THE LANCET Global Health

Supplementary appendix

Supplementary Material

Appendix Table 1. Characteristics of the 24 health facilities in north-west Tanzania included in the survey.

Health facility name	Heath facility type	Health facility ownership	Study strata	Number of registered staff*			
				MD	Non-MD Clinicians	Nurse	Assistant
Bugando Medical Center	Referral hospital (zonal)	Government & Faith-based	Mwanza city	82	1	395	308
Sekou Toure	Referral hospital (regional)	Government	Mwanza city	11	15	168	0
Geita Hospital	District hospital	Government	Geita district town	6	25	110	1
Kahama Hospital	District hospital	Government	Kahama district town	4	27	122	0
Buzuruga	Health center	Government	Mwanza city	1	6	18	2
ELCT Nyakato	Health center	Faith-based	Mwanza city	1	4	8	0
Kasamwa Health Center	Health center	Government	Geita rural	0	1	9	1
Nyang'wale Health Center	Health center	Government	Geita rural	0	2	1	0
Nzera Health Center	Health center	Government	Geita rural	0	3	9	0
Bulungwa Health Center	Health center	Government	Kahama rural	0	3	5	1
Ushetu Health Center	Health center	Government	Kahama rural	0	2	5	0
Mpera Health Center	Health center	Faith-based	Kahama rural	0	2	2	0
Kiloleli Chamwenda	Dispensary	Government	Mwanza city	0	2	3	0
Nyakato	Dispensary	Government	Mwanza city	0	3	6	0
KKKT Nyamanoro	Dispensary	Faith-based	Mwanza city	2	1	2	1
Nyakahoja	Dispensary	Faith-based	Mwanza city	1	4	5	1
TCMC Dispensary	Dispensary	Faith-based	Geita district town	0	2	2	0
Bung'wangoko Dispensary	Dispensary	Government	Geita rural	0	0	1	0
Busolwa Dispensary	Dispensary	Government	Geita rural	0	1	1	0
Fulwe Dispensary	Dispensary	Government	Geita rural	0	1	1	0
Mbulu Dispensary	Dispensary	Government	Kahama district town	0	2	3	0
Idahina Dispensary	Dispensary	Government	Kahama rural	0	1	1	0
Isagehe Dispensary	Dispensary	Government	Kahama rural	0	1	2	0
Mkwangy Dispensary	Dispensary	Government	Kahama rural	0	1	1	0

* Including those who provide outpatient care to adults with chronic diseases (and hence were eligible for completion of our health worker questionnaire) and those who do not provide such care (who were not eligible).

Appendix Table 2. SARA health facility questionnaire results from 24 health facilities in north-west Tanzania, by health facility type.

	Referral hospitals (N=2)	District hospitals (N=2)	Urban health centers (N=2)	Rural health centers (N=6)	Urban dispensaries (N=6)	Rural dispensaries (N=6)
A. FACILITY SERVICES						
Provision of care for chronic diseases						
Hypertension	2 (100%)	2 (100%)	2 (100%)	5 (83%)	6 (100%)	3 (50%)
Diabetes mellitus	2 (100%)	2 (100%)	2 (100%)	2 (33%)	4 (67%)	1 (17%)
Heart failure	2 (100%)	2 (100%)	1 (50%)	4 (67%)	2 (33%)	1 (17%)
COPD and asthma	2 (100%)	2 (100%)	2 (100%)	5 (83%)	6 (100%)	5 (83%)
Epilepsy	2 (100%)	2 (100%)	2 (100%)	5 (83%)	4 (67%)	5 (83%)
HIV infection	2 (100%)	2 (100%)	2 (100%)	5 (83%)	5 (83%)	1 (17%)
B. REFERRAL & BACK-REFERRAL						
Routinely refer NCDs						
Hypertension						
Yes, but rarely see	0	0	1 (50%)	0	1 (17%)	1 (17%)
Yes, usually refer	0	0	0	2 (33%)	3 (50%)	5 (83%)
No, manage here	2 (100%)	2 (100%)	1 (50%)	4 (67%)	2 (33%)	0
Diabetes mellitus						
Yes, but rarely see	0	0	0	2 (33%)	3 (50%)	2 (33%)
Yes, usually refer	0	0	2 (100%)	2 (33%)	2 (33%)	4 (67%)
No, manage here	2 (100%)	2 (100%)	0	2 (33%)	1 (17%)	0
Heart failure						
Yes, but rarely see	0	0	1 (50%)	0	3 (50%)	1 (17%)
Yes, usually refer	0	0	1 (50%)	5 (83%)	3 (50%)	5 (83%)
No, manage here	2 (100%)	2 (100%)	0	1 (17%)	0	0
COPD						
Yes, but rarely see	0	0	0	0	2 (33%)	1 (17%)
Yes, usually refer	0	0	0	1 (17%)	1 (17%)	1 (17%)
No, manage here	2 (100%)	2 (100%)	2 (100%)	5 (83%)	3 (50%)	4 (67%)
Epilepsy						
Yes, but rarely see	0	0	0	0	1 (17%)	1 (17%)
Yes, usually refer	0	0	0	0	2 (33%)	1 (17%)
No, manage here	2 (100%)	2 (100%)	2 (100%)	6 (100%)	3 (50%)	4 (67%)
Total USUALLY refer ANY NCD	*0*	*0*	*2*	*5*	*4*	*5*
Reasons refer NCDs (among those usually referring any NCD)						
Lack of trained staff	-	-	1 (50%)	5 (100%)	3 (75%)	5 (100%)
Lack of necessary equipment	-	-	2 (100%)	5 (100%)	4 (100%)	5 (100%)
Lack of drugs	-	-	2 (100%)	5 (100%)	3 (75%)	5 (100%)
Other reasons[1]	-	-	2 (100%)	1 (20%)	2 (50%)	1 (20%)
Routinely refer for HIV						
Yes, but rarely see	0	0	0	0	0	1 (17%)
Yes, usually refer	0	0	1 (50%)	1 (17%)	4 (67%)	5 (83%)
No, manage here	2 (100%)	2 (100%)	1 (50%)	5 (83%)	2 (33%)	0
USUALLY refer for HIV	*0*	*0*	*1*	*1*	*4*	*5*
Reasons refer HIV (among those usually referring for HIV)						
Lack of trained staff	-	-	1 (100%)	1 (100%)	3 (75%)	5 (100%)
Lack of necessary equipment	-	-	1 (100%)	1 (100%)	4 (100%)	5 (100%)

	Referral hospitals (N=2)	District hospitals (N=2)	Urban health centers (N=2)	Rural health centers (N=6)	Urban dispensaries (N=6)	Rural dispensaries (N=6)
Lack of drugs	-	-	1 (100%)	1 (100%)	4 (100%)	5 (100%)
Other reasons	-	-	0	0	0	0
Get back-referral (among those USUALLY referring for relevant chronic disease)						
Hypertension	-	-	-	0	0	2 (40%)
Diabetes mellitus	-	-	0	0	1 (50%)	1 (25%)
Heart failure	-	-	0	0	0	0
COPD and asthma	-	-	-	0	0	0
Epilepsy	-	-	-	-	0	1 (100%)
HIV infection	-	-	0	1 (100%)	2 (50%)	4 (80%)
C. DRUG SUPPLY						
Experience drug stock-outs						
Never	0	0	1 (50%)	0	0	0
Occasionally	2 (100%)	1 (50%)	0	4 (67%)	5 (83%)	4 (67%)
Often	0	0	1 (50%)	2 (33%)	0	2 (33%)
Always	0	1 (50%)	0	0	1 (17%)	0
Usual stock-out duration (among those experiencing)						
<1 week	1 (50%)	1 (50%)	0	0	0	0
1 week to <1 month	1 (50%)	0	0	4 (67%)	1 (17%)	4 (67%)
1 month or longer	0	1 (50%)	1 (100%)	2 (33%)	5 (83%)	2 (33%)
D. OUTREACH						
Any outreach activities conducted	1 (50%)	2 (100%)	1 (50%)	4 (67%)	4 (67%)	6 (100%)
Type of activity						
Health promotion	1 (50%)	2 (100%)	1 (50%)	4 (67%)	4 (67%)	6 (100%)
Disease screening	1 (50%)	2 (100%)	1 (50%)	2 (33%)	1 (17%)	0
Curative services	1 (50%)	1 (50%)	0	0	0	1 (17%)
Chronic diseases specifically targeted						
Hypertension	1 (50%)	0	0	0	0	0
Diabetes mellitus	1 (50%)	0	0	0	0	0
Heart failure	1 (50%)	0	0	0	0	0
COPD and asthma	1 (50%)	0	0	0	0	0
Epilepsy	1 (50%)	0	0	0	0	0
HIV infection	1 (50%)	1 (50%)	1 (50%)	0	2 (33%)	1 (17%)
Difficulties in outreach planning or implementation (of those who conduct any)	1 (100%)	2 (100%)	1 (100%)	4 (100%)	4 (100%)	6 (100%)
Insufficient staff/time	1 (100%)	2 (100%)	1 (100%)	4 (100%)	1 (25%)	6 (100%)
Insufficient funds	1 (100%)	1 (50%)	1 (100%)	4 (100%)	4 (100%)	5 (83%)
Lack of transport	0	2 (100%)	1 (100%)	4 (100%)	4 (100%)	6 (100%)
Lack of equipment	0	2 (100%)	0	3 (75%)	1 (25%)	4 (67%)
Lack of drugs	0	2 (100%)	1 (100%)	4 (100%)	1 (25%)	3 (50%)
Staff insufficiently trained	0	2 (100%)	1 (100%)	3 (75%)	1 (25%)	5 (83%)
Other reasons[2]	0	1 (50%)	0	2 (50%)	2 (50%)	1 (17%)
E. MONITORING AND SUPERVISORY VISITS						
Time since HIV monitoring or supervisory visit						
Within last 3 months	2 (100%)	2 (100%)	1 (50%)	5 (83%)	1 (17%)	2 (33%)
>3 months but <1 year	0	0	0	0	3 (50%)	0

	Referral hospitals (N=2)	District hospitals (N=2)	Urban health centers (N=2)	Rural health centers (N=6)	Urban dispensaries (N=6)	Rural dispensaries (N=6)
≥1 year	0	0	0	0	0	0
Never	0	0	0	0	2 (33%)	1 (17%)
No HIV services	0	0	1 (50%)	1 (17%)	0	3 (50%)
Time since other chronic disease monitoring or supervisory visit						
Within last 3 months	0	0	1 (50%)	2 (33%)	0	2 (33%)
>3 months but <1 year	1 (50%)	0	0	0	1 (17%)	0
≥1 year	0	2 (100%)	0	0	0	0
Never	1 (50%)	0	1 (50%)	4 (67%)	5 (83%)	1 (17%)
No chronic disease services	0	0	0	0	0	3 (50%)
STAFFING						
F. Number of staff assigned						
MDs						
None	0	0	0	6 (100%)	4 (67%)	6 (100%)
1-2	0	0	2 (100%)	0	2 (33%)	0
3+	2 (100%)	2 (100%)	0	0	0	0
Non-MD clinicians						
None	0	0	0	0	0	1 (17%)
1-2	1 (50)	0	0	4 (67%)	4 (67%)	5 (83%)
3+	1 (50%)	2 (100%)	2 (100%)	2 (33%)	2 (33%)	0
Nurses						
None	0	0	0	0	0	0
1-2	0	0	0	2 (33%)	2 (33%)	6 (100%)
3+	2 (100%)	2 (100%)	2 (100%)	4 (67%)	4 (67%)	0
Clinical assistants						
None	1 (50%)	1 (50%)	1 (50%)	4 (67%)	4 (67%)	6 (100%)
1-2	0	1 (50%)	1 (50%)	2 (33%)	2 (33%)	0
3+	1 (50%)	0	0	0	0	0
Laboratory staff						
None	0	0	0	1 (17%)	2 (33%)	6 (100%)
1-2	0	0	2 (100%)	4 (67%)	3 (50%)	0
3+	2 (100%)	2 (100%)	0	1 (17%)	1 (17%)	0
Pharmacy staff						
None	0	0	1 (50%)	5 (83%)	6 (100%)	6 (100%)
1-2	0	0	1 (50%)	1 (17%)	0	0
3+	2 (100%)	2 (100%)	0	0	0	0
Other						
None	0	0	0	0	0	0
1-2	0	0	0	0	0	5 (83%)
3+	2 (100%)	2 (100%)	2 (100%)	6 (100%)	6 (100%)	1 (17%)
G. SERVICE READINESS						
Communications						
Landline or cellular available	2 (100%)	2 (100%)	2 (100%)	4 (67%)	6 (100%)	3 (50%)
Short-wave radio available	1 (50%)	0	0	0	0	0
Functioning computer	2 (100%)	2 (100%)	2 (100%)	1 (17%)	2 (33%)	0
Access to email or internet	2 (100%)	0	1 (50%)	0	2 (33%)	0
Ambulance service						
Any service available	2 (100%)	2 (100%)	2 (100%)	6 (100%)	3 (50%)	6 (100%)
Any functional service	2 (100%)	2 (100%)	2 (100%)	6 (100%)	3 (50%)	6 (100%)
Environmental health						
Running water						
Always	1 (100%)	0	0	0	2 (33%)	0
Mostly	1 (50%)	2 (100%)	2 (100%)	0	1 (17%)	1 (17%)
Rarely	0	0	0	0	2 (33%)	0

	Referral hospitals (N=2)	District hospitals (N=2)	Urban health centers (N=2)	Rural health centers (N=6)	Urban dispensaries (N=6)	Rural dispensaries (N=6)
Never	0	0	0	6 (100%)	1 (17%)	5 (83%)
Waiting area	2 (100%)	1 (50%)	2 (100%)	5 (83%)	4 (67%)	2 (40%)
Toilet for general OPD use	2 (100%)	2 (100%)	2 (100%)	3 (50%)	6 (100%)	3 (50%)
H. PROVISION OF CARE IN OPD						
Hypertension						
Diagnose	2 (100%)	2 (100%)	2 (100%)	6 (100%)	6 (100%)	6 (100%)
Manage	2 (100%)	2 (100%)	2 (100%)	4 (67%)	5 (83%)	2 (33%)
Received training						
Yes, within last 2 years	1 (50%)	0	0	0	0	0
Yes, before that	0	0	0	0	0	0
Never	1 (50%)	2 (100%)	2 (100%)	6 (100%)	6 (100%)	6 (100%)
Diabetes mellitus						
Diagnose	2 (100%)	2 (100%)	1 (50%)	5 (83%)	6 (100%)	4 (67%)
How diagnose (of those who diagnose):						
Symptoms	0	0	0	2 (40%)	2 (33%)	4 (100%)
Mostly lab tests in symptomatic pts	1 (50%)	0	0	0	0	0
Lab test in symptomatic pts AND screening tests	1 (50%)	2 (100%)	1 (100%)	3 (60%)	4 (67%)	0
I don't know	0	0	0	0	0	0
Manage	2 (100%)	2 (100%)	1 (50%)	3 (50%)	4 (67%)	0
Received training						
Yes, within last 2 years	1 (50%)	0	0	0	0	0
Yes, before that	0	1 (50%)	0	0	0	0
Never	1 (50%)	1 (50%)	2 (100%)	6 (100%)	6 (100%)	6 (100%)[4]
Heart failure						
Diagnose	2 (100%)	2 (100%)	2 (100%)	6 (100%)	6 (100%)	3 (50%)
Manage	2 (100%)	2 (100%)	0	1 (17%)	1 (17%)	0
Received training						
Yes, within last 2 years	1 (50%)	0	0	0	0	0
Yes, before that	0	0	0	0	0	0
Never	1 (50%)	2 (100%)	2 (100%)	6 (100%)	6 (100%)	6 (100%)
COPD and asthma						
Diagnose	2 (100%)	2 (100%)	2 (100%)	6 (100%)	6 (100%)	5 (83%)
Manage	2 (100%)	2 (100%)	2 (100%)	5 (83%)	6 (100%)	5 (83%)
Received training						
Yes, within last 2 years	1 (50%)	0	0	0	0	0
Yes, before that	0	0	0	0	0	0
Never	1 (50%)	2 (100%)	2 (100%)	6 (100%)	6 (100%)	6 (100%)
Epilepsy						
Diagnose	2 (100%)	2 (100%)	2 (100%)	6 (100%)	6 (100%)	6 (100%)
Manage	2 (100%)	2 (100%)	2 (100%)	6 (100%)	5 (83%)	6 (100%)
Received training						
Yes, within last 2 years	1 (50%)	0	1 (50%)	0	0	0
Yes, before that	0	0	0	2 (33%)	0	1 (17%)
Never	1 (50%)	2 (100%)	1 (50%)	4 (67%)	6 (100%)	5 (83%)

	Referral hospitals (N=2)	District hospitals (N=2)	Urban health centers (N=2)	Rural health centers (N=6)	Urban dispensaries (N=6)	Rural dispensaries (N=6)
HIV infection						
Diagnose	2 (100%)	2 (100%)	2 (100%)	6 (100%)	5 (83%)	5 (83%)
Manage	1 (50%)	0	0	5 (83%)	2 (33%)	1 (17%)
Received training						
Yes, within last 2 years	1 (50%)	0	0	2 (33%)	2 (33%)	2 (33%)
Yes, before that	0	2 (100%)	1 (50%)	4 (67%)	1 (17%)	3 (50%)
Never	1 (100%)	0	1 (50%)	0	3 (50%)	1 (17%)
I. NATIONAL GUIDELINES IN OPD						
Have guidelines for HIV care (in OPD or CTC)						
Yes, observed	2 (100%)	2 (100%)	0	5 (83%)	1 (17%)	0
Yes, reported not seen	0	0	1 (50%)	0	0	1 (17%)
No	0	0	1 (50%)	1 (17%)	5 (83%)	5 (83%)
Guidelines in OPD	*1*	*0*	*0*	*3*	*1*	*1*
Guidelines for HIV usually followed (of those with guidelines in OPD)						
Majority of service providers follow the guidelines without problems	1 (100%)	-	-	1 (33%)	1 (100%)	0
Guidelines can sometimes not be followed because of lack of equipment, supplies, training or other reasons	0	-	-	2 (67%)	0	1 (100%)
Guidelines can usually not be followed because of lack of equipment, supplies or training or other reasons	0	-	-	0	0	0
Have guidelines for chronic diseases						
Yes, observed	0	0	0	0	3 (50%)	0
Yes, reported not seen	0	0	0	0	0	0
No	2 (100%)	2 (100%)	2 (100%)	6 (100%)	3 (50%)	6 (100%)
NCD guidelines include (observed; of those with guidelines):						
Hypertension	-	-	-	-	3 (100%)	-
Diabetes mellitus	-	-	-	-	3 (100%)	-
Heart failure	-	-	-	-	3 (100%)	-
COPD	-	-	-	-	3 (100%)	-
Epilepsy	-	-	-	-	3 (100%)	-
Guidelines for NCDs usually followed (of those with guidelines)						
Majority of service providers follow the guidelines without problems	-	-	-	-	1 (33%)	-
Guidelines can sometimes not be followed because of lack of equipment, supplies, training or other reasons	-	-	-	-	2 (67%)	-
Guidelines can usually not be followed because of lack of equipment, supplies or training or other reasons	-	-	-	-	0	-
J. EQUIPMENT IN OPD						

	Referral hospitals (N=2)	District hospitals (N=2)	Urban health centers (N=2)	Rural health centers (N=6)	Urban dispensaries (N=6)	Rural dispensaries (N=6)
Available and functioning:						
Weighing scale	2 (100%)	1 (50%)	1 (50%)	5 (83%)	5 (83%)	3 (50%)
Height measurement device	1 (50%)	2 (100%)	1 (50%)	1 (17%)	0	4 (67%)
Thermometer	2 (100%)	0	2 (100%)	3 (50%)	5 (83%)	4 (67%)
Stethoscope	2 (100%)	2 (100%)	2 (100%)	5 (83%)	6 (100%)	6 (100%)
Blood pressure measurement device	1 (50%)	2 (100%)	1 (50%)	4 (67%)	5 (83%)	3 (83%)
Glucometer	2 (100%)	0	0	1 (17%)	1 (17%)	0
Guedel tube or tongue protector	1 (50%)	0	0	0	2 (33%)	0
K. RECORDING SYSTEM IN OPD						
Daily visits in general OPD service						
Names recorded						
Always	1 (50%)	0	2 (100%)	3 (50%)	4 (67%)	1 (17%)
Mostly	0	0	0	2 (33%)	2 (33%)	2 (33%)
Rarely	1 (50%)	2 (100%)	0	1 (17%)	0	2 (33%)
Never	0	0	0	0	0	1 (17%)
Diagnosis recorded						
Always	0	0	2 (100%)	2 (33%)	1 (17%)	1 (17%)
Mostly	2 (100%)	0	0	3 (50%)	4 (67%)	2 (33%)
Rarely	0	2 (100%)	0	1 (17%)	1 (17%)	2 (33%)
Never	0	0	0	0	0	1 (17%)
Records readable & understandable						
Always	0	0	0	0	2 (33%)	0
Mostly	1 (50%)	1 (50%)	2 (100%)	6 (100%)	3 (50%)	4 (67%)
Rarely	1 (50%)	1 (50%)	0	0	1 (17%)	1 (17%)
Never	0	0	0	0	0	1 (17%)
L. ANC SERVICES						
ANC services offered	1 (50%)	2 (100%)	1 (50%)	6 (100%)	4 (67%)	6 (100%)
PMTCT services offered	2 (100%)	2 (100%)	1 (50%)	6 (100%)	4 (67%)	5 (83%)
M. HIV COUNSELLING AND TESTING						
HIV counselling and testing provided	2 (100%)	2 (100%)	1 (50%)	5 (83%)	4 (67%)	4 (67%)
Rapid tests available (at least one valid)						
Screening	2 (100%)	2 (100%)	0	2 (40%)	2 (50%)	2 (50%)
Confirmatory	2 (100%)	2 (100%)	0	2 (40%)	2 (50%)	3 (75%)
Tie-breaker	0	0	0	0	0	0
N. HIV TREATMENT						
HIV treatment services offered	2 (100%)	2 (100%)	1 (50%)	5 (83%)	1 (17%)	0
Of those offering services:						
Prescribe OI treatment	2 (100%)	2 (100%)	1 (100%)	5 (100%)	1 (100%)	-
Prescribe OI prophylaxis	2 (100%)	2 (100%)	1 (100%)	5 (100%)	1 (100%)	-
Prescribe ART	2 (100%)	2 (100%)	1 (100%)	5 (100%)	1 (100%)	-
Stock ART	2 (100%)	2 (100%)	1 (100%)	5 (100%)	1 (100%)	-
Stock other medicines (eg cotrimoxazole)	2 (100%)	2 (100%)	0	4 (80%)	1 (100%)	-
Stock TB medicines	2 (100%)	1 (50%)	1 (100%)	5 (100%)	1 (100%)	-
Patient names recorded						
Always	2 (100%)	1 (50%)	1 (100%)	5 (100%)	0	-
Mostly	0	1 (50%)	0	0	0	-
Rarely	0	0	0	0	0	-
Never	0	0	0	0	1 (100%)	-
Records understandable						
Always	2 (100%)	2 (100%)	1 (100%)	5 (100%)	0	-

	Referral hospitals (N=2)	District hospitals (N=2)	Urban health centers (N=2)	Rural health centers (N=6)	Urban dispensaries (N=6)	Rural dispensaries (N=6)
Mostly	0	0	0	0	0	-
Rarely	0	0	0	0	0	-
Never	0	0	0	0	1 (100%)	-
O. LABORATORY						
Diagnostic services offered	2 (100%)	2 (100%)	2 (100%)	6 (100%)	6 (100%)	2 (33%)
Of those who offer diagnostic services:						
Glucometer available	2 (100%)	1 (50%)	1 (50%)	3 (50%)	3 (50%)	0
Glucometer functioning (of those with)						
Never	1 (50%)	0	0	1 (33%)	0	-
Occasionally	0	0	0	1 (33%)	1 (33%)	-
Always	1 (50%)	1 (100%)	1 (100%)	1 (33%)	2 (67%)	-
Use urine protein dipstick tests	2 (100%)	2 (100%)	2 (100%)	6 (100%)	4 (67%)	1 (50%)
Use urine glucose dipstick tests	2 (100%)	2 (100%)	2 (100%)	6 (100%)	4 (67%)	1 (50%)
Ever experience stock-outs of urine glucose dipsticks (of those using)						
Never	1 (50%)	0	1 (50%)	1 (17%)	2 (50%)	1 (100%)
Occasionally	1 (50%)	2 (100%)	0	3 (50%)	1 (25%)	0
Often	0	0	0	2 (33%)	1 (25%)	0
Always	0	0	1 (50%)	0	0	0
Do creatinine testing	2 (100%)	2 (100%)	0	0	1 (17%)	0
CD4 counter available	2 (100%)	2 (100%)	0	3 (50%)	0	0
CD4 counting functioning (of those with)						
Occasionally	1 (50%)	1 (50%)	-	0	-	-
Always	1 (50%)	1 (50%)	-	3 (100%)	-	-
Ever have CD4 assay kits stock outs (of those with counter)						
Never	1 (50%)	0	-	1 (33%)	-	-
Occasionally	1 (50%)	1 (50%)	-	1 (33%)	-	-
Often	0	0	-	1 (33%)	-	-
Always	0	1 (50%)	-	0	-	-
Microscope for sputim smears available	2 (100%)	2 (100%)	1 (50%)	5 (83%)	2 (33%)	0
Microscope functioning (of those with)						
Often	0	0	0	0	1 (50%)	-
Always	2 (100%)	2 (100%)	1 (100%)	5 (100%)	1 (50%)	-
P. IMAGING SERVICES						
Perform diagnostic x-rays, ultrasound or CT?	2 (100%)	2 (100%)	1 (50%)	0	1 (17%)	0
Available and functioning:						
X-ray machine	2 (100%)	2 (100%)	0	0	0	0
Ultrasound equipment	2 (100%)	1 (50%)	1 (50%)	0	1 (17%)	0

	Referral hospitals (N=2)	District hospitals (N=2)	Urban health centers (N=2)	Rural health centers (N=6)	Urban dispensaries (N=6)	Rural dispensaries (N=6)
ECG	1 (50%)	0	1 (50%)	0	0	0
Q. PHARMACY						
Observed available and valid:						
Metformin	2 (100%)	2 (100%)	1 (50%)	0	3 (50%)	0
Insulin short acting	2 (100%)	2 (100%)	0	0	0	0
Insulin intermediate acting	2 (100%)	0	0	0	0	0
Insulin long acting	1 (50%)	1 (50%)	0	0	0	0
Captopril or lisinopril tab	1 (50%)	0	1 (50%)	0	4 (67%)	0
Nifedipine tab	2 (100%)	1 (50%)	1 (50%)	0	4 (67%)	0
Atenolol or propranolol tab	2 (100%)	2 (100%)	1 (50%)	2 (33%)	5 (83%)	0
Hydrochlorothiazide or Bendrofluazine tab	2 (100%)	1 (50%)	1 (50%)	1 (17%)	2 (33%)	1 (17%)
Acetylsalicylic acid	2 (100%)	1 (50%)	2 (100%)	6 (100%)	5 (83%)	6 (100%)
Salbutamol inhaler	0	0	1 (50%)	0	0	0
Phenobarbitone tab	2 (100%)	2 (100%)	2 (100%)	4 (67%)	4 (67%)	3 (60%)
HIV first line therapy[3]	2 (100%)	2 (100%)	1 (50%)	5 (83%)	1 (17%)	0

Note: a few results are missing for some health facilities; percentages are of complete data. COPD=chronic obstructive lung disease. NCD=non-communicable disease. OPD=outpatient department. CTC=HIV care and treatment clinic. ANC=antenatal care. PMTCT=prevention of mother to child transmission. OI=opportunistic infection. ART=antiretroviral therapy. TB=tuberculosis.

[1]Other reasons given (sic): lack of special NCD Unit, admission wards are not enough, few rooms to accommodate patients, restrictions in service provision according to level of health facility, no accomodation

[2]Other reasons given (sic): transportation improvement, updating training, poor community participation, poor environment (under tree), interaction between outreach activities with other school/participant activities, lack of population willingness to particate, poor response from community.

[3]Defined as in Table 1.

Appendix Table 3. Self-completed questionnaire results from 335 healthcare workers at 24 health facilities in north-west Tanzania, by health facility type.

	Referral hospitals (N=66)	District hospitals (N=110)	Urban health centers (N=35)	Rural health centers (N=57)	Urban dispensaries (N=50)	Rural dispensaries (N=17)
Healthcare worker cadre						
MD	29 (44%)	4 (4%)	0	0	1 (2%)	0
Non-MD clinician	7 (11%)	24 (22%)	8 (23%)	13 (23%)	12 (24%)	4 (24%)
Nurse	25 (38%)	57 (52%)	19 (54%)	23 (40%)	20 (40%)	6 (35%)
Assistant	5 (8%)	25 (23%)	8 (23%)	21 (37%)	17 (34%)	7 (41%)
EXPERIENCE, LEVEL OF COMFORT AND SENSE OF EQUIPMENT AVAILABILITY						
Seen >5 patients in past 3m						
Hypertension	44 (67%)	57 (52%)	12 (35%)	7 (12%)	13 (26%)	1 (6%)
Diabetes mellitus	40 (61%)	56 (51%)	3 (9%)	3 (5%)	7 (14%)	0
Heart failure	27 (41%)	17 (15%)	0	0	3 (6%)	0
COPD	9 (13%)	18 (16%)	6 (17%)	3 (5%)	3 (6%)	0
Asthma	11 (17%)	30 (27%)	11 (31%)	4 (7%)	10 (20%)	0
Epilepsy	7 (11%)	20 (18%)	4 (11%)	9 (16%)	2 (4%)	1 (6%)
HIV infection	54 (82%)	86 (78%)	25 (71%)	42 (74%)	25 (50%)	5 (29%)
Very comfortable managing						
Hypertension	12 (18%)	5 (5%)	6 (17%)	2 (4%)	8 (16%)	1 (6%)
Diabetes mellitus	9 (14%)	5 (5%)	7 (20%)	3 (5%)	8 (16%)	0
Chronic heart failure	12 (18%)	7 (6%)	2 (6%)	2 (4%)	2 (4%)	1 (6%)
COPD	5 (8%)	6 (5%)	5 (14%)	2 (4%)	5 (10%)	0
Asthma	20 (30%)	11 (10%)	15 (43%)	5 (9%)	10 (20%)	2 (12%)
Epilepsy	13 (20%)	8 (7%)	4 (11%)	2 (4%)	9 (18%)	1 (6%)
HIV infection	17 (26%)	9 (8%)	10 (29%)	3 (5%)	12 (24%)	1 (6%)
Have necessary equipment to manage						
Hypertension	8 (12%)	6 (5%)	10 (29%)	9 (16%)	12 (24%)	1 (6%)
Diabetes mellitus	11 (17%)	12 (11%)	6 (17%)	3 (5%)	13 (26%)	0
HIV infection	15 (23%)	19 (17%)	11 (31%)	14 (25%)	15 (30%)	3 (18%)
Have necessary drugs to manage						
Hypertension	11 (17%)	16 (15%)	12 (34%)	10 (18%)	14 (28%)	1 (6%)
Diabetes mellitus	19 (29%)	13 (12%)	5 (14%)	4 (7%)	7 (14%)	0
HIV infection	25 (38%)	29 (26%)	11 (31%)	18 (32%)	8 (16%)	3 (18%)
TRAINING AND SUPERVISION						
Chronic diseases excl HIV						
Training/advice from supervisor						
In past year	20 (32%)	12 (11%)	4 (12%)	2 (4%)	3 (6%)	0
Before the last year	3 (5%)	9 (8%)	6 (18%)	5 (9%)	4 (8%)	2 (13%)
Never	40 (63%)	88 (81%)	23 (70%)	48 (87%)	43 (86%)	14 (88%)
Training/advice from higher department						
In past year	12 (18%)	9 (8%)	1 (3%)	4 (7%)	3 (6%)	1 (6%)
Before the last year	0	12 (11%)	4 (11%)	5 (9%)	4 (8%)	2 (12%)
Never	54 (82%)	89 (81%)	30 (86%)	48 (84%)	43 (86%)	14 (82%)
Training course						
In past year	13 (20%)	6 (5%)	5 (14%)	4 (7%)	4 (8%)	2 (12%)
Before the last year	6 (9%)	13 (12%)	4 (11%)	7 (12%)	4 (8%)	0
Never	47 (71%)	91 (83%)	26 (74%)	46 (81%)	42 (84%)	15 (88%)
HIV infection						
Training/advice from supervisor						
In past year	22 (34%)	17 (16%)	9 (26%)	12 (22%)	9 (18%)	6 (38%)
Before the last year	12 (18%)	35 (32%)	6 (18%)	13 (24%)	9 (18%)	3 (19%)
Never	31 (48%)	57 (52%)	19 (56%)	30 (55%)	31 (63%)	7 (44%)
Training/advice from higher department						

	Referral hospitals (N=66)	District hospitals (N=110)	Urban health centers (N=35)	Rural health centers (N=57)	Urban dispensaries (N=50)	Rural dispensaries (N=17)
In past year	14 (22%)	16 (15%)	7 (20%)	13 (23%)	9 (18%)	7 (41%)
Before the last year	14 (22%)	30 (27%)	7 (20%)	14 (25%)	8 (16%)	2 (12%)
Never	37 (57%)	64 (58%)	21 (60%)	30 (53%)	33 (66%)	8 (47%)
Training course						
In past year	12 (18%)	5 (5%)	4 (11%)	6 (11%)	8 (16%)	5 (29%)
Before the last year	15 (23%)	29 (26%)	13 (37%)	15 (26%)	8 (16%)	3 (18%)
Never	38 (58%)	76 (69%)	18 (51%)	36 (63%)	34 (68%)	9 (53%)
KNOWLEDGE[1]						
Hypertension						
Good	21 (32%)	9 (8%)	4 (11%)	3 (5%)	2 (4%)	0
Satisfactory	31 (47%)	47 (43%)	23 (66%)	27 (47%)	22 (44%)	9 (53%)
Poor	14 (21%)	54 (49%)	8 (23%)	27 (47%)	26 (52%)	8 (47%)
Diabetes mellitus						
Good	15 (23%)	13 (12%)	2 (6%)	1 (2%)	2 (4%)	1 (6%)
Satisfactory	37 (56%)	44 (40%)	17 (49%)	22 (39%)	28 (56%)	5 (29%)
Poor	14 (21%)	53 (48%)	16 (46%)	34 (60%)	20 (40%)	11 (65%)
HIV infection						
Good	20 (30%)	9 (8%)	1 (3%)	3 (5%)	4 (8%)	1 (6%)
Satisfactory	37 (56%)	68 (62%)	29 (83%)	41 (72%)	35 (70%)	13 (76%)
Poor	9 (14%)	33 (30%)	5 (14%)	13 (23%)	11 (22%)	3 (18%)

Note: a few results are missing; percentages are of complete data.

[1]Based on answers to 10 questions about management of each disease. Good: 10/10; satisfactory: 7-9/10; poor: <7/10·

Appendix Table 4. Self-completed questionnaire results from 335 healthcare workers at 24 health facilities in north-west Tanzania, by healthcare worker cadre.

	MDs (N=34)	Non-MD clinicians (N=68)	Nurses (N=150)	Assistants (N=83)
Type of facility				
Hospital (regional/referral)	29 (85%)	7 (10%)	25 (17%)	5 (6%)
District hospital	4 (12%)	24 (35%)	57 (38%)	25 (30%)
Health center	0	21 (31%)	42 (28%)	29 (35%)
Dispensary	1 (3%)	16 (24%)	26 (17%)	24 (29%)
EXPERIENCE, LEVEL OF COMFORT AND SENSE OF EQUIPMENT AVAILABILITY				
Seen >5 patients in past 3m				
Hypertension	31 (91%)	33 (49%)	50 (33%)	20 (24%)
Diabetes mellitus	31 (91%)	24 (35%)	31 (21%)	23 (28%)
Heart failure	26 (76%)	5 (7%)	11 (7%)	5 (6%)
COPD	8 (24%)	7 (10%)	15 (10%)	9 (11%)
Asthma	6 (18%)	20 (29%)	25 (17%)	15 (18%)
Epilepsy	1 (3%)	17 (25%)	16 (11%)	9 (11%)
HIV infection	32 (94%)	45 (66%)	111 (74%)	49 (59%)
Very comfortable managing				
Hypertension	10 (29%)	11 (16%)	8 (5%)	5 (6%)
Diabetes mellitus	11 (32%)	8 (12%)	6 (4%)	7 (8%)
Chronic heart failure	11 (32%)	6 (9%)	7 (5%)	2 (2%)
COPD	5 (16%)	10 (15%)	4 (3%)	4 (5%)
Asthma	11 (32%)	21 (31%)	25 (17%)	6 (7%)
Epilepsy	11 (33%)	13 (19%)	9 (6%)	4 (5%)
HIV infection	10 (29%)	10 (15%)	21 (14%)	11 (13%)
Have necessary equipment to manage				
Hypertension	6 (18%)	14 (21%)	15 (10%)	11 (13%)
Diabetes mellitus	9 (26%)	10 (15%)	12 (8%)	14 (17%)
HIV infection	7 (21%)	16 (24%)	34 (23%)	20 (24%)
Have necessary drugs to manage				
Hypertension	10 (29%)	16 (24%)	25 (17%)	13 (16%)
Diabetes mellitus	18 (53%)	8 (12%)	12 (8%)	10 (12%)
HIV infection	12 (35%)	22 (32%)	42 (28%)	18 (22%)
TRAINING AND SUPERVISION				

	MDs (N=34)	Non-MD clinicians (N=68)	Nurses (N=150)	Assistants (N=83)
Chronic diseases excl HIV				
Training/advice from supervisor				
In past year	14 (44%)	14 (22%)	11 (7%)	2 (2%)
Before the last year	0	9 (14%)	14 (9%)	6 (7%)
Never	18 (56%)	40 (63%)	124 (83%)	74 (90%)
Training/advice from higher department				
In past year	6 (17%)	10 (15%)	12 (8%)	2 (2%)
Before the last year	0	9 (13%)	10 (7%)	8 (10%)
Never	28 (82%)	49 (72%)	128 (85%)	73 (88%)
Training course				
In past year	10 (29%)	10 (15%)	12 (8%)	2 (2%)
Before the last year	4 (12%)	11 (16%)	10 (7%)	9 (11%)
Never	20 (59%)	47 (69%)	128 (85%)	72 (87%)
HIV infection				
Training/advice from supervisor				
In past year	11 (33%)	18 (28%)	36 (24%)	10 (12%)
Before the last year	4 (12%)	15 (23%)	43 (29%)	16 (20%)
Never	18 (55%)	31 (48%)	71 (47%)	55 (68%)
Training/advice from higher department				
In past year	6 (18%)	17 (25%)	35 (23%)	8 (10%)
Before the last year	1 (3%)	18 (26%)	40 (27%)	16 (19%)
Never	26 (79%)	33 (49%)	75 (50%)	59 (71%)
Training course				
In past year	8 (18%)	11 (16%)	22 (15%)	1 (1%)
Before the last year	5 (15%)	21 (31%)	43 (29%)	14 (17%)
Never	22 (67%)	36 (53%)	85 (57%)	68 (82%)
KNOWLEDGE[1]				
Hypertension				
Good	15 (44%)	19 (28%)	5 (3%)	0
Satisfactory	18 (53%)	36 (57%)	80 (53%)	22 (27%)
Poor	1 (3%)	10 (15%)	65 (43%)	61 (73%)
Diabetes mellitus				
Good	13 (38%)	16 (24%)	4 (3%)	1 (1%)
Satisfactory	21 (62%)	39 (57%)	70 (47%)	23 (28%)
Poor	0	13 (19%)	76 (51%)	59 (71%)
HIV infection				
Good	19 (56%)	10 (15%)	8 (5%)	1 (1%)
Satisfactory	14 (41%)	50 (74%)	111 (74%)	48 (58%)
Poor	1 (3%)	8 (12%)	31 (21%)	34 (41%)

Note: a few results are missing; percentages are of complete data.

[1]Based on answers to 10 questions about management of each disease. Good: 10/10; satisfactory: 7-9/10; poor: <7/10·

Appendix 5: Extract from the self-completed questionnaire for healthcare workers
Here we show the three case-based scenarios with ten knowledge questions for each. Correct answers are shown in bold.

Case scenario A
Assume you are based in a rural dispensary or health center. A patient comes to see you at your clinic. He is 40 years old. He asks for treatment of frequent headache. He denies any history of fevers. The patient tells you that he had his blood pressure measured 1 month ago and it was 155/105. His body mass index is 29 kg / m^2.

Please state whether the following statements are true or false.

Question number	Question
301	At the first visit it is important to ask about other symptoms, conduct a brief general examination, and take blood pressure (BP) on both arms.
	1. **True** 2. False 3. I don't know
302	The headaches that this patient is experiencing are most likely due to malaria.
	1. True 2. **False** 3. I don't know
303	This patient probably does not have hypertension since hypertension is defined as a systolic blood pressure of greater than 160mmHg.
	1. True 2. **False** 3. I don't know
304	High blood pressure can be a dangerous disease and therefore must only be managed in a well-equipped hospital (not a dispensary or a health center).
	1. True 2. **False** 3. I don't know
305	For patients with high blood pressure, it is important to educate them to not add salt to food, to reduce weight if he/she is overweight, and to perform regular exercise.
	1. **True** 2. False 3. I don't know
306	If drug therapy is indicated for hypertension, the best, first-line therapy for most patients should be a thiazide diuretic drug, e.g. such as hydrochlorothiazide or bendrofluazide.
	1. **True** 2. False 3. I don't know
307	If the blood pressure remains greater than 160/100 mmHg with first-line therapy, the best course of action is to stop that drug and to start the patient on another drug like diazepam or frusemide.
	1. True 2. **False** 3. I don't know
308	In patients with hypertension, medications can usually be stopped as soon as the blood pressure is normal.
	1. True 2. **False** 3. I don't know
309	Possible serious complications of chronic, untreated high blood pressure include stroke, kidney failure, heart failure, infarction of the heart.
	1. **True** 2. False 3. I don't know
310	In the first year after being started on antihypertensive treatment, a person with hypertension only needs to return to clinic every 6 months in order to check blood pressure, receive further counseling and adjustments in medications.
	1. True 2. **False** 3. I don't know

Case scenario B
Assume you are based in a rural health center or dispensary. A patient comes to see you. She is 30 years old and in good general health. She recently tested HIV-positive with a single rapid HIV test. She feels weak and complains about diarrhea that has been present for 3 days but has no fever. When asked, she reports that she does not take cotrimoxazole (Septrim).

Question number	Question
401	In order to confirm the diagnosis of HIV in this patient, it is important to perform at least 2 different rapid HIV tests.
	1. **True**

	2. False	
	3. I don't know	
402	The most likely cause of diarrhea in this patient is malaria.	
	1. True	
	2. False	
	3. I don't know	
403	After confirmation of HIV infection, it is important to examine in order to establish disease stage, start the patient on cotrimoxazole, educate on healthy life style, conduct CD4 test or refer for CD4 test to the nearest center where this can be done.	
	1. True	
	2. False	
	3. I don't know	
404	HIV can be a dangerous disease and therefore must only be managed in a well-equipped hospital (not a health center or dispensary).	
	1. True	
	2. False	
	3. I don't know	
405	For patients with HIV, it is important to educate about healthy lifestyles, the importance of medication compliance and safe sexual practices.	
	1. True	
	2. False	
	3. I don't know	
406	If this patient is confirmed to have WHO clinical stage 4 disease, antiretroviral drugs should only be started if the CD4 count is less than 200 cells / mm^3.	
	1. True	
	2. False	
	3. I don't know	
407	If antiretroviral therapy is indicated, a combination of zidovudine, lamivudine and lopinavir (a protease-inhibitor) is a reasonable first-line treatment.	
	1. True	
	2. False	
	3. I don't know	
408	In patients with HIV, medications can usually be stopped as soon as the CD4 count is normal.	
	1. True	
	2. False	
	3. I don't know	
409	Possible serious complications of chronic, untreated HIV infection include tuberculosis, chronic diarrhea, severe weight loss and cryptococcal meningitis.	
	1. True	
	2. False	
	3. I don't know	
410	In the first year after being started on antiretroviral treatment, a person with HIV only needs to return to clinic every 6 months in order to receive further counseling and adjustments in medications.	
	1. True	
	2. False	
	3. I don't know	

Case scenario C

Assume you are based in a rural health center or dispensary. A patient comes to see you. He is 40 years old. His height is about 165 cm, his body weight is about 90 kg. He smokes about 10 cigarettes a day. He seeks help because of frequent dizziness. When asked about any other problems he mentions frequent thirst and frequent need to urinate, also during the night.

Question number	Question	
501	At the first visit, the most important investigation that you can perform is a malaria smear.	
	1. True	
	2. False	
	3. I don't know	
502	The frequent thirst and frequent need to urinate in this patient may be due to type 2 diabetes mellitus.	
	1. True	
	2. False	
	3. I don't know	
503	Diabetes mellitus is diagnosed when a patient has symptoms of diabetes mellitus and a fasting blood glucose of >7·0mmol/L and/or a random blood glucose of >11·1mmol/L.	
	1. True	
	2. False	
	3. I don't know	
504	Diabetes mellitus can be a dangerous disease and therefore must only be managed in a well-equipped hospital (not a health center or dispensary).	
	1. True	

		2.	**False**
		3.	I don't know
505	If this patient has diabetes mellitus, it is important to educate him to reduce intake of sugars such as soda and candy or sweets, to reduce weight, to stop smoking and to perform regular exercise.		
		1.	**True**
		2.	False
		3.	I don't know
506	If drug therapy is indicated for type 2 diabetes mellitus, the best, first-line therapy for most patients should be an oral medicine such as metformin.		
		1.	**True**
		2.	False
		3.	I don't know
507	In persons with diabetes mellitus, it is very important that the blood glucose level should not go below 12mmol/L as this could cause symptoms of hypoglycemia (low blood sugar).		
		1.	True
		2.	**False**
		3.	I don't know
508	In patients with diabetes mellitus type 2, medications can usually be stopped as soon as the blood sugar is normal.		
		1.	True
		2.	**False**
		3.	I don't know
509	Common complications of chronic, untreated diabetes mellitus include chronic lung disease (emphysema), liver cancer and blindness.		
		1.	True
		2.	**False**
		3.	I don't know
510	In the first year after being started on anti-diabetic treatment, a person with diabetes mellitus only needs to return to clinic every 6 months in order to check their blood sugar, receive further counseling and adjustments in medications.		
		1.	True
		2.	**False**
		3.	I don't know