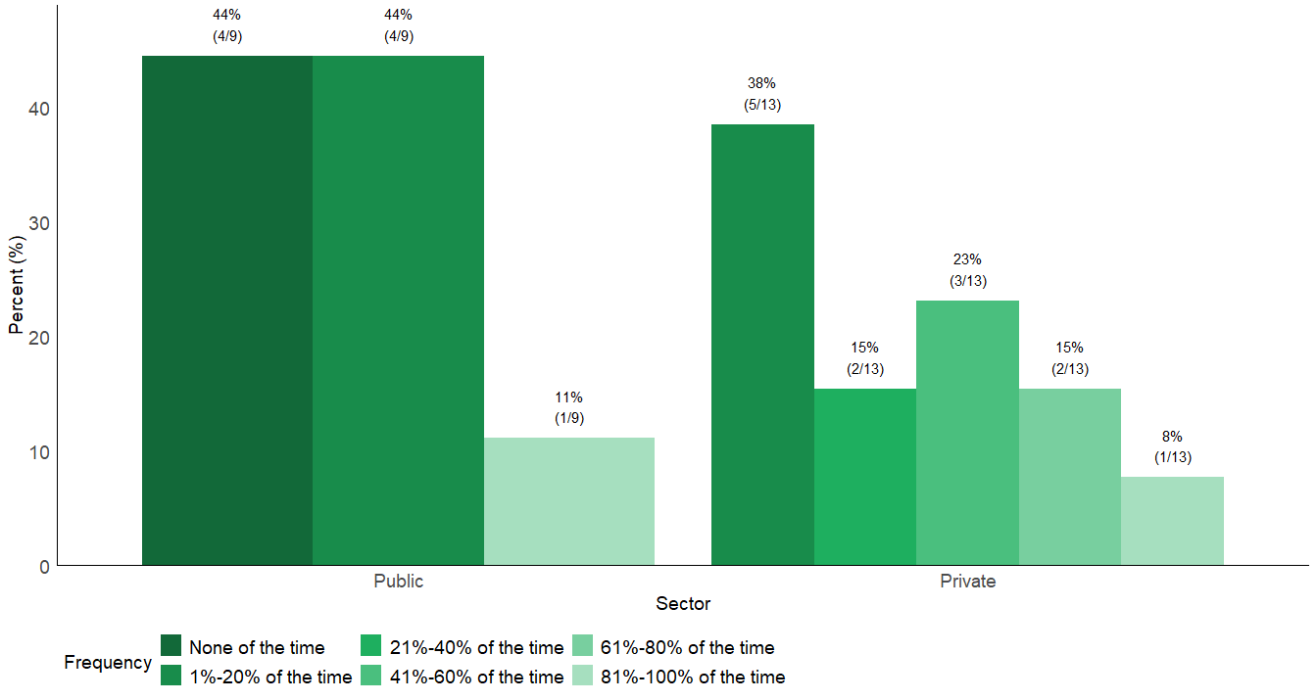


Figure 32. Frequency in which pharmacists in Tanzania refer patients to a clinic when they do not have a prescription, by sector type.



Figures 33 and 34 show the pharmacists' view on how patients will respond to a referral in Senegal and Tanzania, respectively.

Figure 33. Pharmacist perspective on what a patient will do in response to a clinician referral: Senegal.

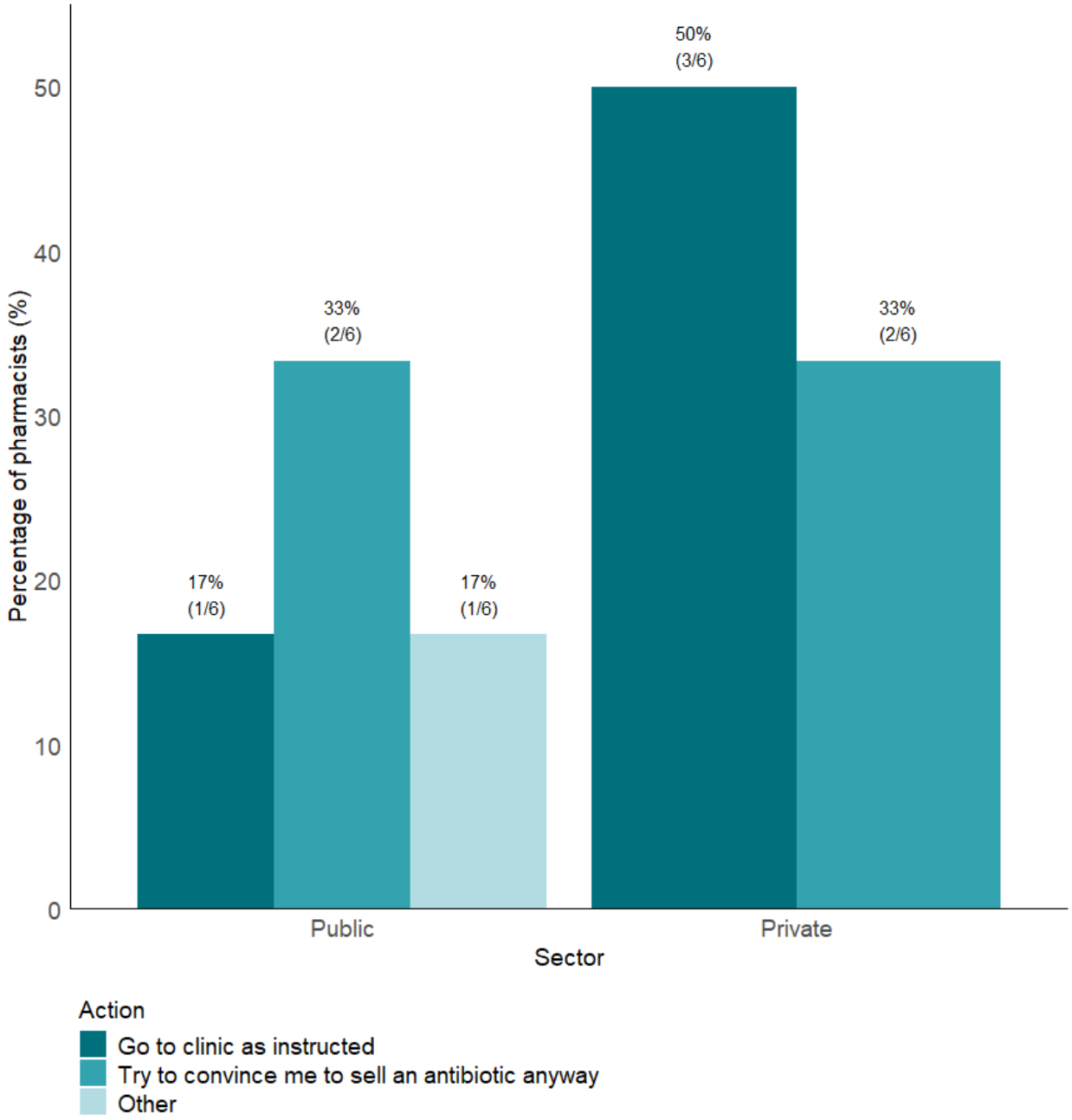
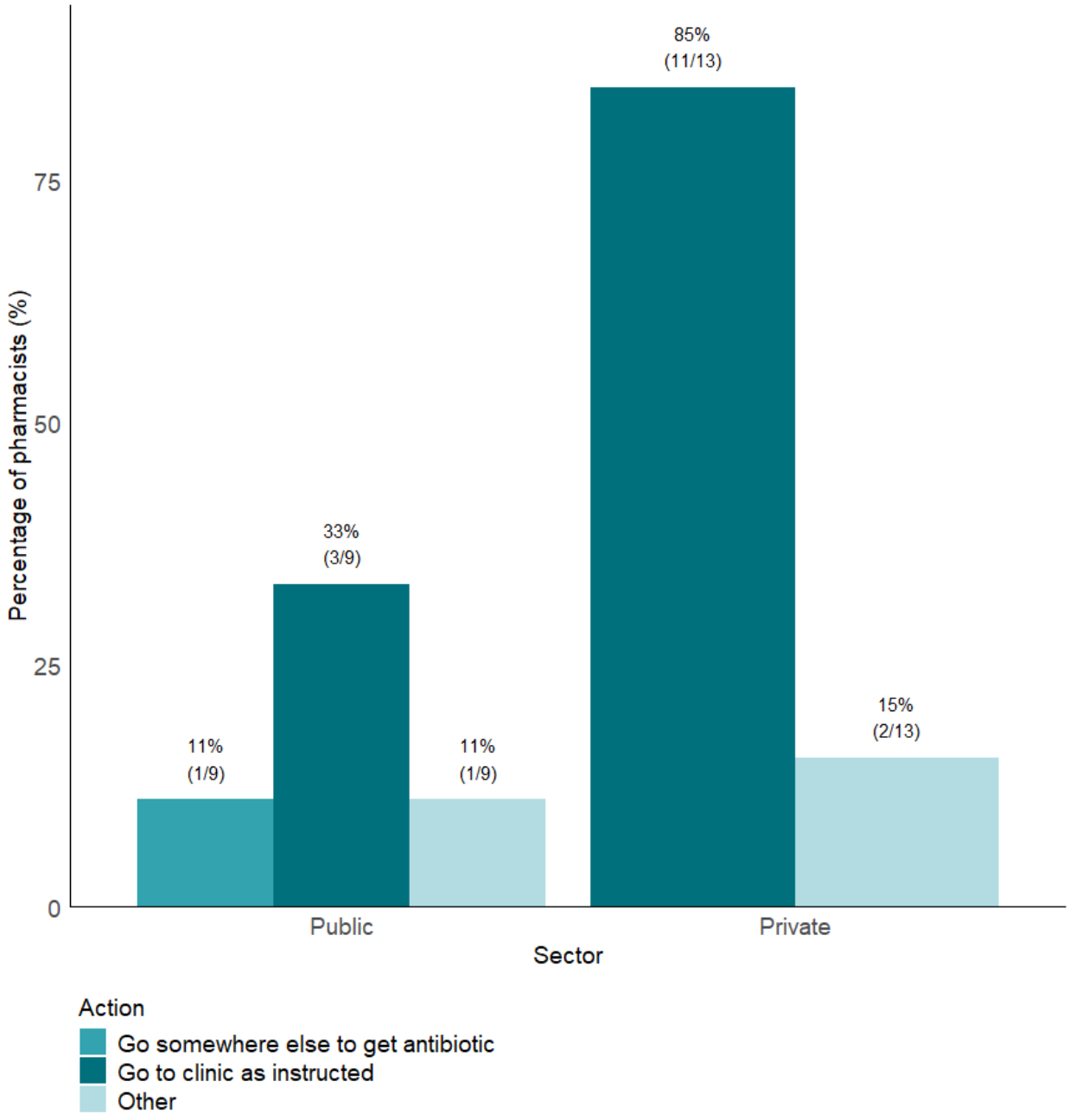


Figure 34. Pharmacist perspective on what a patient will do in response to a clinician referral: Tanzania.



Key takeaways

Key takeaways from the study are as follows:

- Wait times and turnaround times are a challenge in both countries and a major barrier to seeking appropriate care.
- In Tanzania, over half of providers in public-sector labs report having patients leave the lab without being tested because the wait is too long. This rarely happens in Senegal.
- Some providers (20%-30% in each country) are willing to prescribe antibiotics if the test results are not available quickly enough.
- Over half of the lab staff interviewed in Tanzania and over a third of the lab staff interviewed in Senegal report advising patients to seek an antibiotic after seeing their test results.
- Many patients in both countries get antibiotics directly from a pharmacy without necessarily having a prescription.
- In both countries, many pharmacists in the private sector are willing to dispense antibiotics without a prescription. Despite largely believing that patients will go to a referred clinic, as instructed, they do not frequently refer patients to a clinician.

Appendix. Tables on population characteristics

Demographic characteristics are not available for any of the providers; only patient data are presented below.

Senegal

Tables A1 and A2 summarize patient population characteristics in Senegal by service location and by sector, respectively.

Table A1. Patient population characteristics by service location in Senegal.

Variable	Clinic/hospital (N=39)	Laboratory (N=31)	Pharmacy (N=29)	P-value
	Number (%)			
District = Guediawaye*	16 (41.00)	15 (48.40)	19 (65.50)	0.131
Sector = private	10 (25.60)	10 (32.30)	15 (51.70)	0.077
Age (*mean, standard deviation [SD]*)	*38.66, 11.91*	*34.90, 11.21*	*35.48, 10.21*	0.325
Sex = Male	20 (51.30)	16 (51.60)	13 (44.80)	0.836
Education level				0.363
Primary or less	13 (34.20)	7 (22.60)	13 (46.40)	
Secondary	8 (21.10)	10 (32.30)	5 (17.90)	
University or greater	17 (44.70)	14 (45.20)	10 (35.70)	
Marital status = married	25 (64.10)	18 (58.10)	16 (55.20)	0.743
Race/ethnicity				0.370
Fula (Peul)	5 (12.80)	6 (21.40)	9 (31.00)	
Jola	4 (10.30)	3 (10.70)	1 (3.40)	
Mandinka	5 (12.80)	4 (14.30)	1 (3.40)	
Serer	3 (7.70)	5 (17.90)	4 (13.80)	
Wolof	22 (56.40)	10 (35.70)	14 (48.30)	
Location of residence				0.278
Peri-urban	1 (2.60)	2 (6.50)	5 (17.20)	
Rural	1 (2.60)	1 (3.20)	1 (3.40)	
Urban	37 (94.90)	28 (90.30)	23 (79.30)	
Number of people living in home (*mean, SD*)	*8.82, 4.17*	*4.68, 2.80*	*43.48, 183.88*	0.252
Monthly household income (in West African CFA Francs)				0.081
<100,000 XOF	8 (20.50)	5 (16.10)	9 (31.00)	
100,001-200,000 XOF	11 (28.20)	7 (22.60)	5 (17.20)	
200,001-300,000 XOF	6 (15.40)	5 (16.10)	3 (10.30)	
300,001-400,000 XOF	0 (0.00)	5 (16.10)	2 (6.90)	
400,001-500,000 XOF	4 (10.30)	0 (0.00)	1 (3.40)	
>500,000 XOF	4 (10.30)	7 (22.60)	2 (6.90)	
Prefer not to say	6 (15.40)	2 (6.50)	7 (24.10)	
Patients who have health insurance	11 (28.20)	6 (19.40)	4 (13.80)	0.340
Coverage level = medium	6 (54.50)	2 (33.30)	3 (75.00)	0.424
Frequency of financial issues' limiting access to services				0.006
None or a little of the time	14 (35.90)	14 (45.20)	5 (17.20)	
Sometimes	17 (43.60)	17 (54.80)	22 (75.90)	

Variable	Clinic/hospital (N=39)	Laboratory (N=31)	Pharmacy (N=29)	P-value
	Number (%)			
Most or all of the time	8 (20.50)	0 (0.00)	2 (6.90)	
Understanding of health information				0.752
None or a little of the time	1 (2.60)	0 (0.00)	0 (0.00)	
Sometimes	6 (15.40)	6 (19.40)	4 (13.80)	
Most or all of the time	32 (82.10)	25 (80.60)	25 (86.20)	
Use of health information received to make decisions				0.812
None or a little of the time	1 (2.60)	0 (0.00)	0 (0.00)	
Sometimes	6 (15.40)	5 (16.10)	5 (17.20)	
Most or all of the time	32 (82.10)	26 (83.90)	24 (82.80)	

*All other interviews were conducted in Dakar-Centre.

Table A2. Patient population characteristics by sector in Senegal.

Variable	Public (N=64)	Private (N=35)	P-value
	Number (%)		
District = Guediawaye*	30 (46.90)	20 (57.10)	0.443
Sector = private	0 (0.00)	35 (100.00)	<0.001
Age (*mean, standard deviation [SD]*)	*37.35, 11.54*	*35.06, 10.64*	0.335
Sex = male	37 (57.80)	12 (34.30)	0.043
Education			0.260
Primary or less	25 (39.70)	8 (23.50)	
Secondary	13 (20.60)	10 (29.40)	
University or greater	25 (39.70)	16 (47.10)	
Marital Status = married	39 (60.90)	20 (57.10)	0.878
Race/ethnicity			0.171
Fula (Peul)	10 (16.40)	10 (28.60)	
Jola	6 (9.80)	2 (5.70)	
Mandinka	8 (13.10)	2 (5.70)	
Serer	5 (8.20)	7 (20.00)	
Wolof	32 (52.50)	14 (40.00)	
Location of residence			0.302
Peri-urban	4 (6.20)	4 (11.40)	
Rural	3 (4.70)	0 (0.00)	
Urban	57 (89.10)	31 (88.60)	
Number of people living in home (*mean, SD*)	*8.38, 5.02*	*34.69, 167.86*	0.211
Monthly household income (in West African CFA Francs)			0.035
<100,000 XOF	14 (21.90)	8 (22.90)	
100,001-200,000 XOF	20 (31.20)	3 (8.60)	
200,001-300,000 XOF	7 (10.90)	7 (20.00)	
300,001-400,000 XOF	5 (7.80)	2 (5.70)	
400,001-500,000 XOF	4 (6.20)	1 (2.90)	
>500,000 XOF	4 (6.20)	9 (25.70)	
Prefer not to say	10 (15.60)	5 (14.30)	
Patients who have health insurance	9 (14.10)	12 (34.30)	0.036
Coverage level = medium	5 (55.60)	6 (50.00)	1.000
Frequency of financial issues' limiting access to services			0.018
None or a little of the time	15 (23.40)	18 (51.40)	

Variable	Public (N=64)	Private (N=35)	P-value
	Number (%)		
Sometimes	42 (65.60)	14 (40.00)	
Most or all of the time	7 (10.90)	3 (8.60)	
Understanding of health information			0.268
None or a little of the time	0 (0.00)	1 (2.90)	
Sometimes	12 (18.80)	4 (11.40)	
Most or all of the time	52 (81.20)	30 (85.70)	
Use of health information received to make decisions			0.469
None or a little of the time	1 (1.60)	0 (0.00)	
Sometimes	12 (18.80)	4 (11.40)	
Most or all of the time	51 (79.70)	31 (88.60)	

*All other interviews were conducted in Dakar-Centre.

Tanzania

Almost all patient interviews in Tanzania indicated they took place in a clinic/hospital by mistake, so patient data from Tanzania are only shown by sector (Table A3).

Table A3. Patient population characteristics by sector in Tanzania.

Variable	Public (N=49)	Private (N=51)	P-value
	Number (%)		
District			0.581
Ilala	17 (34.70)	19 (37.30)	
Kinondoni	16 (32.70)	20 (39.20)	
Temeke	16 (32.70)	12 (23.50)	
Sector = private	0 (0.00)	51 (100.00)	<0.001
Age (*mean, standard deviation [SD]*)	*37.73, 11.43*	*37.16, 14.30*	0.824
Sex = male	18 (36.70)	21 (41.20)	0.802
Education			0.307
Primary or less	20 (42.60)	15 (30.60)	
Secondary	16 (34.00)	16 (32.70)	
University or greater	11 (23.40)	18 (36.70)	
Marital Status = married	26 (53.10)	28 (54.90)	1.000
Place of origin			0.052
Central	12 (24.50)	1 (2.00)	
Eastern	7 (14.30)	9 (17.60)	
Lake Zone	5 (10.20)	5 (9.80)	
Northern	11 (22.40)	17 (33.30)	
Not Tanzanian	0 (0.00)	1 (2.00)	
Southern	5 (10.20)	9 (17.60)	
Southern Highlands	2 (4.10)	5 (9.80)	
Western	4 (8.20)	3 (5.90)	
Zanzibar Island	3 (6.10)	1 (2.00)	
Location of residence			0.359
Peri-urban	23 (46.90)	20 (39.20)	
Rural	1 (2.00)	4 (7.80)	
Urban	25 (51.00)	27 (52.90)	

Variable	Public (N=49)	Private (N=51)	P-value
	Number (%)		
Number of people living in home (*mean, SD*)	*4.78, 2.54*	*4.71, 2.79*	0.897
Monthly household income (in Tanzanian Shillings)			0.654
<200,000 TZS	16 (36.40)	10 (23.80)	
200,001-400,000 TZS	10 (22.70)	10 (23.80)	
400,001-600,000 TZS	6 (13.60)	6 (14.30)	
600,001-800,000 TZS	1 (2.30)	3 (7.10)	
800,001-1,000,000 TZS	3 (6.80)	4 (9.50)	
>1,000,000 TZS	2 (4.50)	5 (11.90)	
Prefer not to say	6 (13.60)	4 (9.50)	
Patients who have health insurance	16 (32.70)	22 (43.10)	0.382
Coverage level			0.838
Low	4 (25.00)	7 (31.80)	
Medium	8 (50.00)	11 (50.00)	
High	4 (25.00)	4 (18.20)	
Frequency of financial issues' limiting access to services			0.900
None or a little of the time	9 (18.40)	11 (21.60)	
Sometimes	21 (42.90)	20 (39.20)	
Most or all of the time	19 (38.80)	20 (39.20)	
Understanding of health information			0.086
None or a little of the time	2 (4.10)	1 (2.00)	
Sometimes	1 (2.00)	7 (13.70)	
Most or all of the time	46 (93.90)	43 (84.30)	
Use of health information received to make decisions = most or all of the time	47 (95.90)	46 (90.20)	0.466

References

1. Antimicrobial Resistance Collaborators. Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis. *Lancet*. 2022;399(10325):629–655. https://doi.org/10.1016/s0140-6736(21)02724-0
2. World Health Organization (WHO). *Monitoring and Evaluation of the Global Action Plan on Antimicrobial Resistance: Framework and Recommended Indicators*. WHO; 2019. https://www.who.int/publications/i/item/monitoring-and-evaluation-of-the-global-action-plan-on-antimicrobial-resistance