

Supplementary Information:

Mapping changes in urban informal settlements in sub-Saharan Africa from 2016 to 2022

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1. Supplementary data

1.1 Overview of ground truth data

Supplementary Table 1 summarizes information about our ground truth data from 16 cities in six sub-Saharan African countries.

Supplementary Table 1 | Overview of ground truth data. Clusters/pockets of informal settlements are small, fragmented areas that precisely outline groups of several informal dwellings (as opposed to more broadly outlined entire informal settlements that can also contain green spaces, institutional buildings etc.). Data for Nyala, Sudan (2013) and Kampala, Uganda (2014) was matched with closest possible Sentinel-2 satellite imagery (2015). Subscript numbers link to the original data source, listed on the following page.

City	Geographic scope within city	Year	Mapped objects	Original data format	Original mapping method	Own data editing	Data provider
<i>Kenya</i>							
Kisumu ¹	7 informal settlements (Bondeni, Obunga, Nyawita, Kaloleni, Nyalenda, Manyatta A, Manyatta B) in 1 map	2020	Coordinates of public facilities in informal settlements	Shapefile – points			UN-Habitat
Nairobi ¹	3 informal settlements (Kawangware, Kibera, Mathare) in 3 maps	2020	Coordinates of public facilities in informal settlements	Shapefile – points	Field-based mapping	Manual drawing of polygons of informal settlements (guided by maps in official reports)	UN-Habitat
Nairobi ²	3 informal (Eastleigh, Korochoho, Viwandani) settlements in 3 maps	2015	Boundaries of informal settlements	PDF			Concern Worldwide
<i>Sierra Leone</i>							
Freetown ²	Entire city	2022	Boundaries of informal settlements	Shapefile – polygons	Field-based mapping	Dissolving of overlapping polygons and filling of small holes	CODOHSAPA
<i>South Africa</i>							
Cape Town ³	Entire city	2016	Boundaries of clusters/pockets of informal settlements	Shapefile – polygons	Digitization of hard copy map of informal settlements from City of Cape Town	none	Openup + Ndifuna Ukwazi + Social Justice Coalition + International Budget Partnership

Durban ⁴		2022	Boundaries of clusters/ pockets of informal settle- ments		n.a.		Municipality of eThekwin
Embalenhle ²		2022	Boundaries of informal settlements		Visual interpretation of VHR satellite im- agery (Google Earth Pro / Maxar)		Nova Institute
Lebohang ²		2022	Boundaries of informal settlements		Visual interpretation of VHR satellite im- agery (Google Earth Pro / Maxar)		Nova Institute
<i>Sudan</i>							
Nyala ⁵	Entire city	2013	Boundaries of formal resi- dential areas, informal set- tlements, refugee camps (+ individual dwellings)	GeoPDF	Visual interpretation of VHR satellite im- agery (Worldview-2) and ancillary data	Manual drawing of pol- ygons of informal set- tlements (over GeoPDF map)	Copernicus (EU)
<i>Tanzania</i>							
Arusha ⁶		2015					
Dodoma ⁷		2016					
Kigoma ⁸		2016					
Mbeya ⁹	Core urban area	2017	Boundaries of clusters/ pockets of planned settle- ments and unplanned set- tlements (in residential ar- eas and commercial areas with residential elements)	Shapefile – polygons	Visual interpretation of VHR satellite im- agery (Worldview- 2/GeoEye-1 /Pleia- des)	none	World Bank (EO4SD)
Mtwara ¹⁰		2017					
Mwanza ¹¹		2015					
Tanga ¹²		2018					
<i>Uganda</i>							
Kampala ¹³	Entire city	2014	Boundaries of informal settlements	PDF	Focus groups, infor- mal meetings, field observations (transect walks)	Manual drawing of pol- ygons of informal set- tlements (guided by maps in official reports)	Actogether Uganda + National Slum Dwellers Federation Uganda + Slum Dwellers International + Comic Relief

Original data sources of ground truth data:

¹ <https://data.unhabitat.org/maps/57826715e9db4166a4946a3f885df692/about>.

² Received directly from organization.

³ <https://data.openup.org.za/dataset/informal-settlements-matrix-shapefile-9jrk-izbx/resource/c1ec646a-f5d5-456a-8f4e-6fba35300563>.

⁴ https://gis-ethekwini.opendata.arcgis.com/datasets/c4a5c06d389b40a3ae49c714bc0c71c9_0/about.

⁵ <https://emergency.copernicus.eu/mapping/list-of-components/EMSN002>.

⁶ <https://datacatalog.worldbank.org/search/dataset/0039836>.

⁷ <https://datacatalog.worldbank.org/search/dataset/0039353>.

⁸ <https://datacatalog.worldbank.org/search/dataset/0041084>.

⁹ <https://datacatalog.worldbank.org/search/dataset/0040698>.

¹⁰ <https://datacatalog.worldbank.org/search/dataset/0042022>.

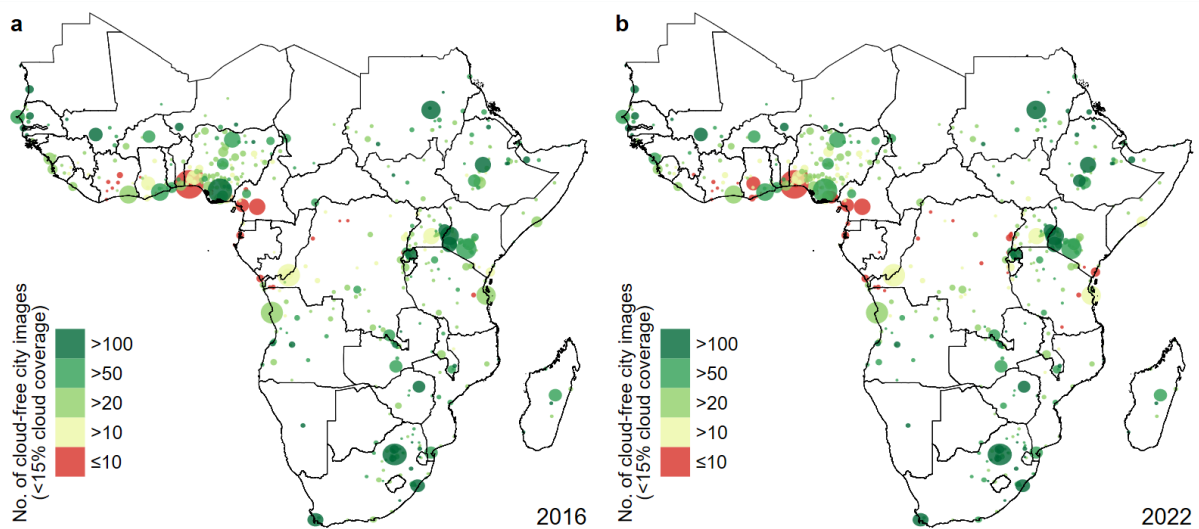
¹¹ <https://datacatalog.worldbank.org/search/dataset/0039824>.

¹² <https://datacatalog.worldbank.org/search/dataset/0041723>.

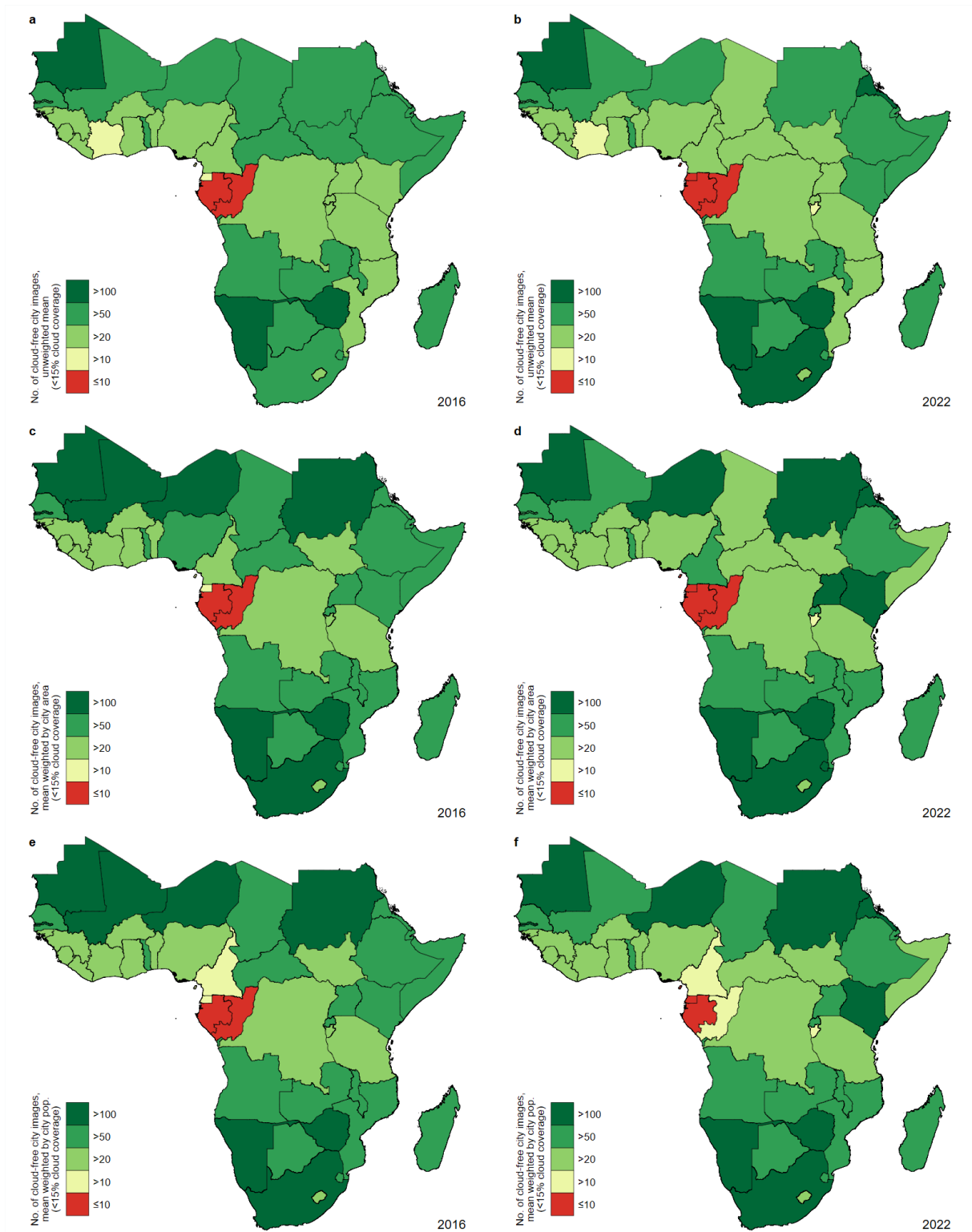
¹³ <https://www.actogetherug.org/kampala-central-profile-data/>, <https://www.actogetherug.org/kawempe-profile-data/>, <https://www.actogetherug.org/makindye-profile-data/>, <https://www.actogetherug.org/nakawa-profile-data/>, <https://www.actogetherug.org/lubaga-profile-data/>.

1.2 Availability of “cloud-free” satellite images

Supplementary Figure 1 maps for all 529 cities in 2016 and 2022 the number of available and utilized satellite images with a cloud coverage of less than 15% (“cloud-free”). In addition, Supplementary Figure 2 illustrates the same statistics aggregated at the country-level. It shows country-level means – as unweighted means (panels a and b), city-area-weighted means (panels c and d), and city-population-weighted means (panels e and f).



Supplementary Figure 1 | Number of “cloud-free” satellite images used for predictions – per city (2016 and 2022). Number of satellite images with less than 15% cloud coverage used for predictions in 2016 (a) and 2022 (b) for 529 cities. Circle area is proportional to cities’ total population size (in 2015, according to Africapolis estimates).



Supplementary Figure 2 | Average number of “cloud-free” satellite images used for predictions – per country (2016 and 2022). Average number of satellite images with less than 15% cloud coverage used for predictions in 2016 (a, c, e) and 2022 (b, d, f) for 44 cities. Unweighted means (a, b), city-area-weighted means (c, d), and city-population-weighted means (e, f).

2. Supplementary methods

2.1 Binarization of segmentation maps – calibration against UN-Habitat estimates

Supplementary Table 2 provides a comparison of the estimates of the share of the urban population living in informal settlements at the country-level from UN-Habitat (col. 2) and our predicted estimates in 2020 – using three alternative binarization thresholds: 1/5 (col.3), 1/4 (col. 4), and 1/3 (col. 5). Columns 6-8 present the corresponding differences in percentage points between the UN-Habitat estimates and our predicated estimates. Boldface indicates the chosen threshold value that minimizes this difference for each country. For nine countries, no UN-Habitat data was available. In these cases, we selected the modal threshold value of all neighboring countries.

Supplementary Table 2 | Share of urban population living in informal settlements, country-level, 2020 – UN-Habitat estimates versus our estimates. UN-Habitat estimates come from the Global Urban Indicators Database 2020. UN-Habitat data was unavailable (–) for nine of our 44 included countries. 1/5, 1/4, and 1/3 are the thresholds used to create the binary segmentation maps and to calculate country- and city-level estimates of informal settlements prevalence. Boldface indicates which threshold was chosen for each country to minimize differences between our estimates and UN-Habitat estimates.

Country	UN-Habitat estimates (%)	Our estimates (%)			Difference: our estimates vs UN-Habitat estimates (pp)		
		1/5	1/4	1/3	1/5	1/4	1/3
Angola	62.6	53.7	43.4	27.4	-8.9	-19.2	-35.2
Benin	67.9	59.8	48.8	31.9	-8.1	-19.1	-36.0
Botswana	39.6	22.1	13.4	5.2	-17.5	-26.2	-34.4
Burkina Faso	26.6	46.0	32.8	13.1	19.4	6.2	-13.5
Burundi	36.8	63.2	47.1	33.2	26.4	10.3	-3.6
Cameroon	32.7	61.1	45.8	25.4	28.4	13.1	-7.3
Central African Republic	–	73.4	54.1	21.9	–	–	–
Chad	82.0	62.1	52.5	35.9	-19.9	-29.5	-46.1
Congo	44.2	59.4	43.3	20.7	15.2	-0.9	-23.5
Côte d'Ivoire	53.2	61.7	50.0	31.9	8.5	-3.2	-21.3
DR Congo	78.4	65.4	52.7	35.2	-13.0	-25.7	-43.2
Djibouti	–	29.3	21.9	10.1	–	–	–
Equatorial Guinea	–	51.2	40.2	24.6	–	–	–
Eritrea	–	52.2	42.0	29.0	–	–	–
Ethiopia	64.3	66.9	50.5	38.6	2.6	-13.8	-25.7
Gabon	–	58.7	45.5	27.4	–	–	–
Gambia	38.9	66.7	55.7	38.3	27.8	16.8	-0.6
Ghana	33.5	62.8	51.3	33.5	29.3	17.8	0.0
Guinea	49.0	75.6	65.1	41.2	26.6	16.1	-7.8
Guinea-Bissau	60.8	76.6	67.8	51.1	15.8	7.0	-9.7
Kenya	50.8	33.2	22.9	16.2	-17.6	-27.9	-34.6
Lesotho	25.6	56.1	41.9	22.4	30.5	16.3	-3.2
Liberia	63.9	78.5	69.1	53.6	14.6	5.2	-10.3

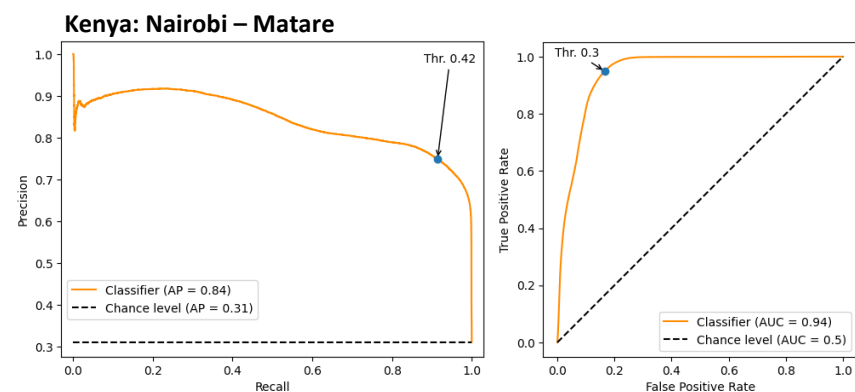
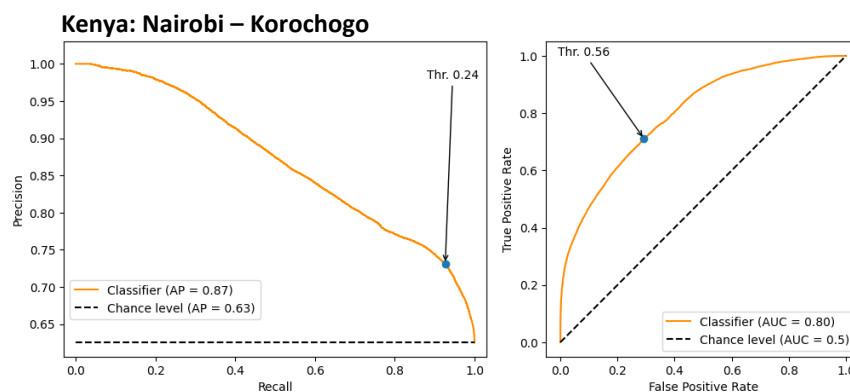
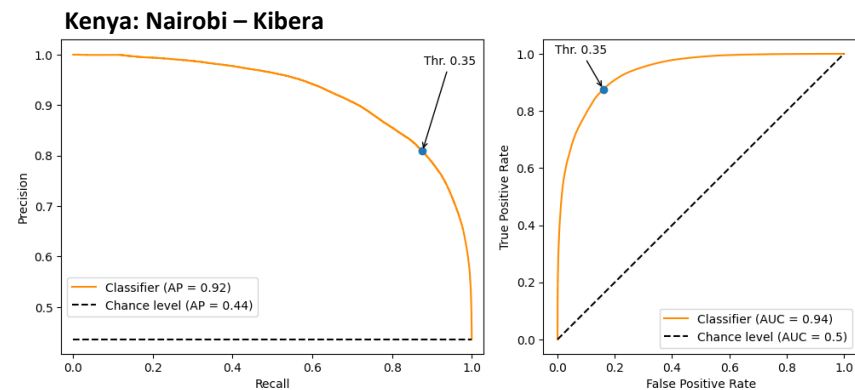
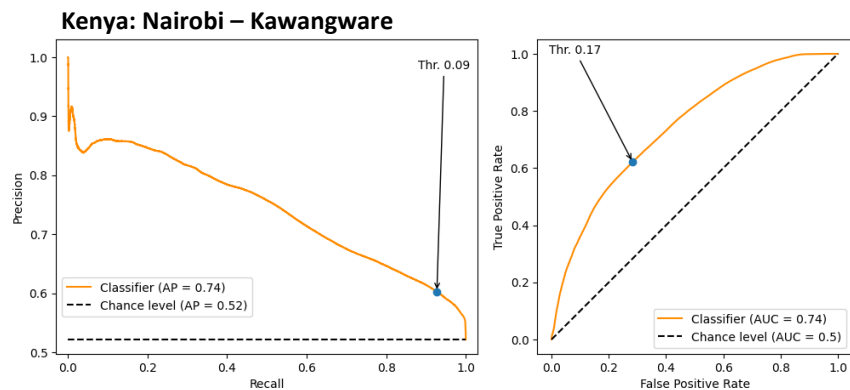
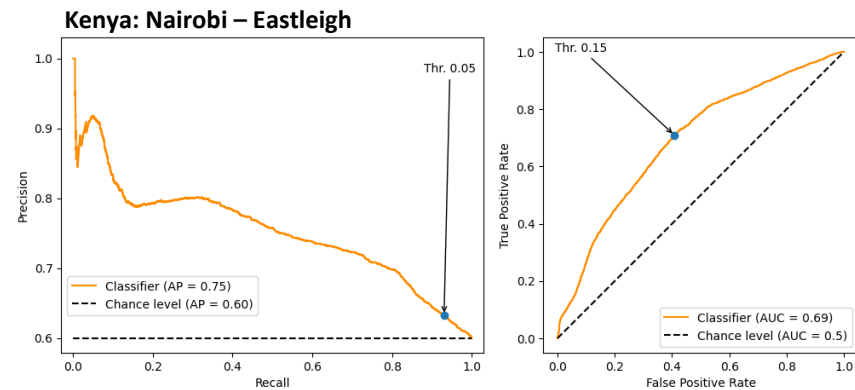
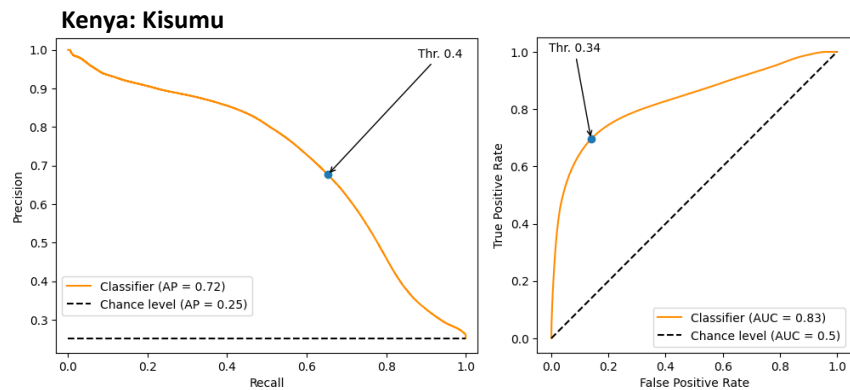
Madagascar	67.4	60.5	51.0	37.0	-6.9	-16.4	-30.4
Malawi	49.8	85.7	80.8	72.1	35.9	31.0	22.3
Mali	41.9	81.7	70.8	44.3	39.8	28.9	2.4
Mauritania	56.0	16.2	7.2	1.1	-39.8	-48.8	-54.9
Mozambique	55.0	57.4	45.6	28.5	2.4	-9.4	-26.5
Namibia	–	66.6	57.7	39.5	–	–	–
Niger	–	60.4	50.6	35.8	–	–	–
Nigeria	49.0	35.6	24.9	13.5	-13.4	-24.1	-35.5
Rwanda	38.3	56.9	42.1	26.7	18.6	3.8	-11.6
Senegal	31.6	26.2	18.7	8.7	-5.4	-12.9	-22.9
Sierra Leone	50.6	51.3	34.8	14.5	0.7	-15.8	-36.1
Somalia	–	67.5	45.3	20.6	–	–	–
South Africa	24.2	42.3	31.7	18.1	18.1	7.5	-6.1
South Sudan	–	20.8	15.3	9.9	–	–	–
Sudan	73.7	53.9	35.9	15.5	-19.8	-37.8	-58.2
Swaziland	10.8	26.3	18.5	9.9	15.5	7.7	-0.9
Tanzania	40.9	69.7	59.1	43.0	28.8	18.2	2.1
Togo	38.5	63.8	49.5	23.3	25.3	11.0	-15.2
Uganda	54.0	56.9	43.2	27.7	2.9	-10.8	-26.3
Zambia	48.3	44.7	36.1	25.8	-3.6	-12.2	-22.5
Zimbabwe	21.6	22.7	14.1	6.8	1.1	-7.5	-14.8

2.2 Performance evaluations statistics

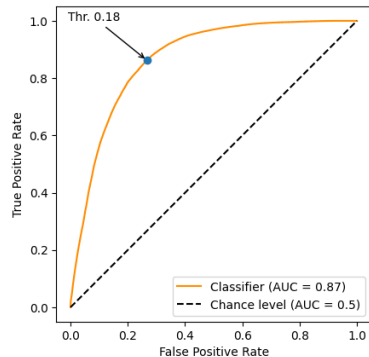
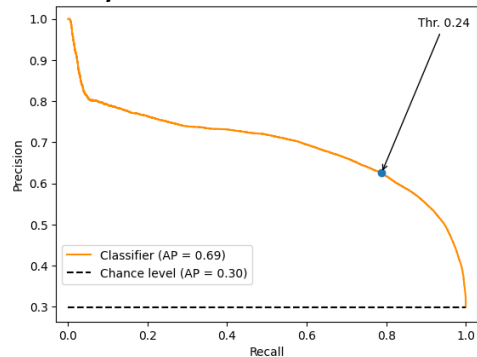
Supplementary Table 3 provides evaluation statistics based on country-specific models. These country-specific models were later aggregated for the ensemble prediction, together with the Freetown-Kampala-Nyala-Mtwara-Embalenhle-Kisumu model. Models were evaluated for each city, such that the model was trained on all cities in the country except the city of interest. In addition, Supplementary Figure 3 provides the Precision-Recall Curve and the Receiver Operating Characteristic (ROC) Curve for the same cities. Lastly, Supplementary Figure 4 visualizes the performance of our predictions within cities, i.e., it shows the distribution of true/false positives/negatives across pixels within cities with ground truth data. All evaluation statistics were based on the binary segmentation maps with the country-specific optimum threshold value.

Supplementary Table 3 | Performance evaluation metrics for country-specific models. Each row presents evaluation metrics based on a country-specific model, i.e., the model was trained on all cities in the respective country except the city that it is evaluated on. IoU = Intersection over Unit. All statistics are naturally bounded between 0 and 100 and expressed in %. Values based on binary segmentation maps with threshold values 1/5 for Kenya and 1/3 for South Africa and Tanzania.

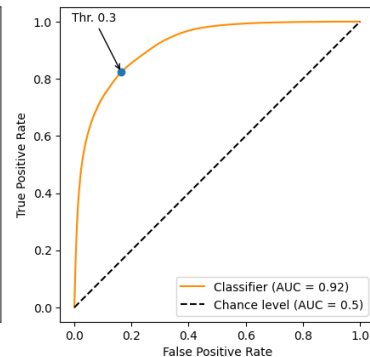
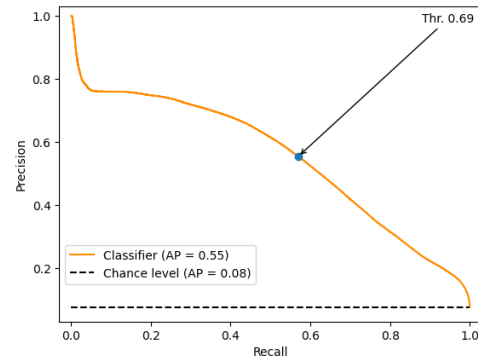
City	Precision	Recall	F1 Score	Specificity	Accuracy	IoU
<i>Kenya</i>						
Kisumu	42.41	82.17	55.82	61.97	67.06	38.77
Nairobi – Eastleigh	73.06	65.37	68.87	63.94	64.8	52.62
Nairobi – Kawangware	72.41	56.08	62.44	77.05	66.41	46.17
Nairobi – Kibera	69.60	96.38	80.6	66.64	79.6	67.57
Nairobi – Korochoho	71.25	94.98	81.3	35.59	72.71	68.51
Nairobi – Mathare	69.02	97.63	80.85	80.15	85.6	67.86
Nairobi – Viwandani	60.05	83.86	69.52	75.64	78.05	53.31
<i>South Africa</i>						
Embalenhle	33.32	80.79	46.24	84.95	84.63	30.33
Lebohang	57.54	56.77	56.98	91.74	85.98	40.03
<i>Tanzania</i>						
Arusha	71.03	65.31	68.01	92.99	87.23	51.57
Dodoma	60.14	48.85	53.85	93.66	86.34	36.85
Kigoma	32.51	25.9	28.72	90.62	81.05	16.78
Mbeya	72.19	76.4	74.13	89.55	86.11	58.95
Mtwara	70.01	52.63	59.97	94.56	86.46	42.85
Mwanza	55.53	75.57	63.97	84.14	82.36	47.05
Tanga	38.85	68.44	49.48	81.2	79.31	32.88
Mean	59.31	70.45	62.55	79.02	79.61	47.01
Median	64.58	72.01	63.21	82.67	81.71	46.61



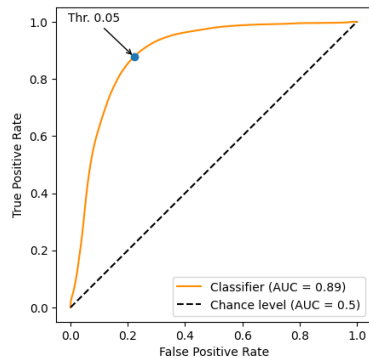
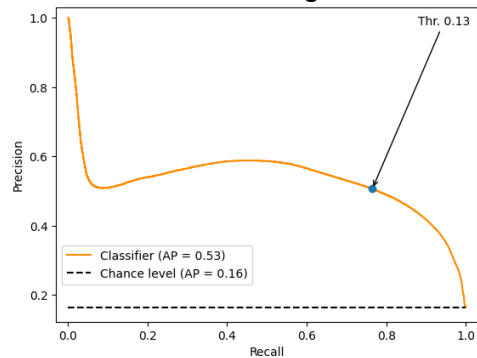
Kenya: Nairobi – Viwandani



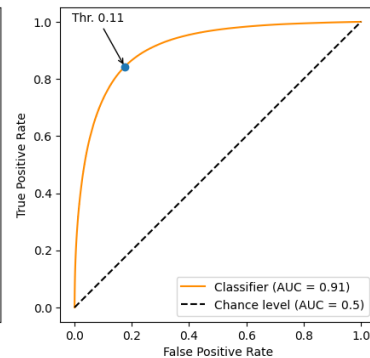
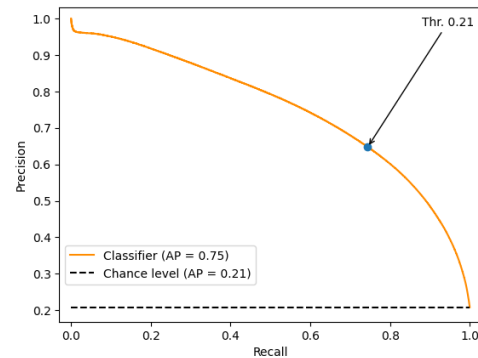
South Africa: Embalenhle



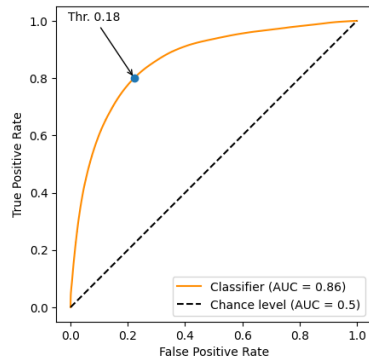
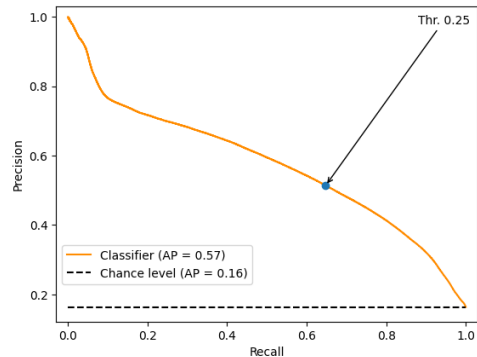
South Africa: Lebahong



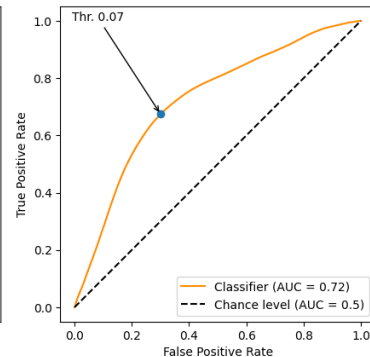
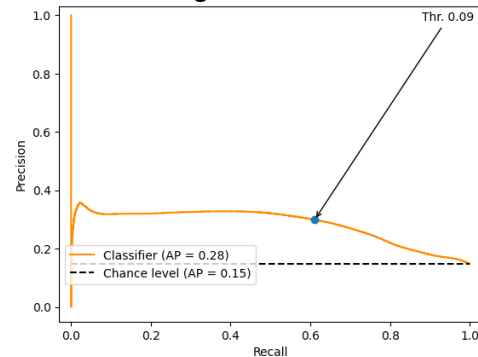
Tanzania: Arusha

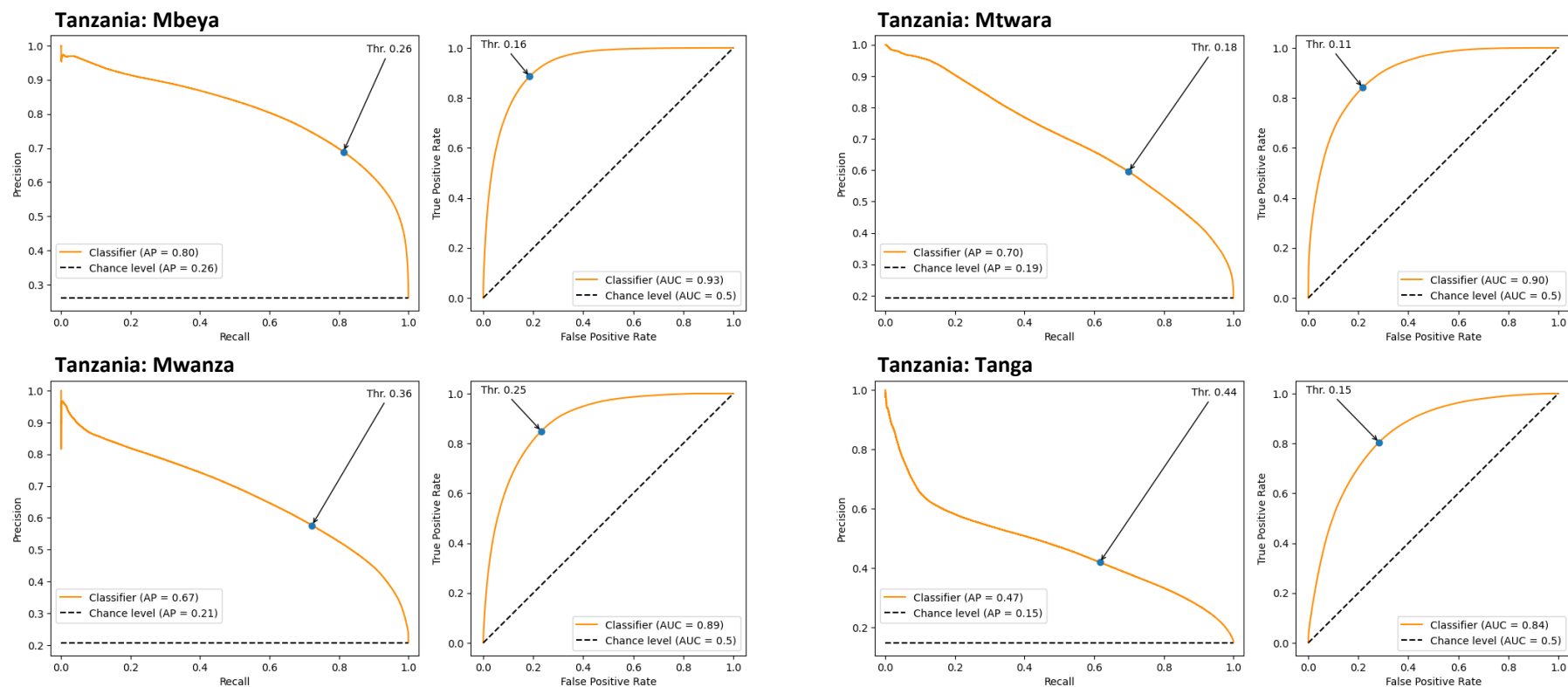


Tanzania: Dodoma



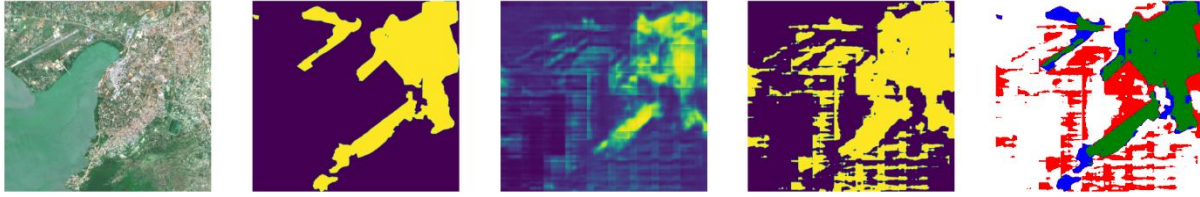
Tanzania: Kigoma



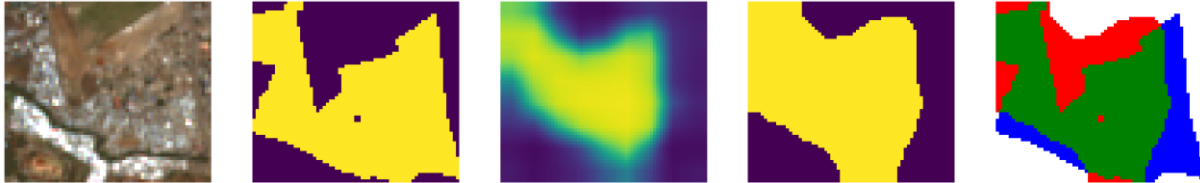


Supplementary Figure 3 | Performance evaluation graphs for country-specific models. For each city the Precision-Recall curve is shown on the left and the ROC curve is shown on the right. The blue dot and arrow indicate the threshold for binary segmentation that jointly optimizes Precision and Recall (i.e., the F1 score) or TPR and FPR, respectively. In each plot, the solid orange line (classifier) denotes the performance of the model trained on all cities from the same country except the city in the plot title, for which the performance is evaluated. The black dotted line always denotes the chance level, i.e., the performance of a hypothetical random guesser for the classification of each pixel in a given city. For the ROC curve, in expectation, random guessing results in an area under curve (AUC) equal to 0.5, whereas for the Precision-Recall curve, the expected performance of a random guesser is always equal to the proportion of positive pixels (the ones belonging to informal settlements) in the ground truth.

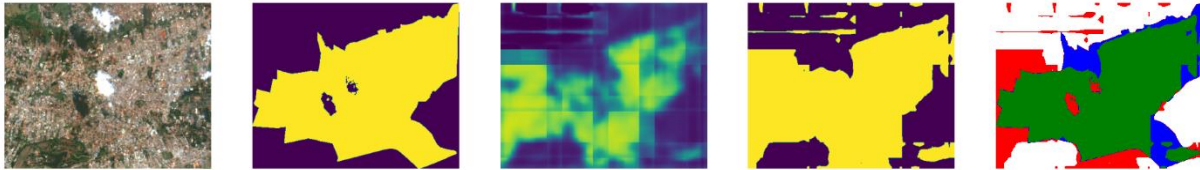
Kenya: Kisumu (Tile size: 8.42km x 9.19km)



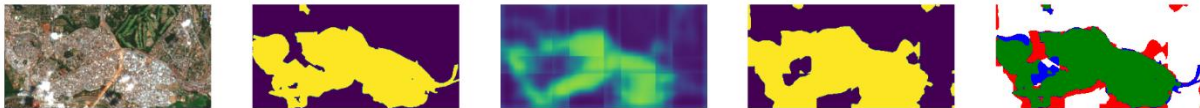
Kenya: Nairobi – Eastleigh (Tile size: 0.57km x 0.65km)



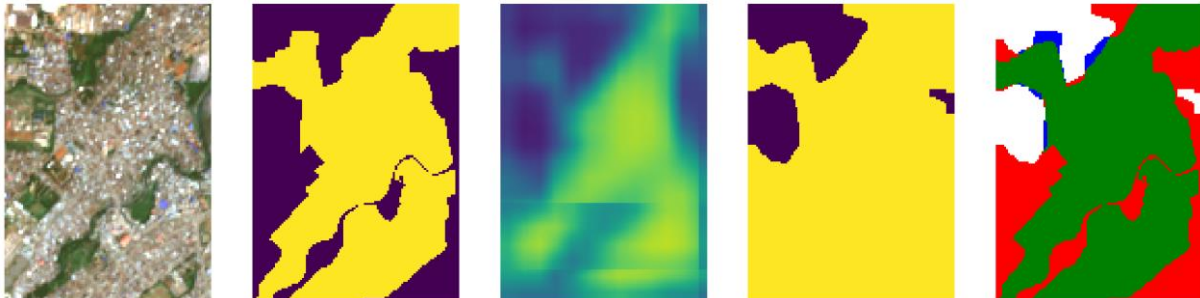
Kenya: Nairobi – Kawangware (Tile size: 3.42km x 4.29km)



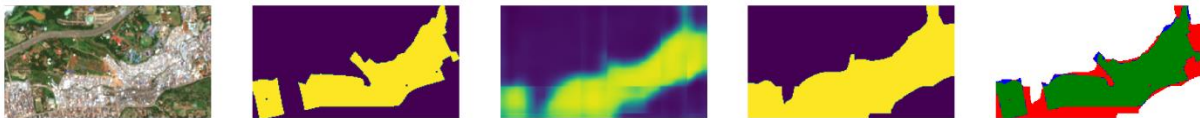
Kenya: Nairobi – Kibera (Tile size: 1.92km x 3.84km)



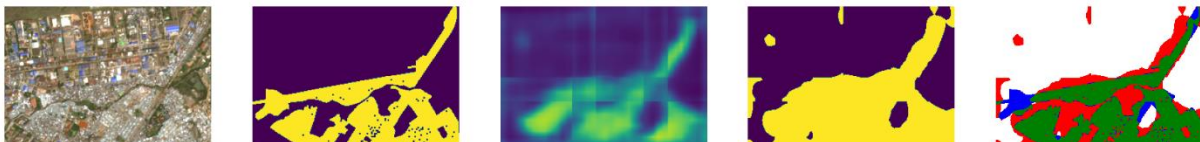
Kenya: Nairobi – Korochocho (Tile size: 1.43km x 1.00km)



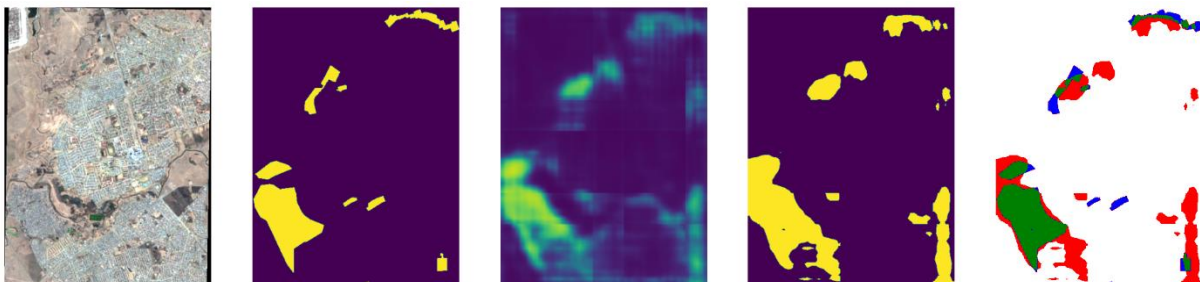
Kenya: Nairobi – Mathare (Tile size: 1.34km x 2.48km)



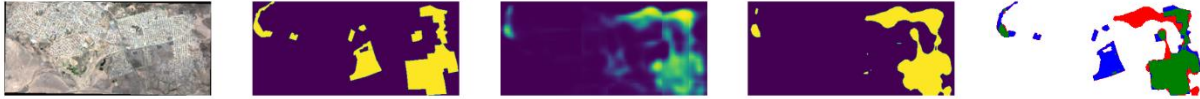
Kenya: Nairobi – Viwandani (Tile size: 1.87km x 2.77km)



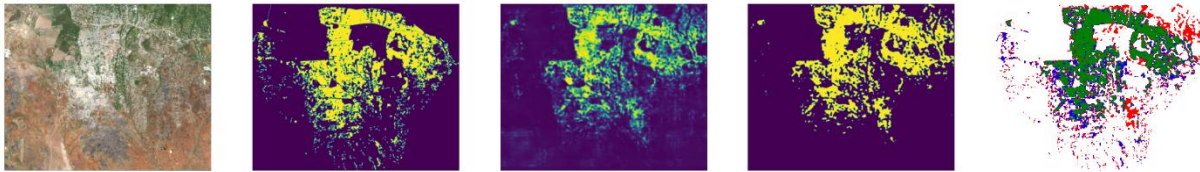
South Africa: Embalenhle (Tile size: 5.81km x 4.29km)



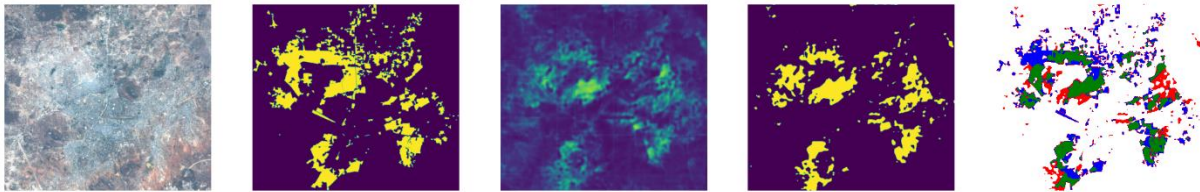
South Africa: Lebohang (Tile size: 2.21km x 4.91km)



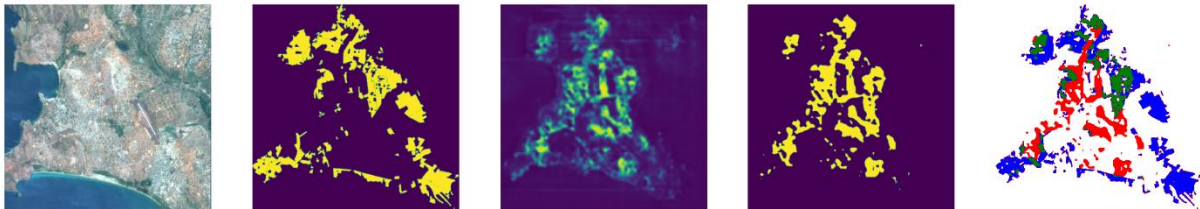
Tanzania: Arusha (Tile size: 15.59km x 19.41km)



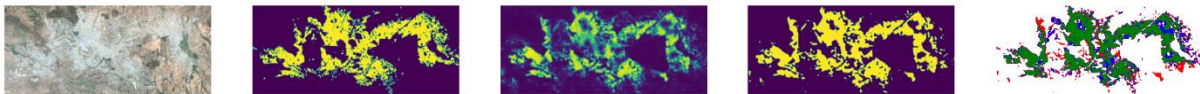
Tanzania: Dodoma (Tile size: 12.69km x 14.11km)



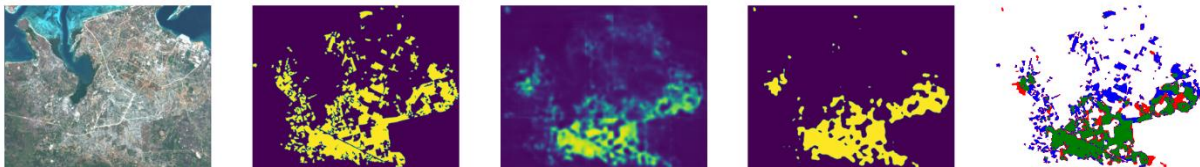
Tanzania: Kigoma (Tile size: 10.69km x 10.73km)



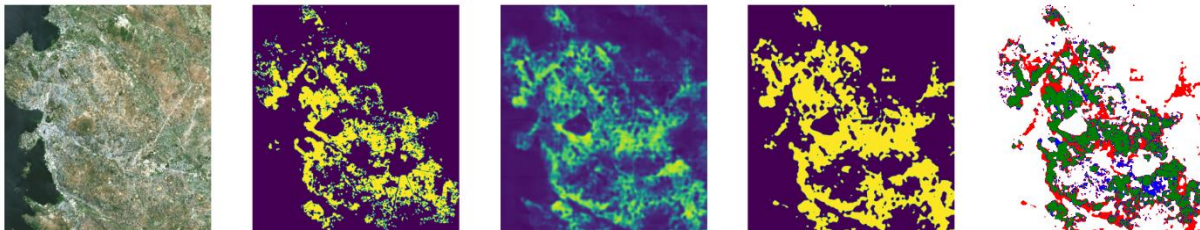
Tanzania: Mbeya (Tile size: 8.91km x 20.96km)



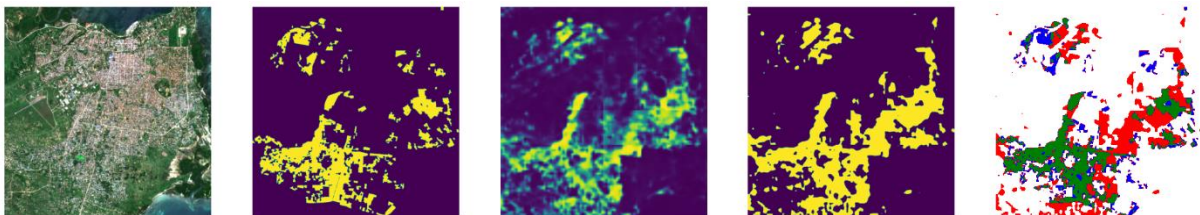
Tanzania: Mtwara (Tile size: 7.38km x 9.38km)



Tanzania: Mwanza (Tile size: 15.18km x 13.88km)



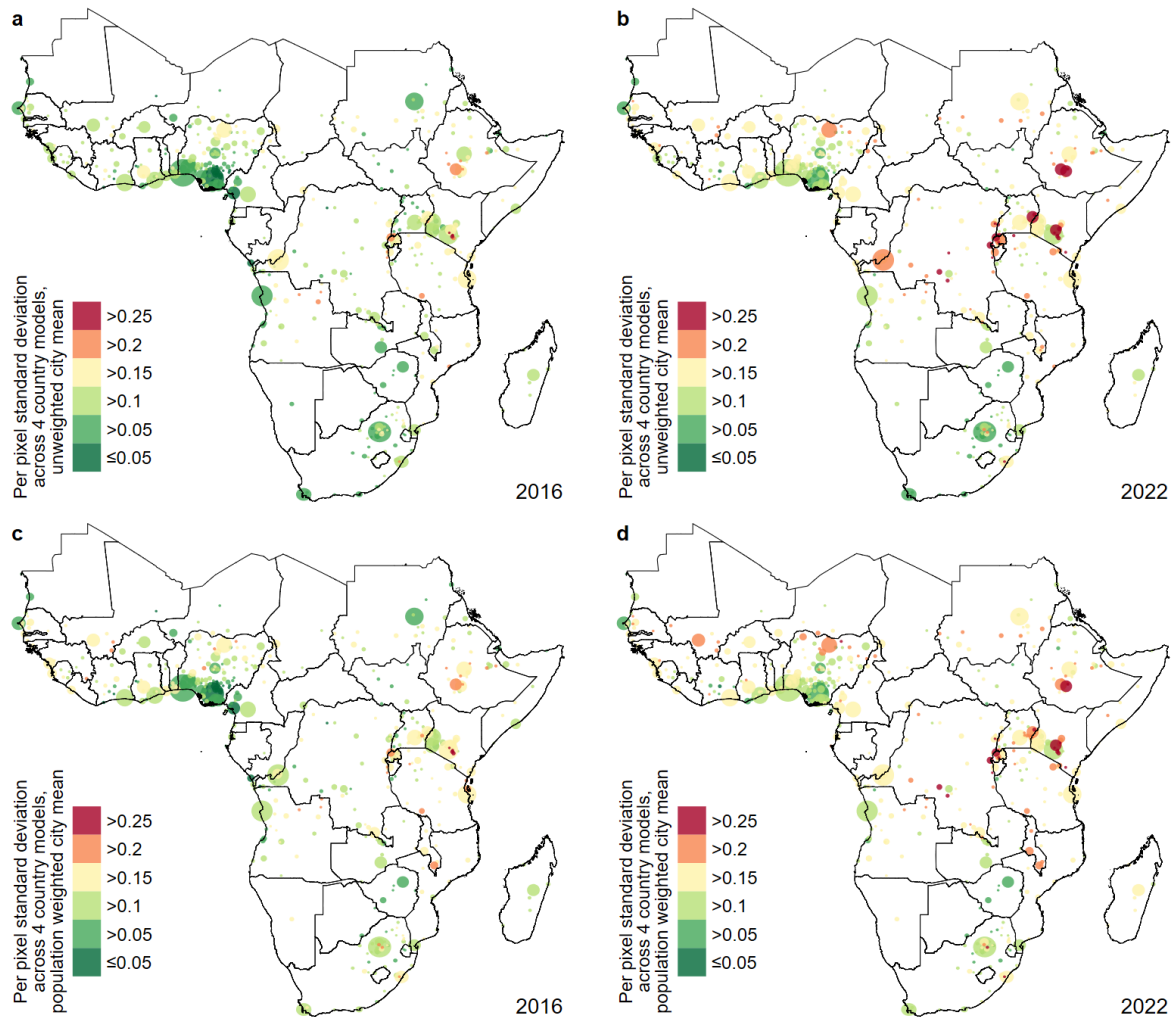
Tanzania: Tanga (Tile size: 7.82km x 7.72km)



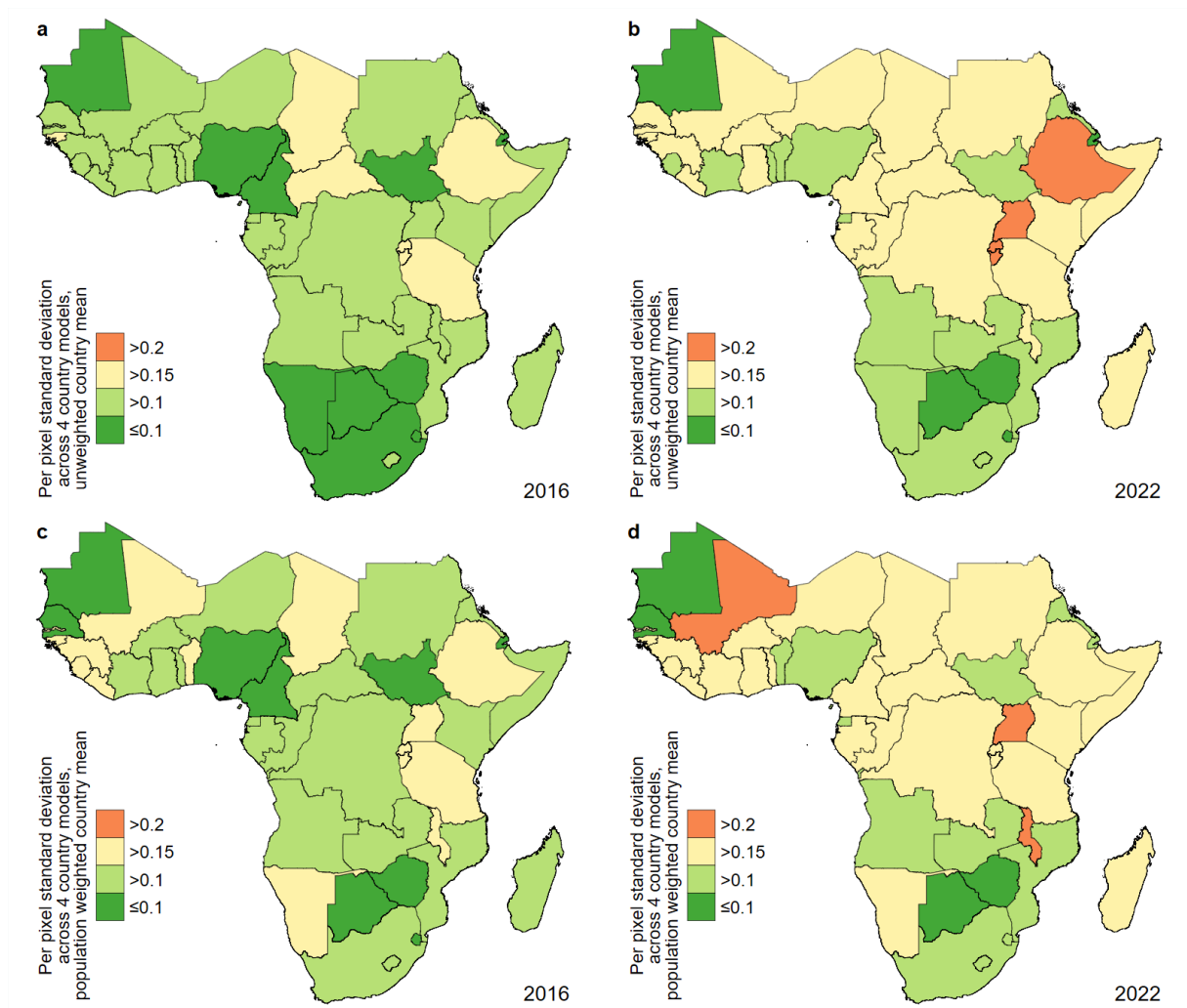
Supplementary Figure 4 | Visualization of predictions and corresponding performance evaluations for country-specific models. For each city from left to right: 1) input satellite image, 2) binary ground truth raster, 3) raw (continuous) prediction map, 4) binary segmentation map, 5) classification of pixels into true positives (green), false positives (red), true negatives (white), and false negatives (blue). Binarization thresholds were 0.2 for Kenya, and 0.33 for South Africa and Tanzania.

2.3 Per-pixel standard deviation of predictions across country-specific models

Supplementary Figure 5 maps for all 529 cities in 2016 and 2022 the average per-pixel standard deviation of predictions across country-specific models – once as unweighted means (panels a and b) and once as population-weighted means (panels c and d). In addition, Supplementary Figure 6 illustrates the same statistics aggregated at the country-level.



Supplementary Figure 5 |Per-pixel standard deviation of predictions across country-specific models – per city (2016 and 2022). Unweighted means (a and b) and population-weighted means (c and d) in 2016 (a and c) and 2022 (b and d) for 529 cities. Circle area is proportional to cities' total population size (in 2015, according to Africapolis estimates).



Supplementary Figure 6 | Per-pixel standard deviation of predictions across country-specific models – per country (2016 and 2022). Unweighted means (a and b) and population-weighted means (c and d) in 2016 (a and c) and 2022 (b and d) for 44 countries.

3. Supplementary results

3.1 Comprehensive results

Supplementary Table 4 provides comprehensive results for all 529 cities. It contains city-level estimates of the share of the urban area (col. 1-3), the share of the urban population (col. 4-6), and the total urban population (col. 7-9) living in informal settlements. This includes estimates of 2016 (col. 1, 4, and 7), estimates of 2022 (col. 2, 5, and 8), and estimates of the changes between 2016 and 2022 (col. 3, 6, and 9). In addition, Supplementary Table 5 illustrates the same statistics aggregated at the country-level for 44 countries.

Supplementary Table 4 | City-level estimates of informal settlement prevalence and growth across sub-Saharan Africa (2016–2022). From left to right: share of the urban area covered by informal settlements, share of the urban population living in informal settlements, and total population living in informal settlements. Estimates for 2016, 2022, and change between 2016 and 2022. All estimates are based on binary segmentation maps with the thresholds illustrated in Supplementary Table 2.

City	Area share			Population share			Total population		
	2016 (%)	2022 (%)	2016-‘22 (pp)	2016 (%)	2022 (%)	2016-‘22 (pp)	2016 (in thousands)	2022 (in thousands)	2016-‘22 (in thousands)
<i>Angola</i>									
Benguela	7.8	28.3	20.5	13.8	37.0	23.2	32	73	42
Caala	62.6	68.5	6.0	71.6	74.4	2.7	7	5	-1
Cabinda	42.7	70.3	27.6	51.7	76.5	24.8	106	192	86
Cafunfo	85.1	86.8	1.8	89.1	89.4	0.3	3	3	0
Cela	79.5	73.9	-5.6	77.5	70.3	-7.2	2	2	0
Dundo	68.2	77.9	9.7	72.9	82.0	9.1	8	10	1
Gabela	51.5	76.0	24.6	53.3	78.2	24.9	4	6	2
Huambo	43.8	56.2	12.4	52.6	60.0	7.5	87	76	-11
Lobito	18.6	33.0	14.5	23.3	37.3	14.0	27	37	10
Luanda	28.0	50.0	22.0	50.8	54.4	3.6	3452	5910	2457
Lubango	40.5	49.7	9.2	54.7	59.9	5.2	126	143	17
Lucapa	81.9	80.2	-1.7	88.2	82.9	-5.3	3	3	0
Luena	56.9	51.2	-5.6	55.2	50.9	-4.3	10	12	2
Malanje	59.3	69.7	10.4	61.7	70.4	8.7	63	57	-6
Mbanza Congo	5.3	15.0	9.7	4.9	13.3	8.4	1	2	1
Menonge	54.7	58.8	4.1	62.5	63.5	1.0	23	17	-5
N'dalatando	69.0	85.7	16.7	69.2	84.9	15.6	13	11	-2
Namibe	29.7	32.2	2.5	38.0	40.1	2.1	21	27	5
Ngunza	12.4	52.6	40.2	15.4	51.8	36.4	7	23	15
Ondjiva	39.4	59.3	19.9	47.3	65.3	18.0	13	21	7
Santo Antonio do Zaire	29.5	53.9	24.4	32.7	54.8	22.0	10	16	6
Saurimo	71.7	65.1	-6.6	71.6	65.6	-5.9	27	21	-6
Uige	69.7	73.2	3.5	73.9	73.7	-0.1	72	45	-28
<i>Benin</i>									
Abomey	57.4	20.2	-37.2	68.6	27.5	-41.1	86	37	-50
Cotonou	54.2	49.6	-4.6	69.2	57.6	-11.6	815	749	-66

Parakou	57.9	73.1	15.2	62.7	73.7	11.0	63	80	17
Porto Novo	38.6	54.9	16.3	63.5	73.2	9.7	246	310	64
<i>Botswana</i>									
Francistown	24.1	20.8	-3.3	25.8	22.7	-3.2	10	9	-1
Gaborone	22.7	23.8	1.1	22.2	22.8	0.7	22	24	2
<i>Burkina Faso</i>									
Bobo-Diou-lasso	27.5	58.8	31.3	28.9	56.8	27.9	48	117	69
Koudougou	29.6	64.0	34.4	32.0	62.4	30.4	11	24	13
Ouagadougou	25.6	57.3	31.7	28.7	53.7	25.0	541	1287	746
<i>Burundi</i>									
Bujumbura	9.6	15.6	6.0	29.0	28.6	-0.4	224	264	41
<i>Cameroon</i>									
Bafoussam	0.1	4.2	4.1	0.2	10.3	10.1	1	58	57
Bamenda	0.3	19.0	18.7	0.4	24.9	24.6	0	41	40
Buea	0.8	16.2	15.4	0.9	17.9	16.9	0	11	11
Douala	0.2	55.7	55.5	0.2	57.3	57.0	3	1036	1033
Garoua	41.9	58.4	16.5	42.0	56.0	14.0	21	44	23
Kumba	0.0	1.3	1.3	0.0	1.2	1.2	0	0	0
Limbe	2.6	24.6	22.1	2.9	25.1	22.3	1	11	10
Maroua	37.9	58.4	20.6	38.6	57.5	18.9	20	43	23
Ndjamena / Kousseri	34.9	42.8	7.9	35.8	42.5	6.6	7	12	5
Ngaoundere	34.0	48.1	14.1	37.5	47.5	10.0	8	13	6
Nkongsamba	20.8	32.5	11.7	22.0	34.7	12.6	1	1	1
Yaounde	6.3	36.4	30.1	7.7	49.2	41.5	184	1441	1257
<i>Cent. Afr. Rep.</i>									
Bangui	51.9	79.3	27.4	59.6	85.4	25.8	358	556	199
<i>Chad</i>									
Abeche	40.5	42.1	1.6	41.2	42.6	1.4	3	3	0
Moundou	35.4	72.3	36.9	41.6	78.0	36.5	8	15	7
Ndjamena / Kousseri	63.5	73.2	9.7	62.9	69.1	6.2	390	470	80
Sarh	38.2	73.6	35.3	38.7	74.0	35.3	2	4	2
<i>Congo</i>									
Brazzaville	44.6	55.7	11.1	49.5	41.7	-7.7	446	343	-102
Pointe Noire	2.0	52.5	50.5	1.8	58.0	56.1	7	180	173
<i>Côte d'Ivoire</i>									
Abengourou	33.7	1.5	-32.2	38.3	0.8	-37.5	24	0	-23
Abidjan	33.3	55.3	22.0	47.3	63.4	16.1	1808	2661	853
Bouake	39.9	27.9	-12.0	54.9	30.4	-24.4	203	112	-91
Daloa	41.7	24.1	-17.5	42.2	16.3	-25.9	68	28	-40
Divo	0.6	10.6	10.1	0.3	9.1	8.7	0	6	6
Gagnoa	23.0	36.4	13.4	20.0	35.8	15.8	18	34	16
Korhogo	23.0	50.8	27.8	28.8	54.5	25.7	55	111	57
Man	25.8	47.8	21.9	28.7	47.4	18.7	26	43	17
San-Pedro	9.3	35.1	25.9	5.2	34.3	29.0	5	40	34
Soubre	42.5	72.9	30.4	59.6	76.3	16.7	37	49	12
Yamoussoukro	8.2	2.1	-6.1	12.3	2.7	-9.6	12	3	-9

DR Congo

Aru	19.3	47.8	28.6	28.2	61.4	33.1	6	15	8
Balamba	60.9	85.5	24.6	71.1	84.9	13.8	12	18	6
Bandundu	1.5	40.2	38.7	1.4	34.8	33.4	1	24	23
Baraka	64.2	92.7	28.4	70.7	94.8	24.1	11	13	2
Beni	17.9	76.0	58.0	19.1	79.3	60.2	118	511	393
Boma	1.1	56.9	55.9	1.2	60.1	58.9	1	63	61
Bukavu	36.0	83.3	47.3	73.2	94.4	21.2	360	493	133
Bunia	66.7	84.8	18.1	74.0	82.9	8.9	53	61	9
Butembo	39.5	89.4	50.0	34.9	89.1	54.1	58	161	103
Fungurume	57.5	94.1	36.6	63.3	94.0	30.7	7	11	4
Gemena	3.1	54.4	51.2	3.4	55.8	52.4	1	11	11
Goma	62.7	82.1	19.4	72.9	85.8	12.9	173	227	54
Isiro	30.4	49.5	19.1	31.5	48.9	17.3	3	4	2
Kabinda	5.6	41.6	36.0	6.8	44.8	38.0	1	6	5
Kalemie	56.4	87.4	31.1	64.1	90.9	26.8	32	49	17
Kamina	23.6	53.4	29.8	24.3	52.8	28.5	4	11	7
Kananga	3.5	69.6	66.2	4.0	73.4	69.4	11	237	227
Kikwit	5.4	52.6	47.2	7.8	54.7	47.0	17	120	103
Kindu	18.7	64.5	45.8	22.1	59.5	37.4	26	76	49
Kinshasa	40.2	79.2	39.0	51.8	80.2	28.3	2309	3637	1328
Kisangani	26.9	56.2	29.3	29.7	53.8	24.1	58	108	50
Kolwezi	50.7	73.5	22.8	62.9	76.9	14.0	12	19	7
Likasi	57.4	69.2	11.9	61.9	72.0	10.1	84	126	42
Lisala	0.0	10.3	10.3	0.0	9.9	9.9	0	1	1
Lodja	10.3	77.8	67.6	-	-	-	-	-	-
Lubumbashi	57.6	69.8	12.2	67.4	73.3	5.9	907	1296	389
Matadi	64.5	91.7	27.2	80.4	95.8	15.4	66	74	8
Mbandaka	13.9	12.1	-1.8	10.2	9.6	-0.5	6	6	0
Mbanza-Ngungu	0.7	54.3	53.5	0.4	54.5	54.0	0	5	5
Mbuji-Mayi	6.5	13.5	7.1	10.9	23.3	12.4	232	555	323
Moanda	25.2	71.8	46.6	29.0	73.3	44.3	2	4	2
Muene-Ditu	13.2	61.9	48.7	16.5	68.3	51.8	15	70	55
Mumba	22.6	59.8	37.2	24.7	60.3	35.6	3	7	4
Ngandajika	7.1	19.8	12.6	7.8	22.3	14.5	1	4	3
Oicha	29.9	52.5	22.6	26.8	52.7	25.9	2	3	2
Tshikapa	3.7	48.9	45.2	5.3	48.6	43.3	3	30	27
Uvira	86.2	91.2	5.0	88.8	93.3	4.5	16	16	0
Vuhovi	12.6	62.6	50.0	16.4	67.8	51.4	0	2	1

Djibouti

Djibouti	28.0	29.7	1.7	33.5	35.9	2.4	110	117	7
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Eq. Guinea

Bata	22.0	23.0	1.0	26.2	26.3	0.0	4	3	0
Malabo	14.9	13.9	-1.1	17.9	15.1	-2.8	10	8	-2

Eritrea

Asmara	54.2	56.2	2.0	55.0	59.0	4.0	65	67	2
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Ethiopia

Adama	72.7	74.6	2.0	78.1	75.4	-2.7	236	253	17
Addis Ababa	56.7	63.3	6.6	68.8	72.4	3.6	2240	2540	299
Adigrat	41.5	62.4	20.8	58.4	68.3	10.0	35	44	9

Arba Minch	64.6	80.8	16.2	66.3	84.3	18.0	39	52	14
Asela	71.9	81.9	10.0	76.0	81.1	5.2	61	72	11
Bahir Dar	48.3	63.0	14.8	43.4	33.8	-9.6	132	110	-22
Bedeno	38.8	51.6	12.8	46.1	56.7	10.6	45	61	16
Butajira	40.8	79.1	38.3	65.5	89.6	24.1	45	66	22
Chuko	59.5	90.0	30.5	76.9	93.2	16.3	44	58	14
Debre Brehan	72.8	78.8	6.0	81.0	83.8	2.9	46	52	5
Dessie	75.5	90.6	15.0	86.5	90.7	4.3	135	151	16
Dire Dawa – Urban	55.0	72.0	17.1	65.4	78.0	12.6	124	153	28
Girawa	31.8	52.3	20.5	36.2	52.9	16.7	32	52	20
Gonder	67.4	81.2	13.8	73.3	81.4	8.1	138	161	23
Harare Urban	29.2	42.7	13.5	47.0	57.5	10.5	121	160	39
Hawassa	21.9	77.0	55.1	33.2	78.0	44.8	534	1391	857
Hosaena	32.6	59.5	26.9	60.1	77.4	17.3	58	81	23
Jijiga	50.0	73.8	23.8	71.2	82.9	11.7	75	91	16
Jimma	59.0	77.5	18.5	64.2	78.1	13.8	92	123	31
Kombolcha	72.2	80.1	7.9	62.9	68.2	5.3	89	101	12
Mekele	38.0	60.0	22.0	51.0	64.7	13.7	44	59	15
Nekemte	79.1	93.2	14.1	88.4	94.8	6.4	74	86	12
Shashemene	72.7	91.0	18.3	77.4	88.2	10.7	146	187	41
Sodo	26.6	60.6	34.0	36.1	67.6	31.4	508	1062	553
Yirga Chefe	10.6	45.9	35.2	28.9	59.6	30.8	28	63	35
<i>Gabon</i>									
Franceville	20.9	33.4	12.6	21.8	33.4	11.6	1	1	0
Libreville	18.8	47.3	28.4	26.6	57.0	30.4	98	218	120
Port-Gentil	4.7	62.3	57.6	5.2	60.8	55.6	0	2	2
<i>Gambia</i>									
Brikama	18.8	23.8	5.0	27.5	33.2	5.6	17	25	7
Serrekunda	22.4	38.7	16.3	30.2	47.7	17.4	168	312	144
<i>Ghana</i>									
Accra	20.0	33.9	13.8	30.6	37.5	6.9	1153	1573	420
Agona Swedru	9.1	28.1	19.0	10.3	32.8	22.5	4	13	9
Berekum	0.0	9.9	9.9	0.0	15.6	15.6	0	6	6
Cape Coast	10.1	2.9	-7.3	11.8	3.6	-8.2	12	4	-8
Ho	21.8	35.7	13.9	28.8	40.0	11.2	18	27	9
Hohoe	47.6	46.9	-0.7	57.7	53.2	-4.4	18	19	1
Koforidua	9.1	39.8	30.6	14.5	43.5	29.0	19	60	41
Kumasi	30.9	41.6	10.7	47.8	50.3	2.5	1233	1540	307
Mankesim	14.3	23.9	9.6	18.5	25.6	7.2	5	7	2
Obuasi	48.9	42.2	-6.7	56.9	45.6	-11.3	32	24	-8
Somanya	29.0	52.9	23.9	33.0	56.7	23.7	12	20	9
Sunyani	1.9	15.2	13.3	2.3	19.0	16.7	1	11	10
Takoradi	9.7	2.9	-6.8	13.0	4.2	-8.8	59	23	-36
Tamale	9.7	25.3	15.5	17.6	34.0	16.5	42	87	45
Techiman	5.4	25.2	19.8	7.4	27.4	20.1	3	11	8
<i>Guinea</i>									
Conakry	32.9	49.3	16.4	51.8	66.4	14.6	702	1056	354
Kankan	5.0	45.7	40.7	11.6	63.0	51.4	2	15	13
Kindia	26.4	53.9	27.6	33.5	63.2	29.7	23	48	25
Kissidougou	17.8	45.1	27.3	18.3	45.0	26.8	5	15	10
Nzerekore	44.2	20.2	-24.0	56.6	21.2	-35.4	74	32	-42

<i>Guinea-Bissau</i>									
Bissau	52.9	57.1	4.2	67.8	70.9	3.1	182	215	34
<i>Kenya</i>									
Bomet	0.2	1.1	0.9	1.0	2.5	1.5	7	19	12
Busia	16.2	29.8	13.7	31.8	48.8	16.9	37	61	23
Chuka	9.3	53.2	44.0	15.3	59.1	43.8	8	33	25
Eldoret	10.8	16.1	5.3	33.7	37.6	3.9	114	140	26
Embu	20.1	53.4	33.3	26.3	58.1	31.8	244	550	306
Gatukuyu	68.5	88.2	19.7	67.6	86.8	19.2	22	29	7
Kakuma	66.6	82.8	16.2	70.0	80.5	10.5	17	19	2
Kapenguria	5.2	14.6	9.4	21.9	33.8	11.9	10	17	7
Kehancha	4.2	10.0	5.8	15.7	23.2	7.5	34	52	18
Kericho	0.8	1.4	0.6	5.4	7.3	1.9	14	21	7
Kikima	36.8	78.2	41.3	40.2	83.7	43.6	52	112	60
Kipkelion	0.5	1.3	0.9	1.4	2.7	1.3	1	3	2
Kisii	2.5	14.2	11.6	7.2	25.5	18.2	203	747	544
Kisumu	5.4	15.7	10.3	13.1	24.9	11.8	533	1075	542
Kitale	11.3	22.1	10.9	41.7	49.6	8.0	62	81	19
Kitui	5.6	5.1	-0.5	15.8	14.9	-0.9	14	14	0
Machakos	87.0	91.0	3.9	86.2	89.5	3.3	166	179	13
Malindi	29.7	50.9	21.3	54.2	67.9	13.7	75	101	26
Mandera	38.5	40.4	1.9	43.8	37.5	-6.3	36	41	5
Mau Narok	1.0	4.9	3.9	4.1	12.8	8.8	3	9	6
Maua	3.4	12.0	8.6	7.8	20.8	13.0	46	126	80
Meru	8.7	32.1	23.5	19.7	44.8	25.1	59	139	80
Migori	3.2	5.2	2.0	16.6	19.5	2.9	26	32	6
Moi's Bridge	4.0	18.8	14.8	18.5	34.3	15.8	14	27	14
Mombasa	53.6	66.4	12.8	68.1	74.0	5.9	525	618	93
Nairobi	30.1	39.4	9.3	55.6	56.9	1.2	2577	2883	306
Naivasha	8.1	19.9	11.8	23.3	38.9	15.6	16	28	12
Nakuru	14.2	26.7	12.5	44.6	54.3	9.7	196	264	68
Runyenjes	12.5	45.6	33.0	21.9	53.9	32.1	45	115	70
Tala / Kangundo	80.1	82.6	2.5	86.0	85.0	-1.0	85	87	2
Thika	32.3	29.9	-2.4	27.7	22.9	-4.8	19	16	-3
Wundanyi	12.5	63.7	51.1	15.7	77.0	61.3	9	49	39
<i>Lesotho</i>									
Maseru	16.4	29.1	12.7	19.5	34.5	15.0	44	82	38
<i>Liberia</i>									
Monrovia	44.0	65.4	21.4	61.8	76.3	14.6	631	883	252
<i>Madagascar</i>									
Antananarivo	41.6	59.5	17.9	49.8	64.2	14.4	565	854	289
Antsirabe	47.8	68.6	20.8	45.2	66.7	21.5	6	10	4
Antsiranana	39.2	71.8	32.6	44.4	73.8	29.4	10	20	10
Fianarantsoa	52.9	72.2	19.4	51.1	72.1	21.0	2	2	1
Mahajanga	40.3	60.9	20.6	54.7	71.8	17.2	26	42	16
Toamasina	49.0	57.2	8.2	49.4	55.3	5.9	13	16	4
Toliary	42.0	70.7	28.8	46.3	74.0	27.7	7	14	7
<i>Malawi</i>									
Blantyre	29.9	35.5	5.6	73.3	75.0	1.7	507	564	58
Lilongwe	21.7	41.6	19.9	49.8	71.4	21.6	420	766	346

Mpama / Li-koswe	2.6	19.2	16.6	5.3	28.1	22.8	1	6	5
Mzuzu	18.1	34.2	16.1	45.3	67.6	22.3	62	109	47
Zomba	9.6	20.5	10.9	45.1	60.5	15.4	48	71	23
<i>Mali</i>									
Bamako	28.1	52.3	24.3	53.6	70.4	16.8	1459	2425	966
Gao	0.0	0.2	0.2	0.0	0.3	0.3	0	0	0
Kayes	14.6	24.0	9.4	36.7	43.6	6.9	49	69	20
Koutiala	48.4	59.3	10.9	68.3	68.7	0.4	98	116	19
Segou	13.2	26.6	13.5	24.0	41.5	17.5	34	63	29
Sikasso	35.8	42.0	6.1	57.3	48.0	-9.2	106	101	-5
<i>Mauritania</i>									
Nouadhibou	1.7	2.7	1.0	1.0	2.2	1.1	1	1	1
Nouakchott	10.0	17.9	7.9	18.4	30.9	12.6	169	338	169
<i>Mozambique</i>									
Beira	54.2	66.9	12.8	58.2	63.8	5.7	168	183	15
Chimoio	64.7	70.4	5.7	73.8	69.8	-4.0	136	140	4
Lichinga	59.2	74.4	15.2	62.7	76.5	13.8	47	64	17
Maputo	37.3	42.0	4.7	46.6	43.3	-3.3	925	963	38
Maxixe	12.3	14.8	2.5	34.8	36.4	1.6	29	32	2
Nacala Porto	61.7	61.9	0.2	62.8	59.1	-3.7	58	59	1
Nampula	68.4	81.2	12.8	80.7	83.3	2.6	336	397	61
Pemba	71.5	65.0	-6.4	74.6	63.1	-11.5	92	92	0
Quelimane	66.9	76.6	9.7	78.7	84.6	5.9	102	117	16
Tete	70.9	80.8	9.9	76.6	81.2	4.6	57	72	15
Xai-Xai	48.6	67.3	18.7	62.6	75.9	13.3	59	74	15
<i>Namibia</i>									
Windhoek	19.9	25.3	5.5	50.0	59.1	9.1	159	216	57
<i>Niger</i>									
Agadez	3.7	40.5	36.8	4.3	44.4	40.1	0	4	4
Maradi	45.2	65.2	20.0	55.8	69.8	14.0	92	146	54
Niamey	21.1	65.7	44.6	21.9	67.4	45.6	125	440	314
Tahoua	27.5	53.0	25.5	33.8	61.5	27.6	7	17	10
Zinder	39.3	64.9	25.6	45.1	65.3	20.1	44	80	36
<i>Nigeria</i>									
Aba	0.5	21.0	20.4	2.4	42.5	40.1	27	528	500
Abakaliki	0.5	10.6	10.1	1.0	21.6	20.6	2	38	37
Abeokuta	3.0	75.2	72.2	3.6	79.1	75.5	14	336	322
Abraka	4.4	18.1	13.7	6.3	20.9	14.6	2	5	4
Abuja	23.1	26.2	3.1	25.6	25.0	-0.6	310	407	97
Adikpo	0.0	19.6	19.6	0.0	31.7	31.7	0	8	8
Ado Ekiti	30.1	43.3	13.2	34.4	44.1	9.7	76	109	32
Agbor	8.6	40.6	31.9	10.2	44.4	34.2	6	31	25
Akungba	35.8	56.8	21.0	42.1	57.8	15.7	15	22	8
Akure	19.8	37.3	17.5	24.6	39.6	15.1	86	150	64
Akwanga	40.2	71.0	30.8	55.5	82.7	27.2	14	22	8
Ankpa	0.2	40.6	40.4	0.2	49.9	49.6	0	21	21
Argungu	35.5	47.1	11.6	43.2	55.9	12.8	8	11	4
Asaba	23.5	38.8	15.2	29.7	41.6	11.9	26	42	16
Auchi	24.7	56.1	31.4	28.3	57.0	28.7	14	31	17
Azare	43.7	32.8	-10.9	54.2	34.7	-19.6	29	21	-8

Badagry	63.9	61.2	-2.7	66.1	59.9	-6.2	24	24	0
Bauchi	40.2	47.8	7.6	44.4	45.1	0.7	87	95	8
Benin	11.6	34.9	23.3	18.3	43.7	25.4	179	463	284
Bida	51.8	59.5	7.8	65.7	67.0	1.3	125	141	17
Birnin Kebbi	21.4	33.6	12.2	23.9	34.1	10.2	15	24	9
Biu	60.0	72.7	12.7	74.2	81.3	7.1	20	25	5
Bwari	47.3	56.9	9.6	52.1	60.3	8.2	12	19	7
Calabar	7.5	53.3	45.8	9.6	56.7	47.1	19	127	108
Daura	54.0	67.4	13.3	62.8	72.7	9.8	38	49	11
Dutse	11.6	16.6	5.0	12.9	17.3	4.4	6	9	3
Egume	9.7	30.3	20.6	12.1	33.4	21.3	3	8	5
Ejigbo	0.0	45.3	45.3	0.0	48.4	48.4	0	18	18
Eket	0.3	43.7	43.4	0.2	60.8	60.7	0	86	86
Ekpoma	17.3	47.5	30.2	18.8	49.5	30.7	8	21	14
Enugu	0.0	31.4	31.4	0.0	37.3	37.3	0	223	223
Epe	1.6	41.0	39.4	2.5	41.1	38.7	1	13	13
Funtua	56.3	57.8	1.5	66.6	67.4	0.8	50	56	6
Gbenga	0.5	43.7	43.2	1.1	55.0	53.9	1	32	31
Gboko	13.3	39.6	26.3	19.1	50.7	31.6	31	92	62
Gombe	50.4	62.8	12.4	57.4	64.6	7.2	77	96	19
Gusau	30.6	48.2	17.6	34.3	45.8	11.4	34	51	18
Gwagwalada	37.3	53.4	16.1	35.6	49.1	13.5	43	84	41
Hadejia	63.1	77.2	14.1	73.6	83.5	9.9	53	66	13
Ibadan	10.4	68.3	57.9	9.8	69.2	59.4	238	1866	1628
Idah	2.1	28.7	26.6	2.3	35.5	33.3	1	13	12
Ife	0.0	29.8	29.8	0.0	36.0	36.0	0	52	52
Igbidu	0.1	0.9	0.8	0.2	2.7	2.5	0	4	4
Ijebu Igbo	0.0	8.9	8.9	0.0	11.3	11.3	0	8	8
Ijebu Ode	0.5	37.8	37.4	1.4	47.5	46.1	2	88	86
Ikare	29.5	57.5	28.1	34.7	59.5	24.8	26	47	21
Ikerre	16.9	35.7	18.8	18.2	36.6	18.4	12	25	14
Ikire	0.0	71.5	71.5	0.0	75.7	75.7	0	68	68
Ikirun	0.0	63.6	63.6	0.0	66.3	66.3	0	78	78
Ikorodu	3.1	68.6	65.5	5.1	72.3	67.2	28	440	412
Ikot Ankan	0.0	25.8	25.8	0.0	28.7	28.7	0	23	23
Ilesha	0.0	15.0	15.0	0.0	17.6	17.6	0	36	36
Ilorin	61.4	76.7	15.3	71.0	74.4	3.4	474	535	61
Isara	0.0	34.9	34.9	0.0	39.5	39.5	0	16	16
Iseyin	7.0	69.6	62.6	7.0	71.2	64.2	5	56	51
Isiu	0.2	54.0	53.8	0.1	60.9	60.8	0	19	19
Iwo	0.0	63.0	63.0	0.0	69.4	69.4	0	90	90
Jalingo	37.1	69.3	32.2	36.0	69.7	33.7	40	84	45
Jimeta	30.6	45.2	14.6	32.8	43.2	10.4	93	137	44
Jos	44.8	54.1	9.3	49.4	54.9	5.4	227	274	46
Kaduna	41.2	45.8	4.6	40.1	37.1	-3.0	402	413	11
Kafanchan	16.1	52.4	36.2	23.0	57.1	34.0	6	17	11
Kakum	0.0	11.5	11.5	0.0	31.4	31.3	0	15	15
Kaltungo	35.1	61.7	26.6	44.4	68.4	24.0	13	22	9
Kano	54.0	70.5	16.5	62.4	73.2	10.8	1822	2373	550
Karu	36.8	58.9	22.1	45.3	60.9	15.6	58	93	35
Katsina	43.0	56.4	13.4	-	-	-	-	-	-
Katsina Ala	3.5	12.2	8.7	-	-	-	-	-	-
Keffi	32.5	57.1	24.6	48.3	68.8	20.5	29	44	15
Kontagora	50.8	60.7	9.9	56.3	63.3	7.0	25	32	7

Kuje	48.6	65.4	16.7	57.1	72.6	15.5	18	32	14
Lafia	40.4	50.5	10.1	45.2	48.5	3.2	33	39	6
Lagos	16.9	58.6	41.6	23.8	55.2	31.3	2231	5722	3491
Langtang	31.9	40.7	8.9	52.4	46.2	-6.2	19	18	-1
Loburo	1.6	51.6	50.0	2.0	57.0	55.0	2	48	47
Lokoja	25.9	67.1	41.3	29.6	67.8	38.3	15	39	23
Magbon	7.5	45.4	37.9	7.4	41.7	34.3	3	17	14
Maiduguri	47.4	57.2	9.8	47.7	50.6	2.9	280	331	52
Makurdi	29.0	43.9	14.9	34.9	42.9	7.9	67	90	23
Minna	36.3	40.3	4.0	37.9	34.8	-3.2	97	99	2
Mubi	65.3	78.2	12.9	72.5	78.4	5.8	41	50	9
Ndiaga Akpugu	0.0	6.6	6.6	0.0	8.9	8.9	0	5	5
Njobbore / Wuro Tammai	44.1	59.2	15.2	51.6	66.3	14.8	7	9	3
Nsukka	0.0	3.9	3.9	0.0	7.5	7.5	0	61	61
Numan	35.8	56.8	21.1	50.6	68.0	17.4	17	26	9
Offa	42.3	60.0	17.7	53.0	65.6	12.6	40	53	13
Ogbomosho	48.6	71.7	23.1	43.3	72.7	29.4	80	145	65
Ogwashe Uku	2.0	17.4	15.4	2.7	20.2	17.5	0	3	3
Ojikwa	6.7	1.5	-5.2	7.8	1.6	-6.2	2	0	-1
Oju	0.0	3.5	3.5	0.0	4.2	4.2	0	1	1
Okenne	25.8	51.6	25.8	30.1	51.3	21.2	50	91	41
Omoo Ekiti	28.3	54.7	26.4	34.7	60.4	25.7	17	32	16
Ondo	0.0	28.1	28.1	0.0	26.4	26.4	0	37	37
Onitsha	0.4	7.7	7.3	0.7	10.9	10.2	36	635	598
Ore	0.0	26.2	26.2	0.0	28.3	28.3	0	10	10
Oron	4.5	64.7	60.2	4.4	67.7	63.2	2	39	37
Oru	0.0	27.7	27.7	0.0	32.3	32.3	0	19	19
Osogbo	0.0	53.5	53.4	0.0	52.8	52.8	0	289	289
Otukpa	0.0	6.8	6.8	0.0	15.6	15.6	0	2	2
Oturkpo	15.1	53.0	37.9	16.0	53.1	37.1	11	43	31
Owo	10.9	44.4	33.5	13.3	46.4	33.2	8	32	23
Oyo	4.8	68.0	63.2	4.1	70.3	66.2	8	152	144
Port Harcourt	2.2	43.1	40.9	4.6	50.1	45.5	44	535	491
Potiskum	52.4	70.6	18.2	57.7	73.5	15.8	71	105	34
Saki	44.9	79.9	34.9	43.4	77.2	33.8	16	32	16
Sapele	17.6	26.8	9.2	19.1	29.2	10.1	11	19	8
Shagamu	0.2	47.1	46.9	0.2	51.2	51.1	0	61	60
Sokoto	44.4	58.3	13.9	63.0	73.2	10.2	261	340	79
Ughelli	37.4	35.5	-1.9	41.5	40.6	-0.9	33	36	3
Umuahia	6.2	51.4	45.2	8.3	56.2	47.8	17	119	102
Uromi	0.1	29.6	29.5	0.1	37.5	37.4	0	30	30
Uyo	1.5	33.6	32.1	4.1	48.1	44.0	46	586	540
Warri	42.5	16.1	-26.4	48.1	20.6	-27.5	192	92	-100
Wukari	21.5	55.7	34.2	26.7	60.8	34.1	11	29	18
Yenagoa	23.5	31.6	8.1	27.8	37.5	9.7	30	44	14
Zaki Biam	11.3	35.6	24.3	26.7	58.1	31.4	12	31	19
Zaria	51.5	60.0	8.5	62.2	69.9	7.7	252	322	70
Zuru	43.6	54.9	11.4	51.6	60.8	9.1	25	33	8
<i>Rwanda</i>									
Butare	11.9	28.0	16.1	27.2	43.5	16.2	18	30	12
Cyangugu	7.4	24.2	16.9	17.6	38.0	20.3	10	22	12

Gisenyi / Kisoro	29.6	61.6	31.9	44.5	70.5	26.0	173	311	138
Kabarore	11.5	20.5	9.1	16.3	25.7	9.4	7	13	7
Kigali	17.5	29.4	11.9	39.5	46.5	7.1	471	646	175
Kinazi	2.9	21.0	18.1	10.2	32.8	22.7	2	7	5
Ngeruka	13.5	39.9	26.4	19.6	46.4	26.8	4	10	6
Nyamata	21.6	37.5	15.8	30.6	46.2	15.5	8	14	6
Nzahaha	5.4	35.5	30.0	6.8	40.7	33.9	1	6	5
Ruhango	8.5	29.7	21.1	22.6	46.4	23.8	34	75	41
Rwimiyaga	24.5	29.9	5.4	38.1	42.9	4.8	7	11	4
<i>Senegal</i>									
Dakar	20.8	22.0	1.2	13.2	10.6	-2.6	323	288	-35
Diourbel	55.2	67.1	11.9	61.0	71.4	10.3	19	23	4
Kaolack	52.8	70.2	17.4	62.1	75.6	13.6	45	59	15
Louga	57.9	71.7	13.8	64.9	75.5	10.6	9	12	2
Mbour	53.7	60.9	7.2	58.3	60.1	1.8	78	93	15
Saint-Louis	41.2	50.8	9.6	52.3	59.4	7.1	35	46	11
Tambacounda	46.1	68.2	22.2	52.6	72.4	19.8	4	6	2
Thies	58.8	71.9	13.1	67.6	76.4	8.8	47	52	5
Touba	42.7	73.3	30.6	50.5	77.7	27.3	148	226	78
Mosquee	46.7	73.3	26.6	51.1	75.9	24.9	19	31	11
Ziguinchor	46.7	73.3	26.6	51.1	75.9	24.9	19	31	11
<i>Sierra Leone</i>									
Bo	34.5	51.4	16.9	50.3	60.4	10.1	120	163	43
Freetown	49.4	61.8	12.4	78.0	80.5	2.5	878	1012	134
Kenema	34.0	38.4	4.4	42.8	45.2	2.4	76	87	11
Koidu	36.5	40.8	4.3	52.5	53.4	0.9	43	42	-1
Makeni	35.0	56.3	21.3	45.2	66.0	20.8	48	74	26
<i>Somalia</i>									
Baledweyne	59.5	72.0	12.5	64.3	75.0	10.6	2	2	1
Baydhaba	63.8	79.8	16.0	68.6	82.5	13.9	3	4	1
Boosaaso	1.1	13.3	12.1	1.1	13.6	12.5	0	1	1
Burao	49.4	70.0	20.6	50.7	69.9	19.2	3	4	1
Galcaayo	38.2	67.6	29.4	40.6	68.0	27.4	1	1	0
Hargeisa	44.5	63.2	18.8	44.9	62.6	17.7	16	24	8
Kismaayo	54.0	74.9	20.9	57.4	76.5	19.1	2	3	1
Mogadisho	45.5	72.6	27.1	52.8	76.5	23.7	387	632	245
<i>South Africa</i>									
Bloemfontein	7.0	6.3	-0.7	17.3	14.3	-3.0	70	61	-9
Bohlabela	24.9	17.1	-7.8	26.9	17.7	-9.1	22	15	-7
Botshabelo	10.5	9.6	-0.9	12.4	10.6	-1.9	7	7	-1
Bushbuckridge	17.3	6.1	-11.2	18.2	6.4	-11.8	13	5	-9
Cape	3.0	3.8	0.8	8.3	10.7	2.4	262	370	107
Duduza	22.0	19.4	-2.6	29.7	25.2	-4.4	102	94	-7
Durban	18.4	21.5	3.1	31.9	33.2	1.4	802	860	58
East London	10.3	14.2	3.9	29.5	35.5	6.0	51	63	11
Empumalanga	46.1	57.5	11.4	57.9	60.0	2.1	50	53	3
Ennerdale	2.8	5.0	2.1	3.6	5.3	1.7	3	6	2
Esikhawini	5.3	14.2	9.0	12.8	23.6	10.9	10	20	10
Etwatwa	27.6	52.0	24.4	37.4	64.7	27.3	51	96	45
Evaton	3.4	5.0	1.6	10.1	14.5	4.4	60	92	32
George	10.6	7.4	-3.3	24.3	16.7	-7.6	32	25	-7

Hlabisa	3.1	6.6	3.5	11.1	20.1	9.0	4	7	3
Johannesburg	4.1	5.0	0.9	19.0	20.1	1.1	1403	1646	243
Jouberton	1.7	0.4	-1.4	2.4	0.5	-1.8	2	1	-2
Kagiso	8.9	10.2	1.3	15.9	16.5	0.6	25	28	3
Kimberley	7.4	9.0	1.6	15.1	15.4	0.3	27	29	2
KwaGuqa / Hlalanikahle / Vosman	33.0	34.3	1.2	25.5	24.8	-0.7	29	33	3
Lenasia	2.1	11.2	9.1	3.2	23.4	20.2	3	24	21
Madibeng A	17.0	15.8	-1.2	21.9	20.0	-1.9	20	21	1
Madibeng B	4.4	10.9	6.5	6.5	12.8	6.3	5	11	6
Madiseng	8.1	9.3	1.2	7.2	7.3	0.2	6	7	1
Mafikeng	6.7	6.3	-0.4	10.1	10.6	0.5	18	20	1
Mbombela	24.1	30.5	6.4	23.3	29.3	6.0	57	77	20
Mdantsane	4.8	12.1	7.2	5.9	12.8	6.9	5	12	7
Modjadji	23.2	16.9	-6.3	32.0	22.7	-9.3	25	18	-8
Motherwell	4.9	3.7	-1.2	7.2	4.2	-3.0	7	4	-3
Mtubatuba	0.0	1.3	1.3	0.0	4.8	4.8	0	1	1
Nelspruit	20.2	19.8	-0.3	23.0	21.9	-1.1	20	20	0
Newcastle	1.1	1.9	0.8	1.0	1.4	0.4	3	4	1
Paarl	8.7	7.8	-1.0	25.0	21.5	-3.5	42	40	-3
Phuthaditjhaba	12.2	14.4	2.2	13.2	14.7	1.6	22	23	1
Pietermaritz- burg	15.7	20.0	4.3	29.7	31.8	2.1	138	152	14
Pietersburg	6.8	4.0	-2.8	4.6	3.0	-1.7	5	4	-2
Port Elizabeth	7.3	9.2	1.9	17.4	21.9	4.5	90	118	28
Potchefstroom	4.9	4.5	-0.4	19.3	14.1	-5.3	14	11	-3
Potgietersrus	2.2	2.1	-0.1	1.6	1.4	-0.3	2	1	0
Rustenburg	5.8	6.5	0.7	16.0	15.3	-0.7	25	27	2
Sasolburg	3.5	2.1	-1.4	5.8	2.6	-3.2	6	3	-3
Saulsville	42.3	56.9	14.6	60.0	69.0	9.0	99	127	28
Soshanguve	6.8	14.4	7.7	11.2	21.6	10.4	109	234	125
Strand	5.7	5.4	-0.3	32.0	28.8	-3.1	57	56	-1
Thembisile	9.5	9.8	0.3	8.9	7.0	-1.8	11	9	-2
Thohoyandou	2.7	2.1	-0.6	2.3	1.9	-0.4	3	2	-1
Umtata	5.7	10.8	5.1	15.2	19.1	3.9	20	26	6
Vanderbijlpark	1.6	2.0	0.4	9.2	9.2	0.0	19	19	0
Welkom	1.4	2.8	1.4	3.7	5.8	2.1	5	8	3
Witbank	6.6	5.5	-1.0	12.0	10.9	-1.0	17	18	1
<i>South Sudan</i>									
Aweil	28.3	47.5	19.2	30.2	50.1	19.9	0	0	0
Juba	54.2	77.6	23.4	54.3	77.7	23.4	3	3	1
Malakal	14.9	16.7	1.8	14.8	16.5	1.7	1	1	0
Rumbek	2.5	8.7	6.1	2.5	8.5	5.9	0	1	0
Wau	12.5	61.0	48.5	12.5	60.8	48.3	0	1	1
Yambio	2.1	6.2	4.1	2.2	6.3	4.2	0	0	0
<i>Sudan</i>									
al-Damazin	65.5	71.8	6.3	69.7	75.1	5.4	21	23	2
al-Duaiym	20.1	53.2	33.1	28.0	62.1	34.2	6	13	7
al-Fashir	55.4	73.9	18.5	61.4	76.6	15.2	33	42	10
al-Junaynah	61.4	71.1	9.7	66.6	76.8	10.2	20	20	0
al-Khalas	2.1	7.3	5.2	2.1	7.7	5.6	1	2	2
al-Manaqil	27.5	54.8	27.3	29.1	56.4	27.4	7	14	6

al-Qadarif	71.4	85.6	14.1	73.3	85.7	12.4	110	135	25
al-Ubayd	57.7	74.4	16.6	61.2	75.7	14.5	54	69	15
Atbara	4.5	30.7	26.3	5.3	35.9	30.6	1	10	9
Kassala	39.6	57.7	18.1	42.9	61.7	18.8	76	121	44
Khartum	12.8	55.0	42.2	14.2	58.0	43.8	293	1303	1010
Kosty	64.3	78.6	14.3	67.4	79.8	12.3	29	35	6
Nyala	61.5	65.5	4.0	67.3	68.0	0.7	57	60	3
Port Sudan	34.4	52.2	17.8	35.3	53.1	17.8	62	113	52
Rabak	45.8	66.8	21.0	49.9	68.7	18.8	15	22	7
Sennar	53.0	68.9	15.8	53.3	68.6	15.3	9	12	3
Wad Madani	59.5	70.0	10.5	62.2	72.2	10.0	56	66	10
Zalingey	46.2	56.1	10.0	46.8	55.9	9.1	1	1	0
<i>Swaziland</i>									
Manzini	6.2	6.8	0.6	13.5	14.3	0.8	11	13	1
Mbabane	3.0	4.7	1.7	5.0	7.2	2.3	3	4	2
<i>Tanzania</i>									
Arusha	21.1	24.4	3.3	52.4	55.1	2.7	330	392	62
Bukoba	12.7	19.7	7.1	29.6	42.8	13.2	34	53	19
Dar es Salaam	36.7	42.3	5.6	61.6	52.9	-8.7	2986	3226	239
Dodoma	15.6	24.4	8.7	26.1	29.2	3.1	54	65	11
Iringa	26.0	34.0	8.0	32.7	36.1	3.4	31	39	9
Kahama	5.7	9.3	3.6	14.9	19.3	4.4	15	22	7
Kalangalala	20.4	32.6	12.2	31.0	29.6	-1.3	21	23	2
Kasulu Mjini	0.5	9.5	9.0	0.5	8.5	8.0	0	6	6
Katoro	34.3	47.4	13.2	58.4	57.7	-0.7	33	39	6
Kigoma	3.9	10.5	6.5	2.7	5.9	3.2	5	13	7
Kyela Mjini	8.9	7.3	-1.6	23.6	14.8	-8.7	12	9	-4
Masama	2.9	3.6	0.7	5.5	6.6	1.1	2	3	1
Mbeya	48.2	58.4	10.2	68.6	71.5	2.9	270	325	55
Mbomai	0.1	0.1	0.1	0.1	0.2	0.1	0	1	0
Morogoro	18.9	24.5	5.6	27.5	27.0	-0.5	63	70	7
Moshi	4.2	4.7	0.5	19.5	18.7	-0.7	65	69	3
Musoma	10.9	11.4	0.5	21.4	17.6	-3.8	26	23	-3
Mwanza	21.4	28.8	7.4	38.2	40.7	2.4	253	320	67
Shinyanga	6.6	10.7	4.1	15.2	19.2	4.0	13	18	5
Singida	19.7	22.1	2.4	29.9	33.9	4.0	22	27	6
Songea	18.0	28.0	10.0	26.9	29.3	2.4	42	55	13
Sumbawanga	25.7	28.1	2.4	34.9	31.8	-3.1	33	35	2
Tabora	7.8	16.3	8.6	6.3	11.0	4.7	8	15	7
Tanga	28.3	27.2	-1.2	42.7	39.4	-3.3	76	74	-2
Tunduma	43.8	55.8	12.0	57.0	67.0	9.9	56	77	21
Zanzibar	37.4	39.4	2.0	62.5	51.6	-10.9	384	375	-9
<i>Togo</i>									
Kara	12.6	33.7	21.1	19.4	36.6	17.1	9	17	8
Kpalime	7.4	13.4	6.0	10.4	16.4	6.0	3	5	2
Lome / Aflao	56.3	53.0	-3.3	68.2	60.5	-7.7	1141	1226	85
Sokode	19.7	58.2	38.5	24.3	60.0	35.8	8	20	12
Tsevie	16.9	16.1	-0.8	23.1	21.0	-2.1	13	13	0
<i>Uganda</i>									
Arua	17.4	32.5	15.1	49.8	63.8	14.0	75	109	33
Bugembe	21.5	33.2	11.7	58.0	69.6	11.5	21	28	7
Busia	4.9	14.8	9.9	36.0	48.1	12.1	51	78	26

Buwenge	16.0	45.4	29.3	49.2	72.2	23.0	13	21	8
Buyanga	10.2	29.6	19.4	32.8	50.3	17.5	6	10	4
Fort Portal	4.9	24.9	20.0	13.6	33.8	20.2	15	41	26
Gisenyi / Kisoro	8.3	41.8	33.5	17.2	48.4	31.2	7	22	15
Gulu	8.9	23.9	15.0	22.7	41.6	18.9	33	70	37
Hoima	6.4	23.6	17.1	21.0	49.0	28.0	12	32	20
Iganga	29.4	55.0	25.6	64.1	76.8	12.8	60	81	20
Jinja	15.9	30.7	14.8	31.9	45.0	13.1	46	70	23
Kabale	28.5	69.1	40.5	33.9	60.4	26.5	24	45	21
Kampala	43.1	63.7	20.6	66.7	76.5	9.8	2121	2929	808
Kamuli	18.2	39.1	21.0	58.8	75.3	16.5	16	23	7
Kapchorwa	11.5	77.3	65.8	15.3	83.4	68.1	15	95	80
Kasese	55.5	62.6	7.1	65.6	62.4	-3.3	30	32	2
Lira	16.1	33.6	17.5	46.7	62.5	15.8	55	82	28
Lugazi	13.9	31.7	17.9	48.4	56.9	8.5	16	20	4
Masaka	24.7	45.3	20.7	58.2	74.6	16.4	48	67	18
Mbale	10.4	50.2	39.8	17.3	60.0	42.7	152	601	449
Mbarara	19.6	28.8	9.3	44.9	48.2	3.3	50	59	9
Mpondwe / Lhubiriha	6.0	62.7	56.7	18.3	67.6	49.3	26	106	80
Njeru	32.5	48.3	15.7	44.3	55.8	11.5	24	33	8
Rukungiri	3.0	5.6	2.6	14.9	17.1	2.2	4	5	1
Soroti	6.0	10.9	4.8	26.7	35.9	9.2	16	25	9
Yumbe	1.2	5.7	4.5	4.1	18.7	14.6	2	9	7
<i>Zambia</i>									
Chingola	43.2	33.7	-9.5	46.7	34.5	-12.2	41	32	-9
Chipata	55.7	61.6	5.8	62.1	62.9	0.8	47	51	4
Kabwe	35.0	51.3	16.3	36.9	51.2	14.3	39	56	17
Kasama	40.1	48.9	8.8	41.2	47.7	6.5	18	26	8
Kitwe	33.8	31.0	-2.8	36.7	31.7	-4.9	92	88	-4
Livingstone	35.1	42.1	7.1	37.4	43.4	6.0	27	34	7
Luanshya	28.5	46.7	18.2	26.4	43.1	16.7	10	17	7
Lusaka	22.6	31.7	9.1	41.7	49.4	7.8	874	1238	364
Mansa	54.7	70.5	15.7	60.6	69.1	8.5	19	43	24
Mufulira	21.7	23.6	1.9	23.8	25.0	1.2	11	12	1
Ndola	25.7	44.9	19.2	26.8	44.9	18.1	64	116	52
Solwezi	39.0	62.8	23.9	48.7	67.9	19.1	18	30	12
<i>Zimbabwe</i>									
Bulawayo	9.7	6.0	-3.7	10.5	6.2	-4.2	35	21	-15
Harare	17.9	21.9	4.0	25.5	23.5	-2.0	393	380	-12
Kadoma	11.2	13.4	2.2	12.4	14.7	2.2	3	4	1
Kwekwe	9.1	11.2	2.1	7.1	9.3	2.2	3	4	1
Mutare	7.4	6.6	-0.7	7.0	6.5	-0.4	5	5	0

Supplementary Table 5 | Country-level estimates of informal settlement prevalence and growth across sub-Saharan Africa (2016–2022). From left to right: share of the urban area covered by informal settlements, share of the urban population living in informal settlements, and total population living in informal settlements. Estimates for 2016, 2022, and change between 2016 and 2022. All estimates are based on binary segmentation maps with the thresholds illustrated in Supplementary Table 2.

Country	Area share			Population share			Total population		
	2016 (%)	2022 (%)	2016-‘22 (pp)	2016 (%)	2022 (%)	2016-‘22 (pp)	2016	2022	2016-‘22
	(in thousands)								
Angola	34.7	51.8	17.1	49.8	54.9	5.0	4117	6708	2591
Benin	52.6	49.3	-3.3	67.9	60.1	-7.9	1210	1172	-37
Botswana	22.9	23.3	0.4	23.2	22.8	-0.4	32	33	1
Burkina Faso	26.3	58.1	31.8	28.8	54.1	25.3	600	1428	828
Burundi	9.6	15.6	6.0	29.0	28.6	-0.4	224	264	41
Cameroon	3.0	15.9	12.9	5.2	46.6	41.4	243	2708	2465
Cent. Afr. Rep.	51.9	79.3	27.4	59.6	85.4	25.8	358	556	199
Chad	54.1	69.3	15.2	61.8	69.0	7.3	403	493	90
Congo	24.9	54.2	29.3	35.1	46.2	11.1	453	524	71
Côte d'Ivoire	30.3	43.6	13.3	44.1	55.8	11.7	2256	3087	831
DR Congo	35.2	67.1	31.8	41.2	66.2	25.0	4605	8068	3463
Djibouti	28.0	29.7	1.7	33.5	35.9	2.4	110	117	7
Eq. Guinea	19.4	19.6	0.3	19.6	17.1	-2.5	13	11	-2
Eritrea	54.2	56.2	2.0	55.0	59.0	4.0	65	67	2
Ethiopia	32.8	65.5	32.6	55.8	72.3	16.5	5116	7220	2105
Gabon	17.1	48.3	31.2	26.3	56.8	30.5	99	221	122
Gambia	21.7	35.8	14.1	30.0	46.2	16.2	185	336	151
Ghana	20.5	32.9	12.4	34.1	39.4	5.3	2610	3425	815
Guinea	30.0	46.4	16.4	50.3	62.2	11.9	807	1166	359
Guinea-Bissau	52.9	57.1	4.2	67.8	70.9	3.1	182	215	34
Kenya	9.7	22.5	12.7	29.2	40.0	10.8	5095	7467	2372
Lesotho	16.4	29.1	12.7	19.5	34.5	15.0	44	81	38
Liberia	44.0	65.4	21.4	61.8	76.3	14.6	631	883	252
Madagascar	43.0	61.8	18.8	49.8	64.6	14.9	630	959	329
Malawi	21.7	34.9	13.1	57.9	71.4	13.6	1038	1513	476
Mali	27.1	47.1	19.9	51.2	65.7	14.5	1745	2774	1029
Mauritania	9.1	16.2	7.1	17.3	29.3	12.0	170	340	170
Mozambique	42.6	48.9	6.3	56.6	55.8	-0.8	2008	2192	184
Namibia	19.9	25.3	5.5	50.0	59.1	9.1	159	216	57
Niger	25.9	62.4	36.5	31.2	67.3	36.1	269	687	418
Nigeria	13.9	36.6	22.7	23.1	47.7	24.6	9232	21205	11973
Rwanda	18.6	35.4	16.7	38.2	50.5	12.3	705	1072	367
Senegal	39.7	54.0	14.2	22.9	24.0	1.0	728	836	108
Sierra Leone	42.8	55.1	12.2	67.3	72.1	4.8	1165	1378	213
Somalia	45.5	68.2	22.7	52.1	75.5	23.4	413	670	257
South Africa	8.1	9.6	1.5	17.9	19.5	1.6	3741	4408	668
South Sudan	18.5	32.5	14.0	15.3	26.4	11.1	4	6	2
Sudan	28.9	57.9	29.0	27.2	60.7	33.6	851	2060	1208
Swaziland	4.5	5.7	1.2	10.0	11.5	1.4	14	17	3
Tanzania	21.9	26.3	4.4	48.8	45.4	-3.4	4819	5351	532
Togo	43.0	45.6	2.6	64.8	58.8	-5.9	1165	1271	106
Uganda	19.5	47.8	28.4	49.7	67.8	18.1	2917	4645	1728
Zambia	29.5	39.1	9.6	40.3	47.8	7.4	1260	1743	483
Zimbabwe	15.7	18.0	2.3	21.8	19.8	-2.0	439	413	-26