

Supplementary Material

Supplementary Table S1: Population estimates for Tanzania 2010 – 2017 according to the Tanzania Bureau of Statistics (TBS)

Year	Estimated population
2010	46,100,000
2011	47,570,000
2012	49,080,000
2013	50,640,000
2014	52,230,000
2015	53,880,000
2016	55,570,000

Supplementary Table S2: Variation of Defined Daily Dose (DDD per 1000 inhabitants per day (DID) antibiotics per sector of purchase of antibiotics utilized in Tanzania from 2010-2016

	Defined Daily Dose (DDD per 1000 inhabitants per day (DID)		
Year	Public sector	Private sector	Grand Total
2010	0.315695124	6.462989723	6.778684846
2011	3.264509044	9.998647410	13.26315645
2012	1.250840438	8.530454799	9.781295237
2013	0.073671843	14.58051563	14.65418747
2014	2.017742880	27.84687869	29.86462157
2015	0.102752823	31.87673690	31.97948972
2016	2.613756117	45.57334786	48.18710398
Years total	9.638968269	144.869571	154.5085393
%	6.238469611	93.76153039	100

Supplementary Table S3: Variation of Defined Daily Dose (DDD per 1000 inhabitants per day (DID) antibiotics per dosage form of antibiotics utilized in Tanzania from 2010-2016

Dosage form/	Defined Daily Dose (DDD per 1000 inhabitants per day (DID)							All year's
Year	2010	2011	2012	2013	2014	2015	2016	total
Capsule	4.14502603	5.309291455	5.106272557	6.00690412	22.15500286	27.07317189	27.67566794	97.47133686
Tablet	2.122573461	7.209185713	3.914566033	7.260900909	5.447574003	3.839556442	19.16005039	48.95440695
Syrup	0.28356336	0.529064846	0.419095874	0.533276424	0.98205372	0.869443006	0.966824426	4.583321657
Injectable	0.216595104	0.202455566	0.306573632	0.784661864	1.27099537	0.186970845	0.336174748	3.304427128
Solution	0.010744837	0.012516484	0.023937911	0.036285644	0.004262286	0.000001	-	0.08774784
Powder	0.000180271	0.000642391	0.01062064	0.031460592	0.004732801	0.009004053	0.029945636	0.086586383
Intravenous Infusion	0.000002	-	0.00022859	0.000697916	0.000001	0.001342812	0.018440836	0.020712461
Total	6.778684846	13.26315645	9.781295237	14.65418747	29.86462157	31.97948972	48.18710398	154.5085393

Supplementary Table S4: Variation of amounts DIDs and kg of antivirals and antifungals utilized in Tanzania from 2010-2017

Rank	Medicine (ATC code level 5)	Defined Daily Dose (DDD) measurement units. Utilization was expressed in DDD per 1000 inhabitants per day (DID)							
	Year	2010	2011	2012	2013	2014	2015	2016	All years total
1	Amoxicillin (J01CA04)	2.138265	2.732834	3.166120	2.906303	15.186938	8.460106	19.188346	53.778913
2	Metronidazole (J01XD01)	0.719509	5.105518	0.921516	1.307620	1.569014	0.994656	13.243172	23.861005
3	Tetracycline (J01AA07)	0.121011	0.349499	0.033493	0.211189	3.117376	14.126072	2.569880	20.528519
4	Ciprofloxacin (J01MA02)	0.642624	0.857677	1.637936	1.224426	1.279803	1.195216	2.427715	9.265398
5	Cefalexin (J01DB01)	0.021399	0.013309	0.019791	0.074673	1.470269	2.649437	2.693602	6.942480

6	Doxycycline (J01AA02)	0.445702	0.698575	0.581497	0.772933	1.464953	0.750373	2.161038	6.875071
7	Tinidazole (J01XD02)	0.206036	0.229824	0.344764	1.914793	0.625587	0.440550	1.477362	5.238916
8	Ampicillin (J01CA01)	0.882168	1.182723	0.457627	0.438006	0.361189	0.920659	0.233299	4.475671
9	Erythromycin (J01FA01)	0.220473	0.324990	0.510476	0.330956	0.787203	0.481507	0.953598	3.609203
10	Ampicillin + cloxacillin (J01CR50)	0.108795	0.164541	0.433184	0.365566	0.854357	0.345550	1.187669	3.459662
11	Sulfamethoxazole + trimethoprim (J01EE01)	0.114876	0.455251	0.009334	1.785802	0.005797	0.083260	0.001800	2.456121
12	Cloxacillin (J01CF02)	0.207602	0.321452	0.452528	1.282708	0.013342		0.003698	2.281330
13	Phenoxymethyl penicillin (J01CE02)	0.011937	0.064516	0.186077	0.338393	0.460273	0.243257	0.557363	1.861816
14	Procaine benzylpenicillin (J01CE09)	0.132676	0.120228	0.083775	0.256539	0.531735	0.046984	0.126253	1.298190
15	Amoxicillin + clavulanate (J01CR02)	0.082356	0.100458	0.140504	0.142044	0.232627	0.349376	0.231817	1.279183
16	Azithromycin (J01FA10)	0.094503	0.108884	0.114337	0.178926	0.246168	0.076106	0.179319	0.998243
17	Benzathine penicillin (J01CE08)	0.038184	0.041170	0.073368	0.121730	0.425541	0.078943	0.105260	0.884196
18	Ampicillin + cloxacillin (J01CR50)	0.044223	0.048281	0.065898	0.090380	0.143910	0.129011	0.154844	0.676548
19	Levofloxacin (J01MA12)	0.034375	0.038027	0.111927	0.136712	0.187886			0.508927
20	Chloramphenicol (J01BA01)	0.028010	0.023766	0.089806	0.144607	0.100552	0.050258	0.069742	0.506741
21	Benzyl penicillin (J01CE01)	0.003043	0.018718	0.060511	0.087510	0.092412	0.055496	0.093715	0.411406
22	Gentamycin (J01GB03)	0.005098	0.001082	0.019909	0.152425	0.199343	0.000167	0.023951	0.401975
23	Ofloxacin (J01MA01)	0.192910	0.035529	0.012030	0.021427	0.043066	0.074941	0.014443	0.394346
24	Amoxicillin + flucloxacillin (J01CR50)	0.020743	0.053618	0.044492	0.050579	0.060377	0.084763	0.054888	0.369460
25	Clarithromycin + lansoprazole + tinidazole (A02BD09)	0.017254	0.021855	0.037003	0.033176	0.048569	0.045817	0.072146	0.275821
26	Cefuroxime (J01DC02)	0.015055	0.021172	0.017329	0.051782	0.036431	0.071949	0.042467	0.256185
27	Nitrofurantoin (J01XE01)	0.000743	0.000014		0.005453	0.104910	0.006407	0.108366	0.225894
28	Clarithromycin (J01FA09)	0.011396	0.021169	0.018348	0.023908	0.046976	0.051667	0.041063	0.214527
29	Cefadroxil (J01DB05)	0.022564	0.004272	0.008776	0.015943	0.037273	0.044224	0.028872	0.161923

30	Ciprofloxacin + tinidazole (J01RA11)	0.020266	0.018430	0.020166	0.032732	0.032391	0.008771	0.013874	0.146629
31	Ornidazole (J01XD03)	0.012338	0.016220	0.016459	0.018232	0.022623	0.019889	0.035764	0.141526
32	Cefixime (J01DD08)	0.007226	0.011580	0.018225	0.018968	0.020195	0.015190	0.021848	0.113232
33	Clindamycin (J01FF01)	0.083110	0.001855	0.001134	0.003860	0.006826	0.004883	0.002234	0.103901
34	Cefpodoxime (J01DD13)	0.003836	0.003133	0.008052	0.008979	0.020799	0.032830	0.024726	0.102355
35	Ceftriaxone (J01DD04)	0.011348	0.002159	0.022192	0.038954	0.000017	0.000008	0.000080	0.074759
36	Norfloxacin (J01MA06)	0.009422	0.004034	0.007918	0.010087	0.018146	0.011025	0.012003	0.072634
37	Ceftazidime (J01DD02)	0.000004	0.000005	0.014425	0.035810	0.000026	0.000138	0.000004	0.050413
38	Roxithromycin (J01FA06)		0.036802	0.003014			0.002792		0.042608
39	Flucloxacillin (J01CF05)	0.001070	0.001885	0.000317	0.000177	0.000197	0.013781	0.012665	0.030091
40	Perfloxacin (J01MA03)	0.026149							0.026149
41	Sparfloxacin (J01MA09)	0.012622		0.010449					0.023070
42	Nalidixic acid (J01MB02)	0.002309	0.002607	0.002409	0.004045	0.001915	0.005148	0.003507	0.021939
43	Cefaclor (J01DC04)	0.003584	0.003053		0.001601	0.001567	0.001623	0.003777	0.015204
44	Linezolid (J01XX08)				0.009671	0.001705		0.001104	0.012480
45	Cefotaxime (J01DD01)	0.000380	0.000316	0.000345	0.000257	0.000432	0.001872	0.004084	0.007687
46	Cefprozil (J01DC10)	0.000392	0.000317	0.000614	0.002040	0.000452	0.000647	0.001183	0.005646
47	Sultamicillin (J01CR04)	0.000605	0.000475	0.000544	0.000598	0.000939	0.000140	0.000732	0.004032
48	Meropenem (J01DH02)	0.000049	0.000070	0.000111	0.000183	0.000513	0.001954	0.000919	0.003800
49	Cefepime (J01DE01)	0.000309	0.000204	0.001016	0.000670	0.000272	0.000292	0.000200	0.002962
50	Amikacin (J01GB06)		0.000254	0.000746	0.000284		0.000381	0.000185	0.001851
51	Oxytetracycline combinations (J01AA56)		0.000376			0.001385			0.001761
52	Moxifloxacin (J01MA14)	0.000091	0.000101	0.000095	0.000082	0.000001		0.000828	0.001197
53	Ceftriaxone combinations (J01DD54)						0.000172	0.000961	0.001133
54	Piperacillin + tazobactam (J01CR05)	0.000043	0.000037	0.000205	0.000280	0.000117	0.000061	0.000079	0.000822
55	Cefoperazone, combinations (J01DD62)					0.000066	0.000443	0.000243	0.000752
56	Vancomycin (J01XA01)		0.000069	0.000165	0.000051	0.000122	0.000064	0.000160	0.000630
57	Streptomycin (J01GA01)	0.000000	0.000096	0.000237		0.000001	0.000001	0.000135	0.000469

58	Ampicillin combination (J01CA51)			0.000006	0.000020	0.000007	0.000381		0.000415
59	Cefazolin (J01DB04)		0.000000		0.000079	0.000022	0.000251		0.000353
60	Chlortetracycline (J01AA03)		0.000125	0.000089					0.000214
61	Trimethoprim (J01EA01)							0.000119	0.000119
62	Ampicillin + sulbactam (J01CR01)			0.000006	0.000020	0.000006	0.000004		0.000037
63	Spiramycin + metronidazole (J01RA04)					0.000000			0.000000

Supplementary Table S5: The autoregressive integrated moving average (ARIMA) (0, 1, 0) model predicts the significant increase in utilization and forecasts the trends of antibiotics up to the period 2022 modeled using the data from 2010-2016. The model estimated that by 2022, the total of antibiotics consumed would reach 89.60 DID

Predicted total		Lower confidence limits	Upper confidence limits
Year	DIDs of consumed antibiotics		
2010			
2011	13.68	-5.92	33.28
2012	20.16	0.56	39.76
2013	16.68	-2.92	36.28
2014	21.55	1.95	41.15
2015	36.76	17.16	56.36
2016	38.88	19.28	58.48
2017	55.09	35.49	74.69
2018	61.99	34.28	89.71
2019	68.9	34.95	102.84
2020	75.8	36.6	114.99
2021	82.7	38.88	126.52
2022	89.6	41.59	137.61