



# Improved harmonized census geography and spatio-temporal analysis in IPUMS: exploring aging in Africa

ENJEUX DÉMOGRAPHIQUES EN AFRIQUE: L'APPORT DES DONÉES  
DE RECENSEMENT ET D' ÉTAT CIVIL

16 October 2019

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Research Scientist



## IPUMS Overview

Microdata standardization and harmonization

Data usage

## Geographic Harmonization

Harmonization

Confidentiality

Use of year-specific and harmonized units and maps



## PROJECT

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[HOW TO CITE IPUMS-I](#)  
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## HARMONIZED INTERNATIONAL CENSUS DATA FOR SOCIAL SCIENCE AND HEALTH RESEARCH

IPUMS-International is dedicated to collecting and distributing census data from around the world. The project goals are to collect and preserve data and documentation, harmonize data, and disseminate the harmonized data free of charge.

98 COUNTRIES – 443 CENSUSES AND SURVEYS – OVER 1 BILLION PERSON RECORDS

*SOURCE DATA FOR IPUMS-INTERNATIONAL ARE GENEROUSLY PROVIDED BY PARTICIPATING  
NATIONAL STATISTICAL OFFICES*

CREATE AN EXTRACT

[Browse Data](#)

CREATE AN ACCOUNT

[Register](#)

# Microdata dissemination through IPUMS

## SAMPLES IN IPUMS

- Persons organized into households
- High-density (often 10%)
- Full range of census characteristics
- Add harmonized variables and other value

## MICRODATA enable custom analysis

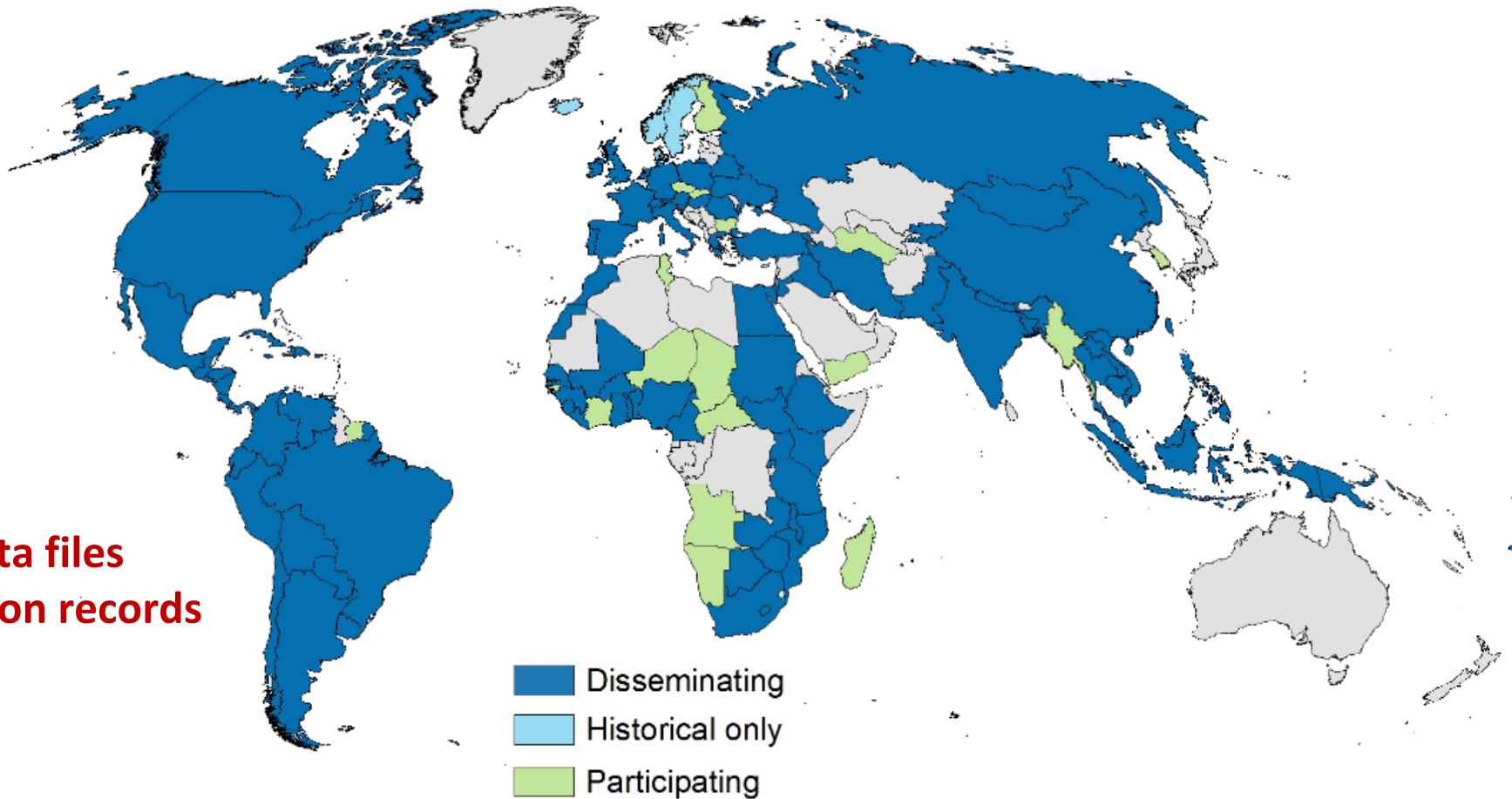
for a scholarly audience of data users

- Custom disaggregation
- Study small populations
- Calculate indicators
- Complex analyses and modeling

Age	Sex	Educ	Occ
00110131207101111000254100001621210010100203100001001101004100000110010			
00110227206101220210194100001333010010020203100001001101002100000400101			
00110301101110311100100110000100001000010010101010100001010101010100001010010			
0011041820410572100100400284000001001002021010000101002021010000310010			
00210146210104120230253100001914110010020203100001001101002100000400301			
00210211103110321001003001620000010010101010100001010101010100001010010			
0021031720410531100100400231000001001002021010000101002021010000110010			
00310126206105121001005002630411110000020103041110403101004100000400010			
0041017721510212100038310000100000991001021010000101002021010000210010			
0041028121510272100033310000153101001002021010000100302021010000210010			
0051018921510512100100310000100000991001021010000101002021010000210010			
0061017121510512100100310000100000021001021010000101002021010000210010			
00610276215105721001003100001743200110010203100001003101001100000210010			
00610308102110721001002001190000010010101010100001010101010100001010010			
00610412103110721001004002310000010010101010100001010101010100001010010			
00710183215105121001003100001122810010020210100001002020208100000210010			
00710224205105821001001100001913110010020203100001003101001100000400010			
00810156212105120180203100001000000110010210100001010020310100000400501			
00810226206105311001003100001712110010020210100001003021010071210110010			
00810317204105311001003100001000010010020210100001010020210091510110010			
00810411103110711001003002250000010010101010100001010101010100001010010			
00910185215105111001003100001744210010020207100001003101001100000110010			

# Microdata in IPUMS International

**98 countries**  
**368 census data files**  
**1 billion+ person records**



Data provided by National Census offices, partners in the census integration and dissemination project

# African Microdata Samples Disseminated by IPUMS

Country	Year	%	N Persons	Country	Year	%	N Persons	Country	Year	%	N Persons
Benin	1979	10	331,883	Kenya	1969	6	659,310	Rwanda	1991	10	742,918
Benin	1992	10	498,419	Kenya	1979	7	1,033,769	Rwanda	2002	10	843,392
Benin	2002	10	685,467	Kenya	1989	5	1,074,098	Rwanda	2012	10	1,038,369
Benin	2013	10	1,009,693	Kenya	1999	5	1,407,547	Senegal	1988	10	700,199
Botswana	1981	10	97,238	Kenya	2009	10	3,841,935	Senegal	2002	10	994,562
Botswana	1991	10	132,623	Lesotho	1996	10	187,795	Sierra Leone	2004	10	494,298
Botswana	2001	10	168,676	Lesotho	2006	10	180,208	South Africa	1996	10	3,621,164
Botswana	2011	10	201,752	Liberia	1974	10	150,256	South Africa	2001	10	3,725,655
Burkina Faso	1985	10	884,797	Liberia	2008	10	348,057	South Africa	2007	2	1,047,657
Burkina Faso	1996	10	1,081,046	Malawi	1987	10	798,669	South Africa	2011	9	4,418,594
Burkina Faso	2006	10	1,417,824	Malawi	1998	10	991,393	South Sudan	2008	7	542,765
Cameroon	1976	10	736,514	Malawi	2008	10	1,341,977	Sudan	2008	17	5,066,530
Cameroon	1987	10	897,211	Mali	1987	10	785,384	Tanzania	1988	10	2,310,424
Cameroon	2005	10	1,772,359	Mali	1998	10	991,330	Tanzania	2002	10	3,732,735
Egypt	1986	14	6,799,093	Mali	2009	10	1,451,856	Tanzania	2012	10	4,498,022
Egypt	1996	10	5,902,243	Morocco	1982	5	1,012,873	Togo	1960	10	137,343
Egypt	2006	10	7,282,434	Morocco	1994	5	1,294,026	Togo	1970	1	23,680
Ethiopia	1984	10	3,404,306	Morocco	2004	5	1,482,720	Togo	2010	10	584,859
Ethiopia	1994	10	5,044,598	Mozambique	1997	10	1,551,517	Uganda	1991	10	1,548,460
Ethiopia	2007	10	7,434,086	Mozambique	2007	10	2,047,048	Uganda	2002	10	2,497,449
Ghana	1984	10	1,309,352	Nigeria	2006	0.1	83,700	Zambia	1990	10	787,461
Ghana	2000	10	1,894,133	Nigeria	2007	0.1	85,183	Zambia	2000	10	996,117
Ghana	2010	10	2,466,289	Nigeria	2008	0.1	107,425	Zambia	2010	10	1,321,973
Guinea	1983	10	457,837	Nigeria	2009	0.1	77,896	Zimbabwe	2012	5	654,688
Guinea	1996	10	729,071	Nigeria	2010	0.1	72,191	<b>TOTAL</b>			<b>118,426,421</b>

\* Nigeria samples are from the General Household Survey; the South Africa 2007 sample is from the Community Survey.

# Standardize data

H01100013200401313520000  
P011001132206619350200113541621100101  
P01100213310341967050021324173230100011002  
P011003133104219590200110400099900000  
H021000122004013138301000  
P02100112220661935020021484165341001100009

Internal use

## ascii fixed-width data files H and P records

# Deliver to users

SAS, SPSS, Stata, R, csv  
Rectangular or heirarchical

# Standardize metadata: codebooks

1	A	B	C	D	E	F	G	H	I	K	N	O	P	Q	R
	Re	Var	Col	Wid	Frm	Value	Va	ValueLabel	Va	Freq	Svar	ValueSvar	Va	ValueLabelSvar	UnivSvar
3160						9	Unknown			13,202		8	Unknown		
3161						B	NA			32,533		9	NIU (not in universe)		
3162	P	mortfat	81	1			Father alive		P13		MZ2007A_0429		Father alive		All residents [discrepancies: non]
3163						1	Yes			1,351,153		1	Yes		
3164						2	No			644,213		2	No		
3165						3	Not sure			6,824		3	Not sure		
3166						9	Unknown			12,325		8	Unknown		
3167						B	NA			32,533		9	NIU (not in universe)		
3168	P	civilreg	82	1			Registered with civil registry		P14		MZ2007A_0430		Registered with civil registry		Residents age 1-17 [discrepancies: non]
3169						1	Yes			406,282		1	Yes		
3170						2	No			579,633		2	No		
3171						B	NA			1,061,133		8	Unknown		
3172						*						9	NIU (not in universe)		
3173	P	whynot	83	1			Reason not registered		P15		MZ2007A_0431		Reason not registered		Unregistered residents age 1-17 [discrepancies: non]
3174						1	Far away			147,290		1	Far away		
3175						2	Not important			9,919		2	Not important		
3176						3	Lack of knowledge			143,410		3	Lack of knowledge		
3177						4	It is complicated			31,207		4	It is complicated		
3178						5	It is expensive			135,455		5	It is expensive		
3179						6	Other			112,352		6	Other		
3180						B	NA			1,467,415		9	NIU (not in universe)		
3181	P	prov1	84	2			Province of residence		P16A		MZ2007A_0432		Province of residence 1 year ago		Residents age 1+ [discrepancies: non]
3182						1	Niassa			109,673		1	Niassa		
3183						2	Cabo Delgado			154,277		2	Cabo Delgado		
3184						3	Nampula			381,336		3	Nampula		
3185						4	Zambezia			366,877		4	Zambezia		
3186						5	Tete			169,172		5	Tete		
3187						6	Manica			133,088		6	Manica		
3188						7	Sofala			157,650		7	Sofala		
3189						8	Inhambane			120,356		8	Inhambane		
3190						9	Gaza			113,341		9	Gaza		
3191						10	Maputo Provincia			109,613		10	Maputo province		
3192						11	Maputo Cidade			109,346		11	Maputo city		
3193						*						97	Abroad		
3194						99	Descon			11,900		98	Unknown		
3195						0	[no label]			36		98	"		
3196						BB	[no label]			110,383		99	NIU (not in universe)		

**Internal codebook**  
for metadata-driven  
data transformations

**Deliver to users**  
Basic codebook and  
DDI Codebook  
with every data extract

# Standardize metadata: documentation

**Person 1**

1. What is this person's name? Pág. Person 1 from page 2  
Last Name \_\_\_\_\_  
First Name \_\_\_\_\_

2. What is this person's telephone number? We use Area Code + Number  
Area Code + Number \_\_\_\_\_  
Month Day \_\_\_\_\_

3. What is this person's sex?  
Male  Female

4. What is this person's date of birth?  
Age on April 1, 2000 \_\_\_\_\_

5. What is this person's race?  
Mark one or more races to indicate what this person considers himself/herself to be.  
White   
Black, African Am., or Negro   
American Indian or Alaska Native — Print name of enrolled or principal tribe.

6. What is this person's address? Lakáskérőív  
NÉPSZÁMLÁLÁS  
11. NÚMERO DE HIJOS  
Esta es una pregunta que sólo harás a las mujeres que tienen 12 años cumplidos o más.  
Si el informante te contesta que la mujer no ha tenido ningún hijo o hija nacido vivo, anota la respuesta en el cuestionario y pasa a la pregunta 12. ESTADO CIVIL.  
YO TUVE 4 HIJOS  
¿CUÁNTOS DE ÉSTOS VIVEN ACTUALMENTE?  
3 PORQUÉ UNO SE ME MURIÓ  
11. NÚMERO DE HIJOS  
PARA MUJERES DE 12 AÑOS O MÁS  
¿Cuántos hijos e hijas nacidos vivos?  
SI CONTESTA QUE "0"  
En total, cuantos hijos e hijas que nacieron vivos ha tenido?  
4  
(Cuántos de éstos viven actualmente?)  
4  
dicho con nombre

## 5. Number of Rooms

How many rooms are used for sleeping without counting hallways?

\_\_\_\_\_ Write the number

Without counting the hallways or bathrooms how many total rooms are in this dwelling? Count the kitchen

\_\_\_\_\_ Write the number

## 6. Access to water

Read all of the options until you get an affirmative answer.

Circle only one answer

- 1 Running water inside the dwelling
- 2 Running water outside the dwelling but on the land
- 3 Running water from a public faucet or hydrant
- 4 Running water that is carried from another dwelling
- 5 Tanked in by truck
- 6 Water from a well, river, lake, stream or other

Answers 3, 4, 5, 6 continue with number 8

## 7. Water supply

How many days of the week is water available?

Circle only one answer

- 1 Daily
- 2 Every third day
- 3 Twice a week
- 4 Once a week
- 5 Occasionally



HOME | SELECT DATA | MY DATA | FAQ | HELP

DATA CART  
YOUR DATA EXTRACT  
0 VARIABLES  
0 SAMPLES

VIEW CART

## ROOMS

Number of rooms

Group: Dwelling Characteristics – HOUSEHOLD

CODES	DESCRIPTION	COMPARABILITY	UNIVERSE	AVAILABILITY	QUESTIONNAIRE TEXT	SOURCE
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## Comparability – Index

GENERAL

Armenia

Brazil

Cambodia

France

Morocco

Palestine

Rwanda

South Africa

## Comparability – General

The censuses generally agree on the broad definition of a "room": essentially an interior area or compartment of a dwelling defined by walls and a roof, excluding corridors or hallways. They differ considerably, however, in delineating which rooms are to be included in the tally and which are to be excluded. Points of difference include: kitchens; bathrooms; garages; kitchens or bathrooms shared by multiple households; rooms used for various commercial or non-residential purposes; etc. See the enumeration text for details.

# Variable harmonization: Marital Status

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# IPUMS International data users and usage

Since 2005

- > 20,000 approved data users  
verified and credible  
academic or policy affiliation
- > 80,000 data download requests

## Discipline

Economics	50%
Demography	15%
Sociology	10%
Statistics	5%
Public Policy	5%
Geography	3.5%
History	1.5%
Other	10%

## Data Users: Institutional Affiliation

### North America

- \*University of Minnesota
- \*University of California, Berkeley
- \*Harvard University
- \*University of Michigan
- \*University of Chicago
- \*Columbia University
- \*Dartmouth College
- \*University of California, Davis

### Asia & Oceania

- \*National University of Singapore
- Australian National University
- Xiamen University, China
- HKUST

### Europe

- \*London School of Economics
- \*Universidad Carlos III de Madrid
- \*University of Oxford
- \*University College London

### Central and South America

- \*Universidade Federal de Minas Gerais, Brazil
- El Colegio de México
- Universidad de Valle, Colombia
- Pontifícia Universidad Católica de Chile

### Africa

- \*University of Witwatersrand, South Africa
- Obafemi Awolowo University, Nigeria
- University of Cape Town, South Africa
- Makerere University, Uganda

### International Organizations

- \*The World Bank
- \*United Nations (UNPD, UNFPA, UNESCO)
- Inter-American Development Bank
- World Health Organization



## IPUMS Overview

Microdata standardization and harmonization

Data usage

## Geographic Harmonization

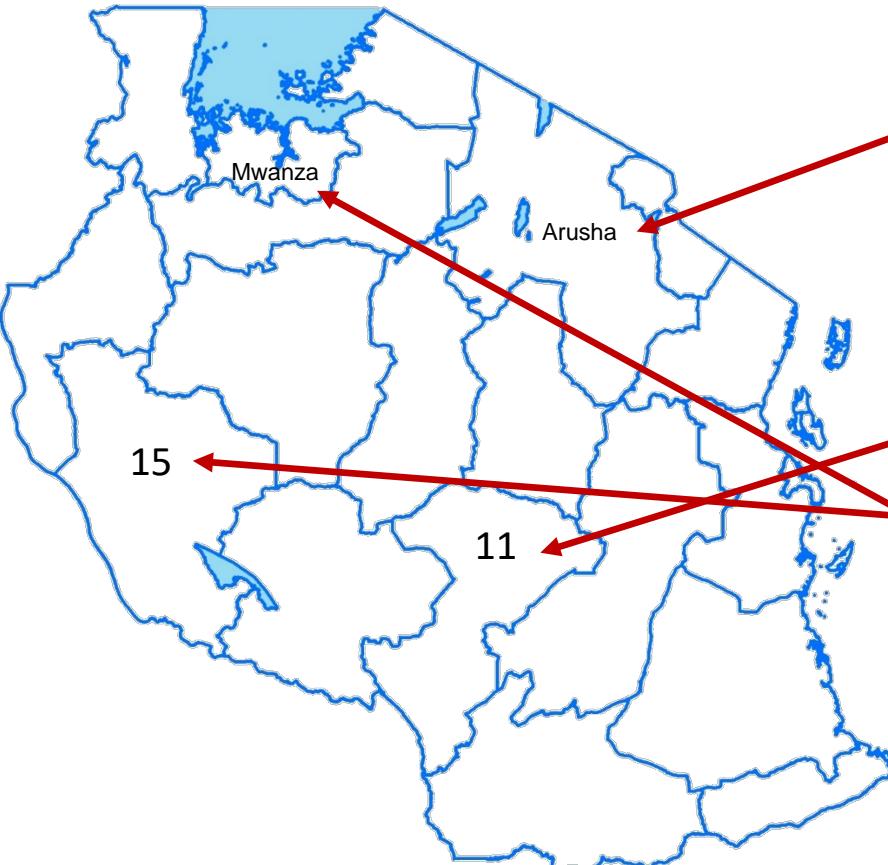
Harmonization

Confidentiality

Use of year-specific and harmonized units and maps

# Spatial harmonization

## Source maps – digitization – code matching



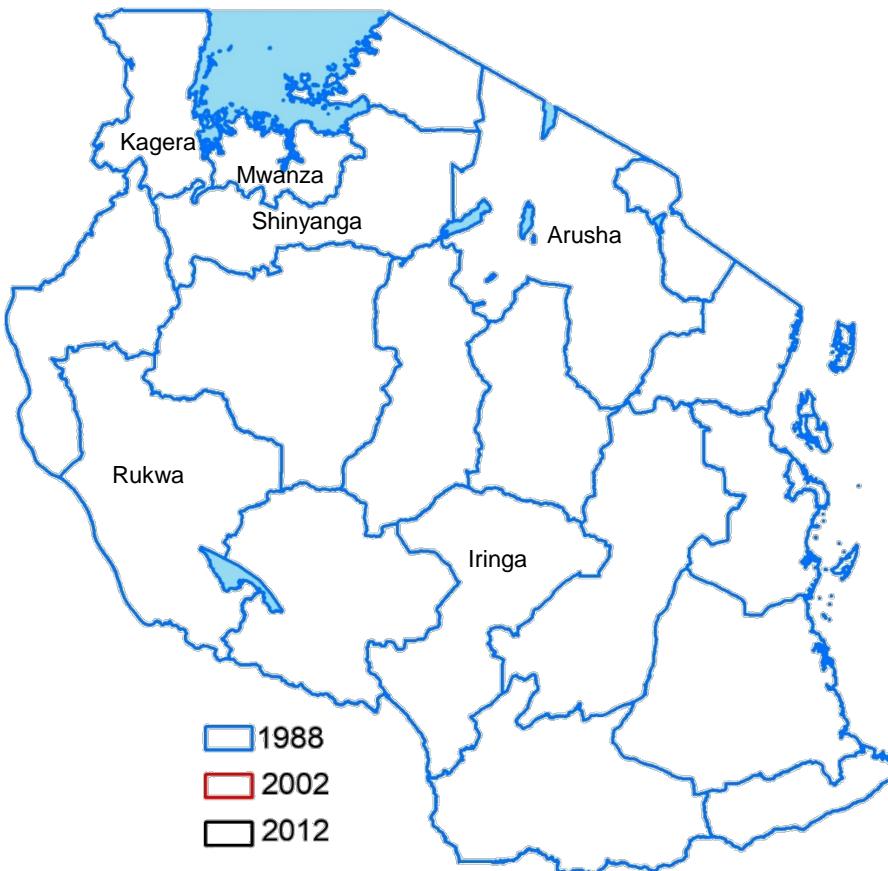
Tanzania 1988
1 = Dodoma {20588}
<b>2 = Arusha {27577}</b>
3 = Kilimanjaro {21429}
4 = Tanga {28908}
5 = Morogoro {25152}
6 = Pwani {23619}
7 = Dar es Salaam {15864}
8 = Lindi {22008}
9 = Mtwara {20910}
10 = Ruvumba {16545}
<b>11 = Iringa {21506}</b>
12 = Mbeya {37441}
13 = Singida {17568}
14 = Tabora {20045}
<b>15 = Rukwa {16338}</b>
<b>16 = Kigoma {13921}</b>
18 = Kagera {23281}
<b>19 = Mwanza {32013}</b>
17 = Shinyanga {28919}
20 = Mara {16783}
51 = Zanzibar Kaskazini {3728}
52 = Zanzibar Kati na Kusini {3419}
53 = Zanzibar Mjini na Magh {4701}
54 = Pemba Kaskazini {5574}
55 = Pemba Kusini {4779}

Tanzania, 1988

Do this work  
for all years

# Spatial harmonization

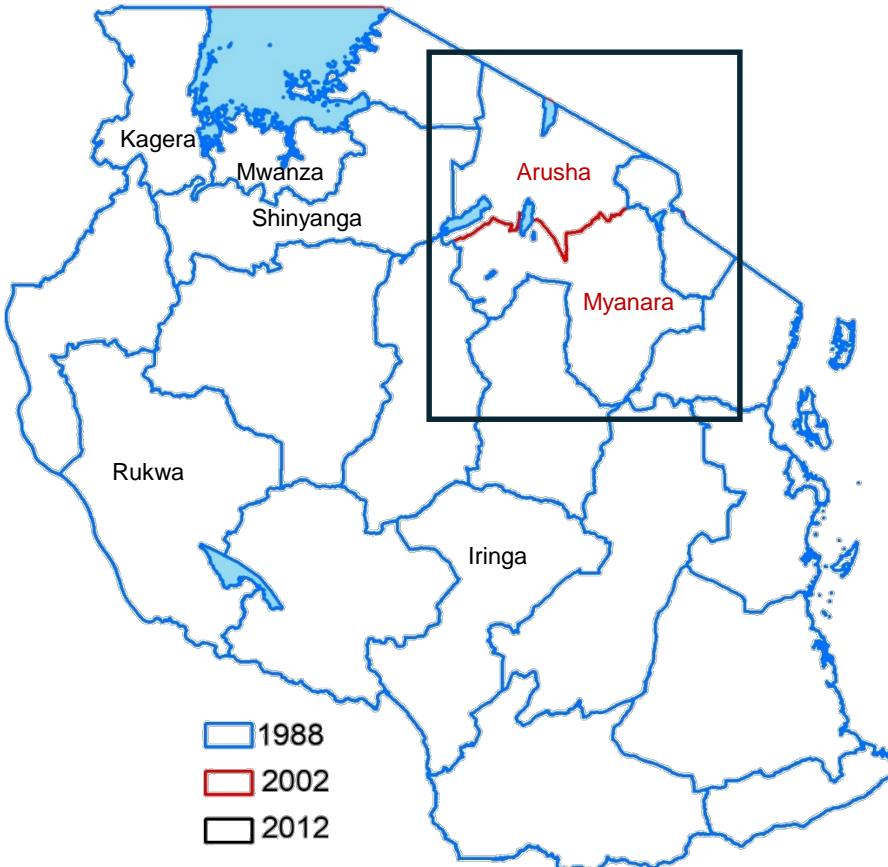
## Compare spatial units in each year



Tanzania, 1988

# Spatial harmonization

## Compare spatial units in each year



Tanzania, 1988 - 2002

# Spatial harmonization

## Compare spatial units in each year



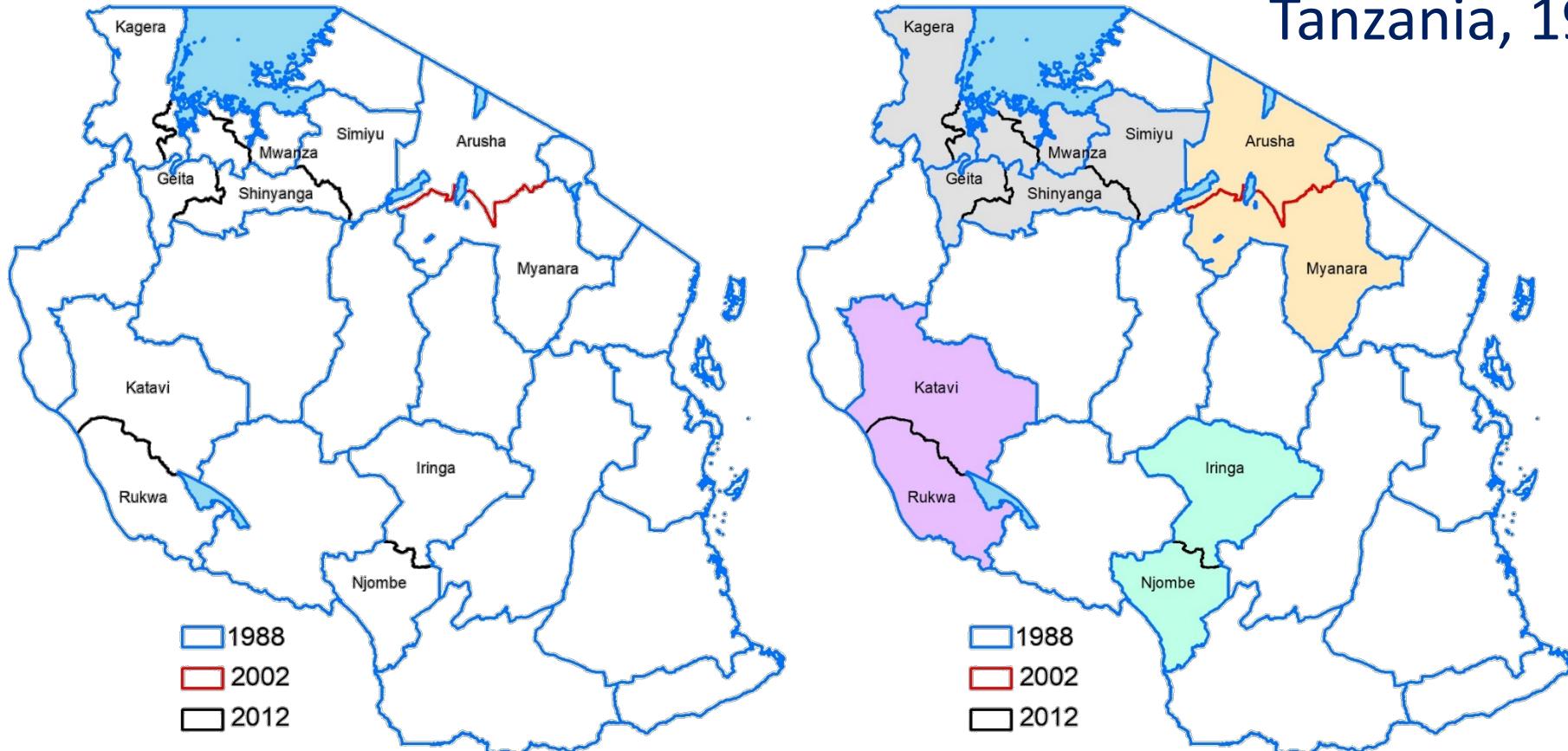
Tanzania, 1988 - 2012

# Spatial harmonization

Tanzania 1988	Tanzania 2002	Tanzania 2012
1 = Dodoma {20588}	1 = Dodoma {42288}	1 = Dodoma {51898}
2 = Arusha {27577}	2 = Arusha {30062}	2 = Arusha {45407}
	21 = Manyara {32714}	21 = Manyara {37581}
3 = Kilimanjaro {21429}	3 = Kilimanjaro {36767}	3 = Kilimanjaro {39983}
4 = Tanga {28908}	4 = Tanga {48897}	4 = Tanga {51466}
5 = Morogoro {25152}	5 = Morogoro {40028}	5 = Morogoro {47454}
6 = Pwani {23619}	6 = Pwani {41590}	6 = Pwani {33720}
7 = Dar es Salaam {15864}	7 = Dar es salaam {22764}	7 = Dar es Salaam {35867}
8 = Lindi {22008}	8 = Lindi {38002}	8 = Lindi {32270}
9 = Mtwara {20910}	9 = Mtwara {35659}	9 = Mtwara {38239}
10 = Ruvumba {16545}	10 = Ruvuma {36561}	10 = Ruvuma {32655}
11 = Iringa {21506}	11 = Iringa {43100}	11 = Iringa {30196}
		22 = Njombe {23608}
12 = Mbeya {37441}	12 = Mbeya {62171}	12 = Mbeya {57774}
13 = Singida {17568}	13 = Singida {31599}	13 = Singida {37244}
14 = Tabora {20045}	14 = Tabora {38961}	14 = Tabora {33405}
		23 = Katavi {11443}
15 = Rukwa {16338}	15 = Rukwa {28597}	15 = Rukwa {20810}
16 = Kigoma {13921}	16 = Kigoma {26369}	16 = Kigoma {33289}
		25 = Geita {26711}
18 = Kagera {23281}	18 = Kagera {42579}	18 = Kagera {36875}
19 = Mwanza {32013}	19 = Mwanza {55508}	19 = Mwanza {57997}
17 = Shinyanga {28919}	17 = Shinyanga {47309}	17 = Shinyanga {31089}
		24 = Simiyu {31952}
20 = Mara {16783}	20 = Mara {28227}	20 = Mara {41209}
51 = Zanzibar Kaskazini {3728}	51 = Zanzibar north {4048}	51 = Zanzibar North {3771}
52 = Zanzibar Kati na Kusini {3419}	52 = Zanzibar south {4761}	52 = Zanzibar South {4199}
53 = Zanzibar Mjini na Magh {4701}	53 = Zanzibar town/west {8663}	53 = Zanzibar town or west {10049}
54 = Pemba Kaskazini {5574}	54 = Pemba north {7292}	54 = Pemba North {6594}
55 = Pemba Kusini {4779}	55 = Pemba south {7252}	55 = Pemba South {6021}

Tanzania, 1988 - 2012

# Spatial harmonization

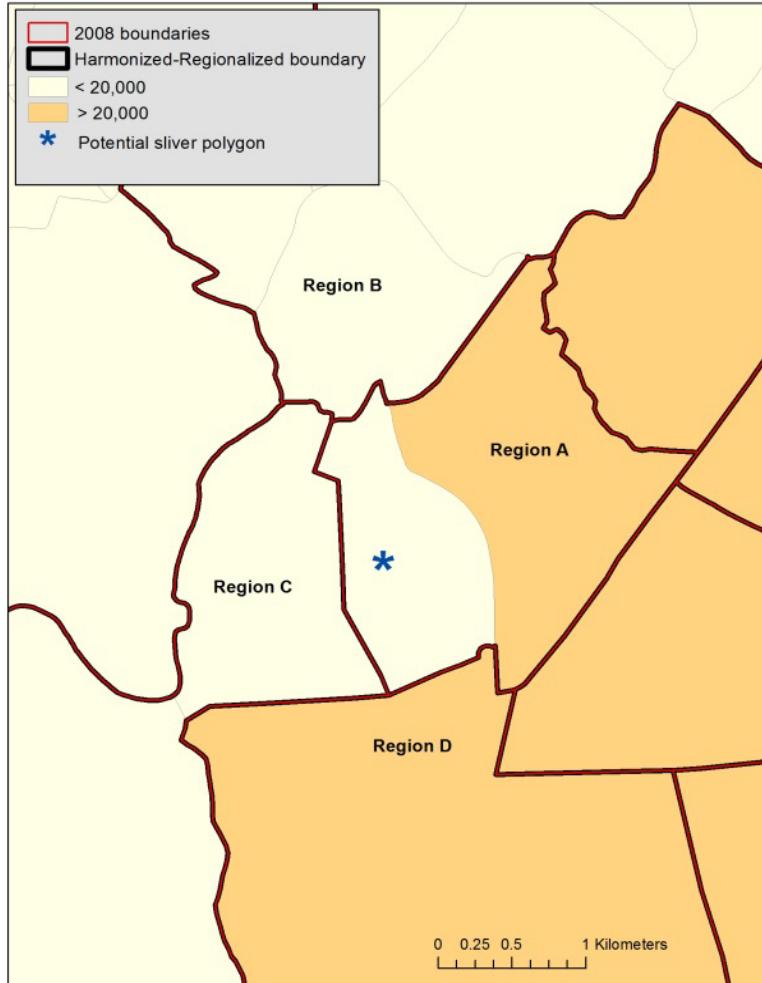


# Spatial harmonization

Tanzania, 1988 - 2012

code	label	tz1988a	tz2002a	tz2012a
834001	Dodoma	1 = Dodoma {20588}	1 = Dodoma {42288}	1 = Dodoma {51898}
834002	Arusha, Manyara	2 = Arusha {27577}	2 = Arusha {30062}	2 = Arusha {45407}
834002	Arusha, Manyara		21 = Manyara {32714}	21 = Manyara {37581}
834003	Kilimanjaro	3 = Kilimanjaro {21429}	3 = Kilimanjaro {36767}	3 = Kilimanjaro {39983}
834004	Tanga	4 = Tanga {28908}	4 = Tanga {48897}	4 = Tanga {51466}
834005	Morogoro	5 = Morogoro {25152}	5 = Morogoro {40028}	5 = Morogoro {47454}
834006	Pwani	6 = Pwani {23619}	6 = Pwani {41590}	6 = Pwani {33720}
834007	Dar es Salaam	7 = Dar es Salaam {15864}	7 = Dar es salaam {22764}	7 = Dar es Salaam {35867}
834008	Lindi	8 = Lindi {22008}	8 = Lindi {38002}	8 = Lindi {32270}
834009	Mtware	9 = Mtware {20910}	9 = Mtware {35659}	9 = Mtware {38239}
834010	Ruvumba	10 = Ruvumba {16545}	10 = Ruvuma {36561}	10 = Ruvuma {32655}
834011	Iringa, Njombe	11 = Iringa {21506}	11 = Iringa {43100}	11 = Iringa {30196}
834011	Iringa, Njombe			22 = Njombe {23608}
834012	Mbeya	12 = Mbeya {37441}	12 = Mbeya {62171}	12 = Mbeya {57774}
834013	Singida	13 = Singida {17568}	13 = Singida {31599}	13 = Singida {37244}
834014	Tabora	14 = Tabora {20045}	14 = Tabora {38961}	14 = Tabora {33405}
834015	Katavi, Rukwa			23 = Katavi {11443}
834015	Katavi, Rukwa	15 = Rukwa {16338}	15 = Rukwa {28597}	15 = Rukwa {20810}
834016	Kigoma	16 = Kigoma {13921}	16 = Kigoma {26369}	16 = Kigoma {33289}
834019	Geita, Kagera, Mwanza, Shinyanga, Simiyu			25 = Geita {26711}
834019	Geita, Kagera, Mwanza, Shinyanga, Simiyu	18 = Kagera {23281}	18 = Kagera {42579}	18 = Kagera {36875}
834019	Geita, Kagera, Mwanza, Shinyanga, Simiyu	19 = Mwanza {32013}	19 = Mwanza {55508}	19 = Mwanza {57997}
834019	Geita, Kagera, Mwanza, Shinyanga, Simiyu	17 = Shinyanga {28919}	17 = Shinyanga {47309}	17 = Shinyanga {31089}
834019	Geita, Kagera, Mwanza, Shinyanga, Simiyu			24 = Simiyu {31952}
834020	Mara	20 = Mara {16783}	20 = Mara {28227}	20 = Mara {41209}
834051	Zanzibar North	51 = Zanzibar Kaskazini {3728}	51 = Zanzibar north {4048}	51 = Zanzibar North {3771}
834052	Zanzibar South	52 = Zanzibar Kati na Kusini {3419}	52 = Zanzibar south {4761}	52 = Zanzibar South {4199}
834053	Zanzibar Town/West	53 = Zanzibar Mjini na Magh {4701}	53 = Zanzibar town/west {8663}	53 = Zanzibar town or west {10049}
834054	Pemba North	54 = Pemba Kaskazini {5574}	54 = Pemba north {7292}	54 = Pemba North {6594}
834055	Pemba South	55 = Pemba Kusini {4779}	55 = Pemba south {7252}	55 = Pemba South {6021}

# Regionalization - confidentiality

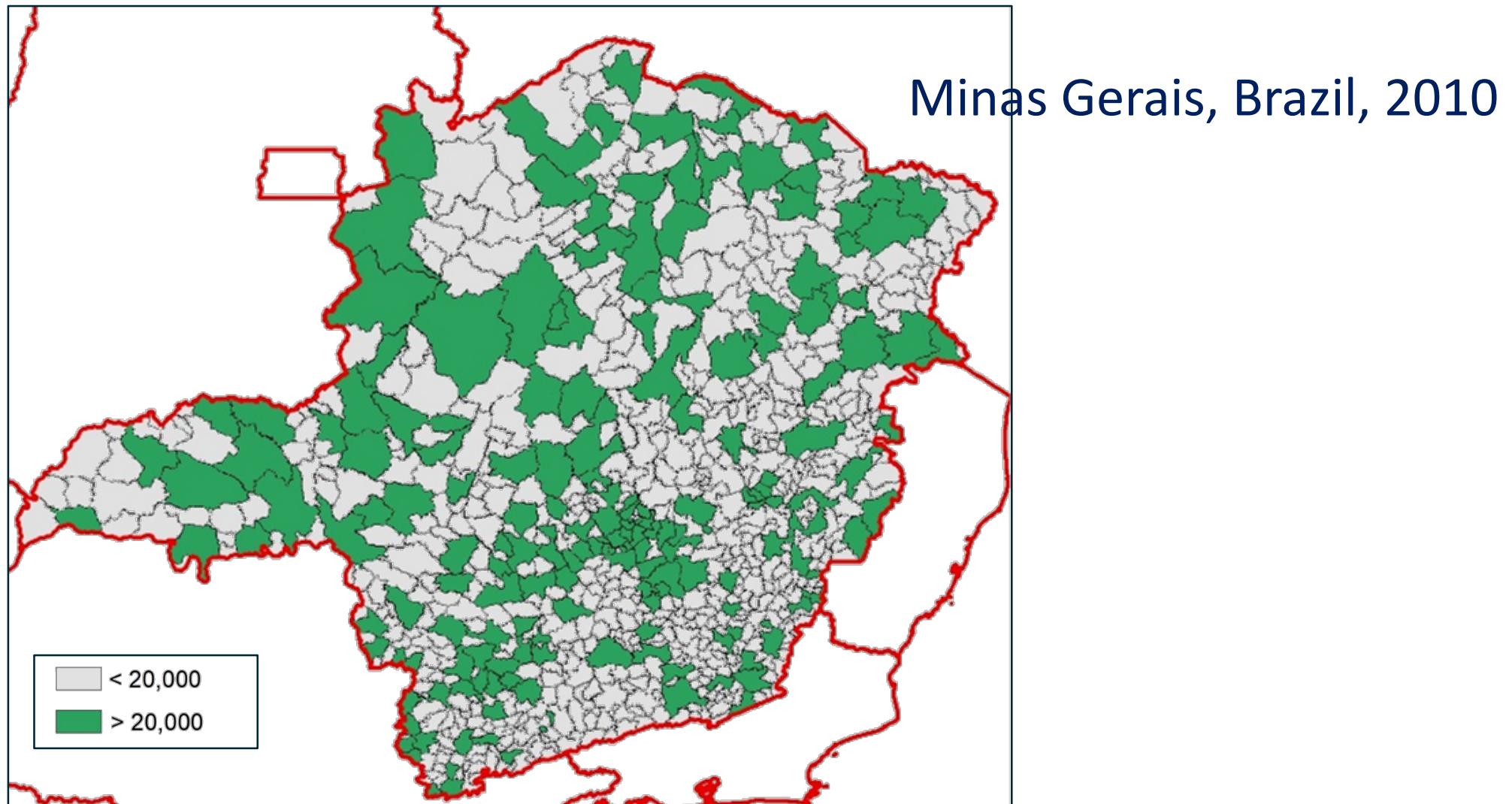


- Population has to be greater than 20,000
- 2<sup>nd</sup> level units within 1<sup>st</sup> level “containers” to avoid slivers
- Units should be contiguous
- Similar population density
- Units should be compact and not skinny

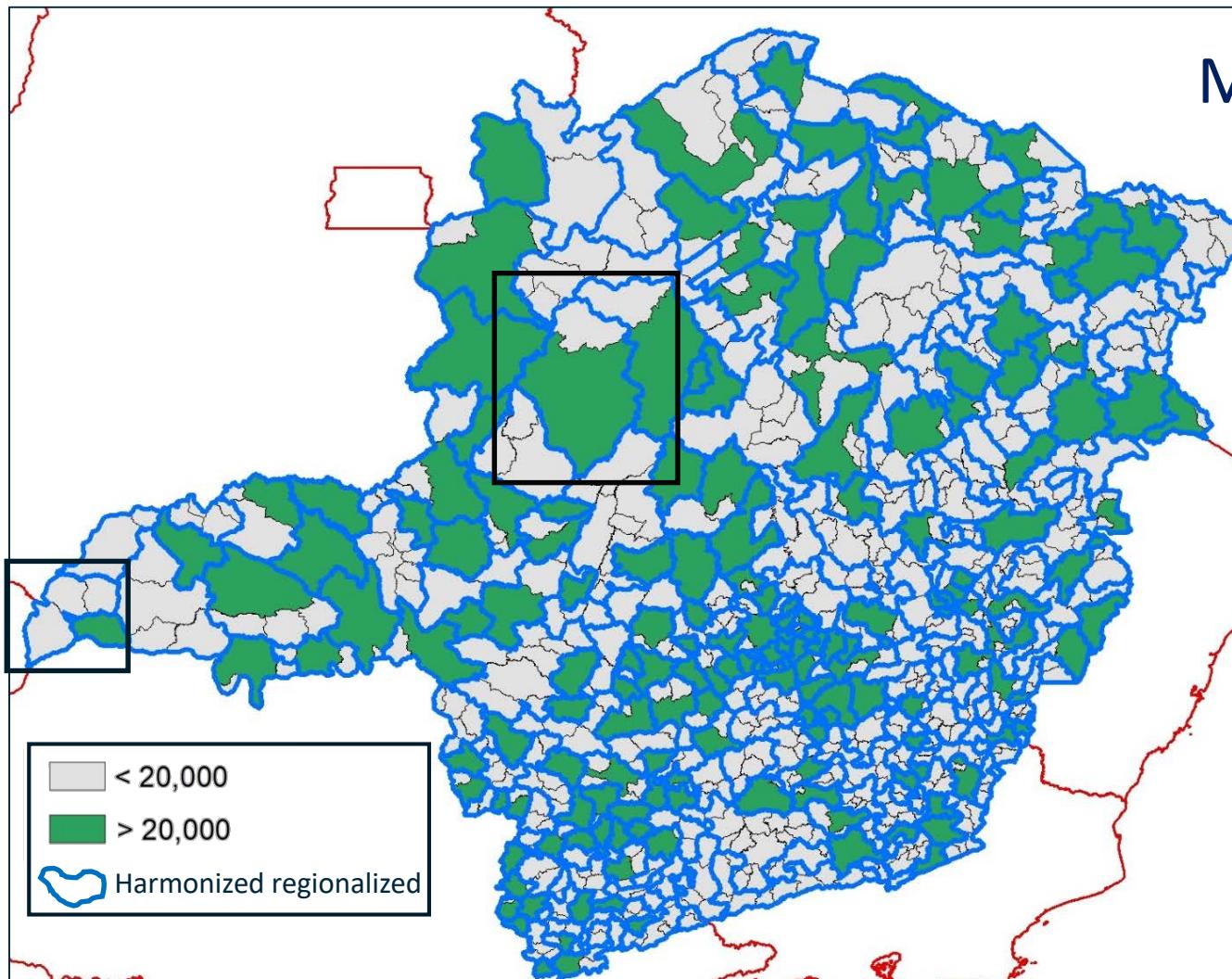
Sarkar, S., Cleveland, L., Silisyene, M. & Sobek, M. (2015). Harmonized census geography and spatio-temporal analysis: gender equality and empowerment of women in Africa. Working paper presented at the Annual Meeting of the Population Association of America, San Diego, CA in April.

Tracy A. Kugler, David C. Van Riper, Steven M. Manson, David A. Haynes II, Joshua Donato & Katie Stinebaugh (2015) Terra Populus: Workflows for Integrating and Harmonizing Geospatial Population and Environmental Data, *Journal of Map & Geography Libraries*, 11:2, 180-206, DOI: 10.1080/15420353.2015.1036484

# Regionalization - confidentiality



# Harmonization + Regionalization





## IPUMS Overview

Microdata standardization and harmonization

Data usage

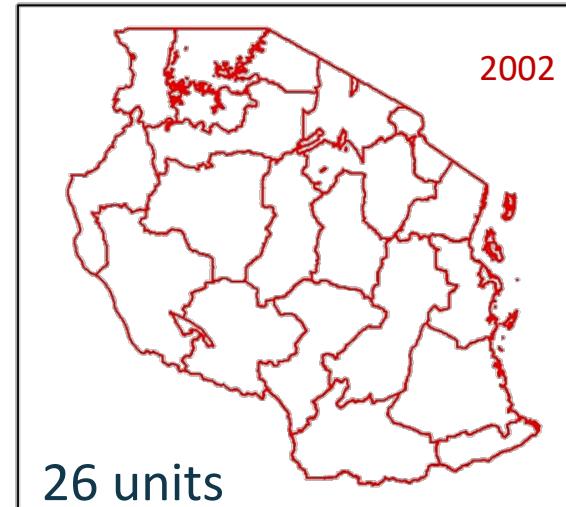
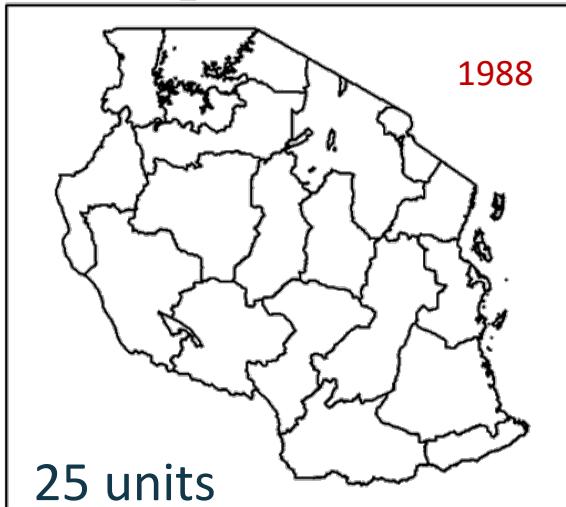
## Geographic Harmonization

Harmonization

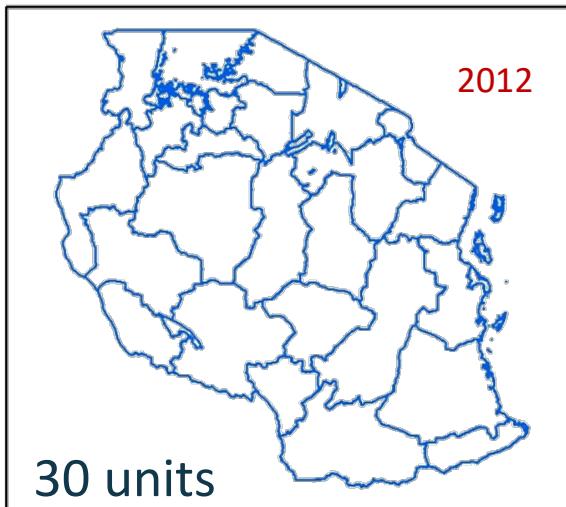
Confidentiality

**Use of year-specific and harmonized units and maps**

# Year-specific versus harmonized



Tanzania, 1988 - 2012



# Year-specific vs. harmonized units?

- Year-specific variables
  - Single year of interest
  - Combine with other data sources requiring the additional detail
  - Creating summarized contextual information
  
- Harmonized variables
  - Comparisons over time: change or trend
    - Trends
    - Measuring change
    - Quasi-experimental design

# Danger of using unit names for comparisons

code	label	missing	mw1987a	mw1998a	mw2008a
rectype	DISTMW		H	H	H
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norecode					
hide					
proj1			MW87A094	MW98A021	MW08A022
proj2					
proj3					
proj4					
proj5					
proj6					
<tt>					
	# Northern Region				
101	Chitipa		101 = Chitipa {1982}	101 = Chitipa {2581}	101 = Chitipa {3687}
102	Karonga		102 = Karonga {2787}	102 = Karonga {4011}	102 = Karonga {5817}
103	Nkhata Bay and Likoma		103 = Nkhata Bay {2935}	103 = Nkhata Bay {3340}	103 = Nkhata Bay {4303}
103	"			106 = Likoma {155}	106 = Likoma {199}
104	Rumphi		104 = Rumphi {1992}	104 = Rumphi {2539}	104 = Rumphi {3930}
105	Mzimba		105 = Mzimba {9355}	105 = Mzimba {11728}	105 = Mzimba {14069}
107	Mzuzu				107 = Mzuzu city {2739}
	# Central Region				
201	Kasungu		201 = Kasungu {7245}	201 = Kasungu {9687}	201 = Kasungu {12629}
202	Nkhota Kota		202 = Nkhota kota {3930}	202 = Nkhota Kota {5006}	202 = Nkhota Kota {6126}
203	Ntchisi		203 = Ntchisi {2639}	203 = Ntchisi {3617}	203 = Ntchisi {4644}
204	Dowa		204 = Dowa {7180}	204 = Dowa {9045}	204 = Dowa {12720}
205	Salima		205 = Salima {4713}	205 = Salima {5869}	205 = Salima {7493}
206	Lilongwe		206 = Lilongwe {22720}	206 = Lilongwe {31102}	206 = Lilongwe {27703}
207	Mchinji		207 = Mchinji {5687}	207 = Mchinji {7086}	207 = Mchinji {10034}
208	Dedza		208 = Dedza {9551}	208 = Dedza {11404}	208 = Dedza {15173}
209	Ntcheu		209 = Ntcheu {8114}	209 = Ntcheu {8558}	209 = Ntcheu {11702}
210	Lilongwe city				210 = Lilongwe city {15341}
	# Southern Region				
301	Mangochi		301 = Mangochi {12315}	301 = Mangochi {15214}	301 = Mangochi {18297}
302	Machinga		302 = Machinga {7595}	302 = Machinga {9020}	302 = Machinga {11369}
303	Zomba		303 = Zomba {11033}	303 = Zomba {13836}	303 = Zomba {14651}
304	Chiradzulu		304 = Chiradzulu {5002}	304 = Chiradzulu {5879}	304 = Chiradzulu {7114}
305	Blantyre		305 = Blantyre {14452}	305 = Blantyre {19929}	305 = Blantyre {8509}
306	Mwanza		306 = Mwanza {2833}	306 = Mwanza {3258}	306 = Mwanza {2596}
307	Thyolo		307 = Thyolo {10232}	307 = Thyolo {11301}	307 = Thyolo {14203}
308	Mulanje		308 = Mulanje {10041}	308 = Mulanje {10445}	308 = Mulanje {12445}
309	Phalombe		309 = Phalombe {5319}	309 = Phalombe {5965}	309 = Phalombe {7505}
310	Chikwawa		310 = Chikwawa {6961}	310 = Chikwawa {8002}	310 = Chikwawa {10081}
311	Nsanje		311 = Nsanje {4689}	311 = Nsanje {4357}	311 = Nsanje {5169}
312	Balaka		312 = Balaka {4968}	312 = Balaka {6071}	312 = Balaka {7931}
313	Neno				313 = Neno {2620}
314	Zomba city				314 = Zomba city {2688}
315	Blantyre city				315 = Blantyre city {16377}
</tt>					
<univ>					
mw1987a mw1998a[all]					
</univ>					

## Malawi

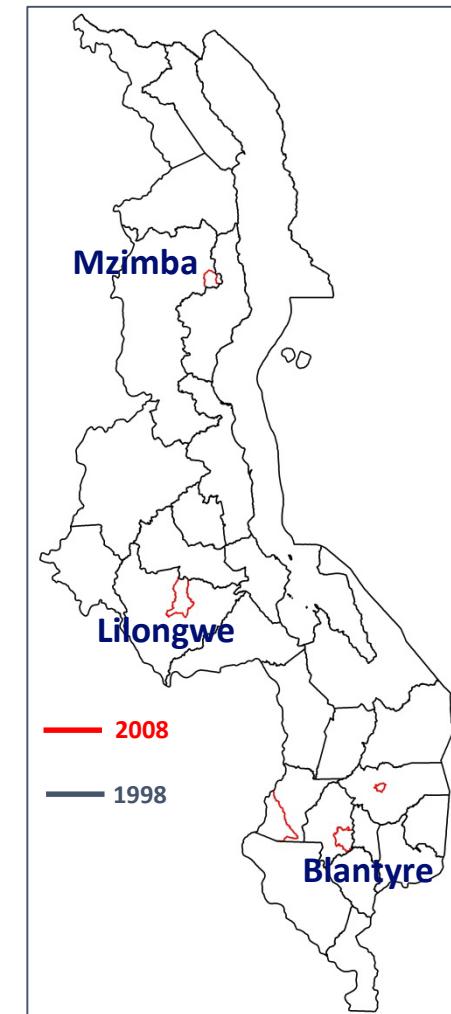
1987	Rural %	Urban %
Mzimba	88.1	11.9
Lilongwe	77.6	22.4
Blantyre	42.0	58.0

1998	Rural %	Urban %
Mzimba	81.7	18.3
Lilongwe	67.4	32.6
Blantyre	37.7	62.3

2008	Rural %	Urban %
Mzimba	96.2	3.8
Lilongwe	100	0
Blantyre	100	0

# Harmonized spatial units

code	label	missing	mw1987a	mw1998a	mw2008a
rectype	GEO1_MW			H	H
columns	Malawi, District 1998 - 2008 [Level 1; consistent boundaries, GIS]				
norecode					
hide					
proj1			MW1987A_0021	MW1998A_0021	MW2008A_0022
proj2					
proj3					
proj4					
proj5					
proj6					
<tt>					
	# Northern Region				
454101	Chitipa		101 = Chitipa (1982)	101 = Chitipa (2581)	101 = Chitipa (3832)
454102	Karonga		102 = Karonga (2787)	102 = Karonga (4011)	102 = Karonga (5758)
454103	Nkhata Bay, Likoma		103 = Nkhata Bay (2781)	103 = Nkhata Bay (3340)	103 = Nkhata Bay (4311)
454103	Nkhata Bay		106 = Likoma (164)	106 = Likoma (165)	106 = Likoma (229)
454103	Likoma		104 = Rumphi (1992)	104 = Rumphi (2539)	104 = Rumphi (3808)
454104	Rumphi				
454105	Mzimba, Mzuzu city		105 = Mzimba (9355)	105 = Mzimba (11728)	105 = Mzimba (14314)
454105	Mzimba (1998)				
454105	Mzimba (2008)				
454105	Mzuzu city (2008)				
	# Central Region				
454201	Kasungu		201 = Kasungu (7245)	201 = Kasungu (9687)	201 = Kasungu (13096)
454202	Nkhota Kota		202 = Nkhota Kota (3930)	202 = Nkhota Kota (5006)	202 = Nkhota Kota (6273)
454203	Ntchisi		203 = Ntchisi (2639)	203 = Ntchisi (3617)	203 = Ntchisi (4754)
454204	Dowa		204 = Dowa (7180)	204 = Dowa (9045)	204 = Dowa (12407)
454205	Salima		205 = Salima (4713)	205 = Salima (5869)	205 = Salima (7737)
454206	Lilongwe, Lilongwe city		206 = Lilongwe (22720)	206 = Lilongwe (31102)	206 = Lilongwe (27562)
454206	Lilongwe (1998)				
454206	Lilongwe (2008)				
454206	Lilongwe city (2008)				
454207	Mchinji		207 = Mchinji (5687)	207 = Mchinji (7086)	207 = Mchinji (9917)
454208	Dedza		208 = Dedza (9551)	208 = Dedza (11404)	208 = Dedza (14652)
454209	Ntcheu		209 = Ntcheu (8114)	209 = Ntcheu (8558)	209 = Ntcheu (11312)
	# Southern Region				
454301	Mangochi		301 = Mangochi (12315)	301 = Mangochi (15214)	301 = Mangochi (18518)
454302	Machinga		302 = Machinga (7595)	302 = Machinga (9020)	302 = Machinga (11477)
454303	Zomba, Zomba city		303 = Zomba (11033)	303 = Zomba (13836)	303 = Zomba (14241)
454303	Zomba (1998)				
454303	Zomba (2008)				
454303	Zomba city (2008)				
454304	Chiradzulu		304 = Chiradzulu (5002)	304 = Chiradzulu (5879)	304 = Chiradzulu (7226)
454305	Blantyre, Blantyre city		305 = Blantyre (14452)	305 = Blantyre (19929)	305 = Blantyre (8417)
454305	Blantyre (1998)				
454305	Blantyre (2008)				
454305	Blantyre city (2008)				
454307	Thyolo		307 = Thyolo (10232)	307 = Thyolo (11301)	307 = Thyolo (14254)
454308	Mulanje		308 = Mulanje (10041)	308 = Mulanje (10445)	308 = Mulanje (12776)
454309	Phalombe		309 = Phalombe (5319)	309 = Phalombe (5965)	309 = Phalombe (7568)
454310	Chikwawa		310 = Chikwawa (6961)	310 = Chikwawa (8002)	310 = Chikwawa (9691)
454311	Nsanje		311 = Nsanje (4689)	311 = Nsanje (4357)	311 = Nsanje (5301)
454312	Balaka		312 = Balaka (4968)	312 = Balaka (6071)	312 = Balaka (7569)
454313	Mwanza, Neno		306 = Mwanza (2833)	306 = Mwanza (3258)	306 = Mwanza (2241)
454313	Mwanza (1998)				
454313	Mwanza (2008)				
454313	Neno (2008)				



# Using harmonized units for comparison

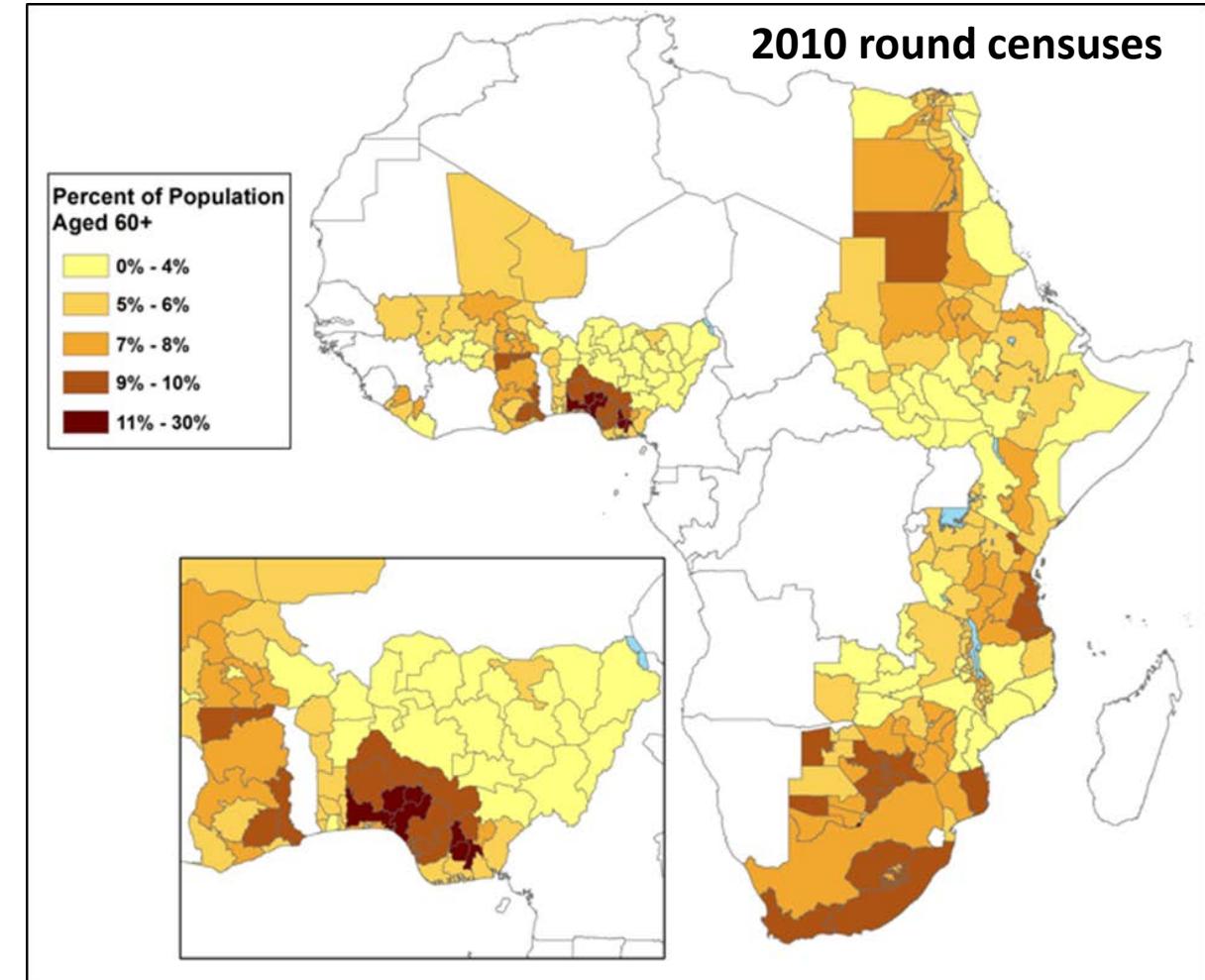
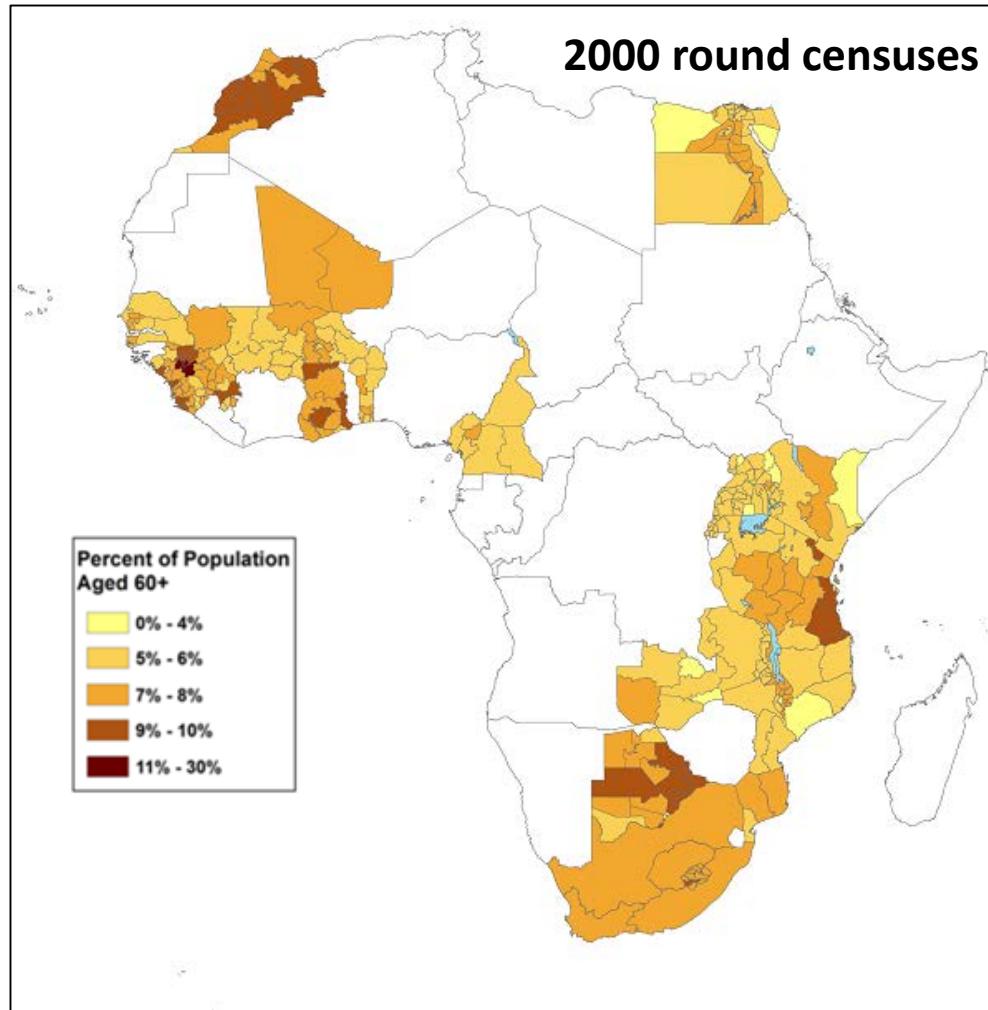
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hide					
proj1			MW1987A_0021	MW1998A_0021	MW2008A_0022
proj2					
proj3					
proj4					
proj5					
proj6					
</t>					
	# Northern Region				
454101	Chitipa	101 = Chitipa {1982}	101 = Chitipa {2581}	101 = Chitipa {3832}	
454102	Karonga	102 = Karonga {2787}	102 = Karonga {4011}	102 = Karonga {5758}	
454103	Nkhata Bay, Likoma				
454103	Nkhata Bay	103 = Nkhata Bay {2781}	103 = Nkhata Bay {3340}	103 = Nkhata Bay {4311}	
454103	Likoma	106 = Likoma {154}	106 = Likoma {155}	106 = Likoma {229}	
454104	Rumphi	104 = Rumphi {1992}	104 = Rumphi {2539}	104 = Rumphi {3808}	
454105	Mzimba, Mzuzu city				
454105	Mzimba (1998)	105 = Mzimba {9355}	105 = Mzimba {11728}		
454105	Mzimba (2008)			105 = Mzimba {14314}	
454105	Mzuzu city (2008)			107 = Mzuzu City {3043}	
	# Central Region				
454201	Kasungu	201 = Kasungu {7245}	201 = Kasungu {9687}	201 = Kasungu {13096}	
454202	Nkhota Kota	202 = NkhotaKota {3930}	202 = Nkhota Kota {5006}	202 = Nkhota Kota {6273}	
454203	Ntchisi	203 = Ntchisi {2639}	203 = Ntchisi {3617}	203 = Ntchisi {4754}	
454204	Dowa	204 = Dowa {7180}	204 = Dowa {9045}	204 = Dowa {12407}	
454205	Salima	205 = Salima {4713}	205 = Salima {5869}	205 = Salima {7737}	
454206	Lilongwe, Lilongwe city				
454206	Lilongwe (1998)	206 = Lilongwe {22720}	206 = Lilongwe {31102}	206 = Lilongwe {27562}	
454206	Lilongwe (2008)			210 = Lilongwe City {15651}	
454206	Lilongwe city (2008)				
454207	Mchinji	207 = Mchinji {5687}	207 = Mchinji {7086}	207 = Mchinji {9917}	
454208	Dedza	208 = Dedza {9551}	208 = Dedza {11404}	208 = Dedza {14652}	
454209	Ntcheu	209 = Ntcheu {8114}	209 = Ntcheu {8558}	209 = Ntcheu {11312}	
	# Southern Region				
454301	Mangochi	301 = Mangochi {12315}	301 = Mangochi {15214}	301 = Mangochi {18518}	
454302	Machinga	302 = Machinga {7595}	302 = Machinga {9020}	302 = Machinga {11477}	
454303	Zomba, Zomba city				
454303	Zomba (1998)	303 = Zomba {11033}	303 = Zomba {13836}	303 = Zomba {14241}	
454303	Zomba (2008)			314 = Zomba City {2545}	
454303	Zomba city (2008)			304 = Chiradzulu {7226}	
454304	Chiradzulu	304 = Chiradzulu {5002}	304 = Chiradzulu {5879}		
454305	Blantyre, Blantyre city				
454305	Blantyre (1998)	305 = Blantyre {14452}	305 = Blantyre {19929}		
454305	Blantyre (2008)			305 = Blantyre {8417}	
454305	Blantyre city (2008)			315 = Blantyre City {15631}	
454307	Thyolo	307 = Thyolo {10232}	307 = Thyolo {11301}	307 = Thyolo {14254}	
454308	Mulanje	308 = Mulanje {10041}	308 = Mulanje {10445}	308 = Mulanje {12776}	
454309	Phalombe	309 = Phalombe {5319}	309 = Phalombe {5965}	309 = Phalombe {7568}	
454310	Chikwawa	310 = Chikwawa {6961}	310 = Chikwawa {8002}	310 = Chikwawa {9691}	
454311	Nsanje	311 = Nsanje {4689}	311 = Nsanje {4357}	311 = Nsanje {6301}	
454312	Balaka	312 = Balaka {4968}	312 = Balaka {6071}	312 = Balaka {7569}	
454313	Mwanza, Neno				
454313	Mwanza (1998)	306 = Mwanza {2833}	306 = Mwanza {3258}	306 = Mwanza {2241}	
454313	Mwanza (2008)			313 = Neno {2496}	
454313	Neno (2008)				
</t>					

1987	Rural %	Urban %
Mzimba/Mzuzu city	87.1	12.2
Lilongwe/Lilingwe city	77.6	22.4
Blantyre/ Blantyre city	42.0	58.0
1998	Rural %	Urban %
Mzimba/Mzuzu city	83.7	16.3
Lilongwe/Lilingwe city	67.4	32.6
Blantyre/ Blantyre city	37.7	62.3
2008	Rural %	Urban %
Mzimba/Mzuzu city	82.1	17.9
°Lilongwe/Lilingwe city	64.6	34.1
×Blantyre/ Blantyre city	36.1	58.2

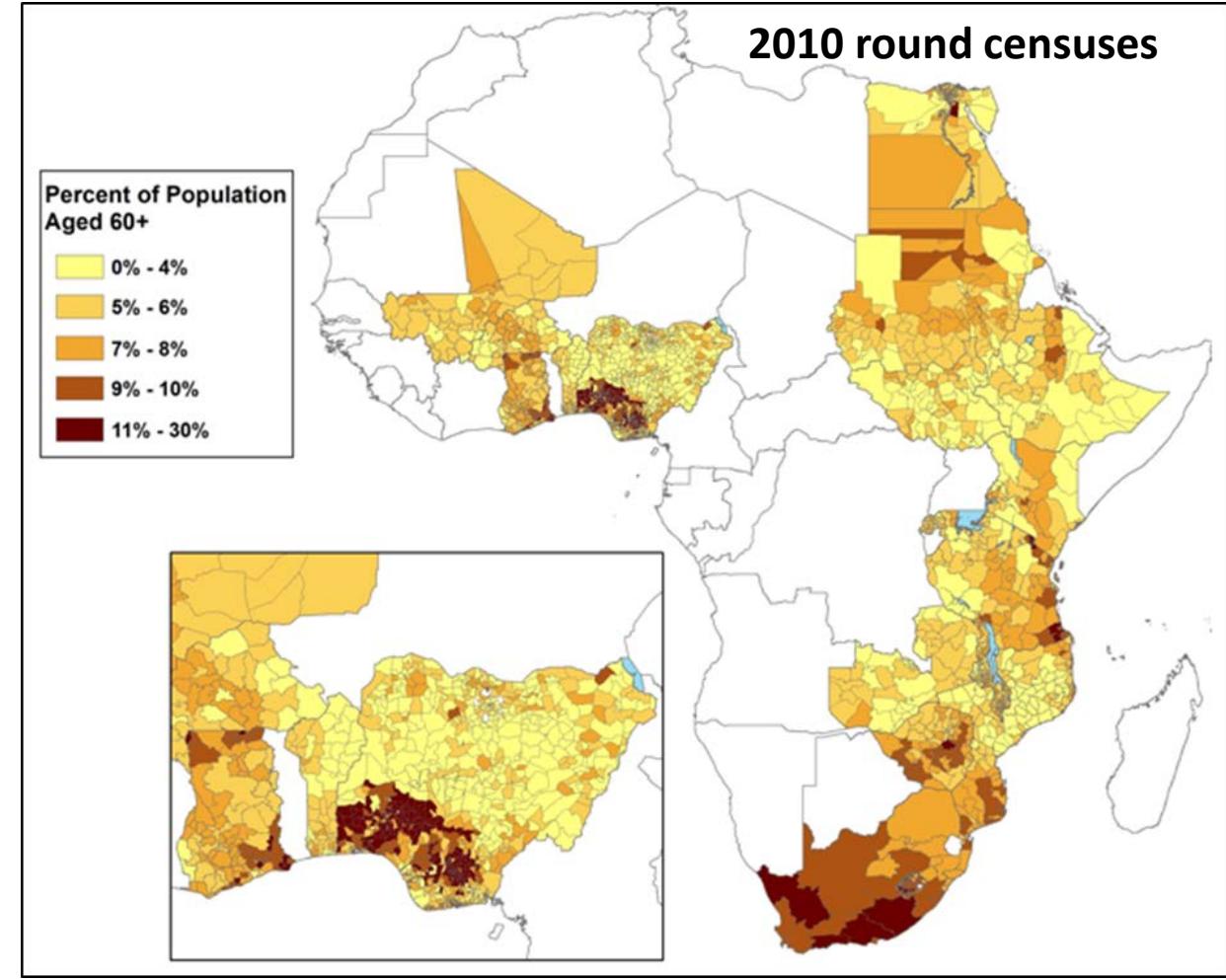
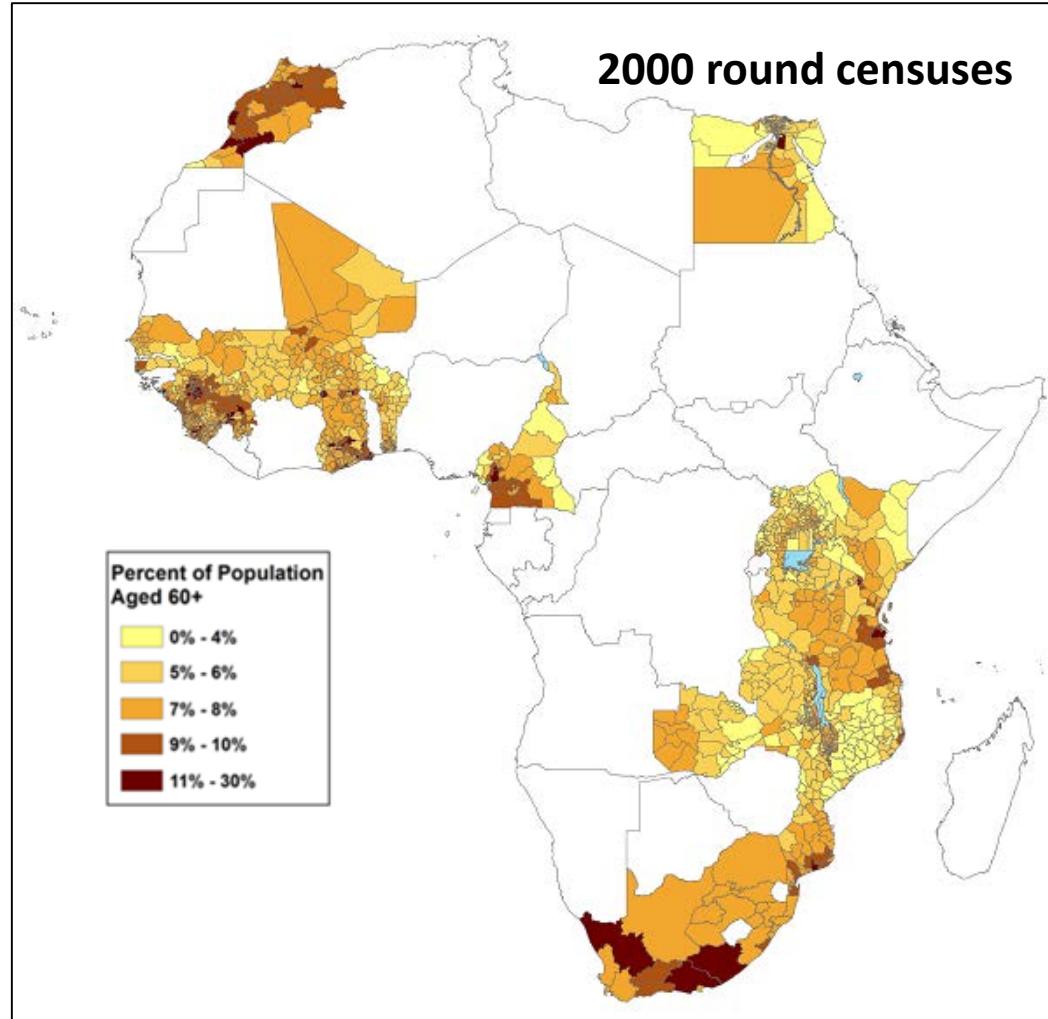
° 1.4% unknown

× 5.7% unknown

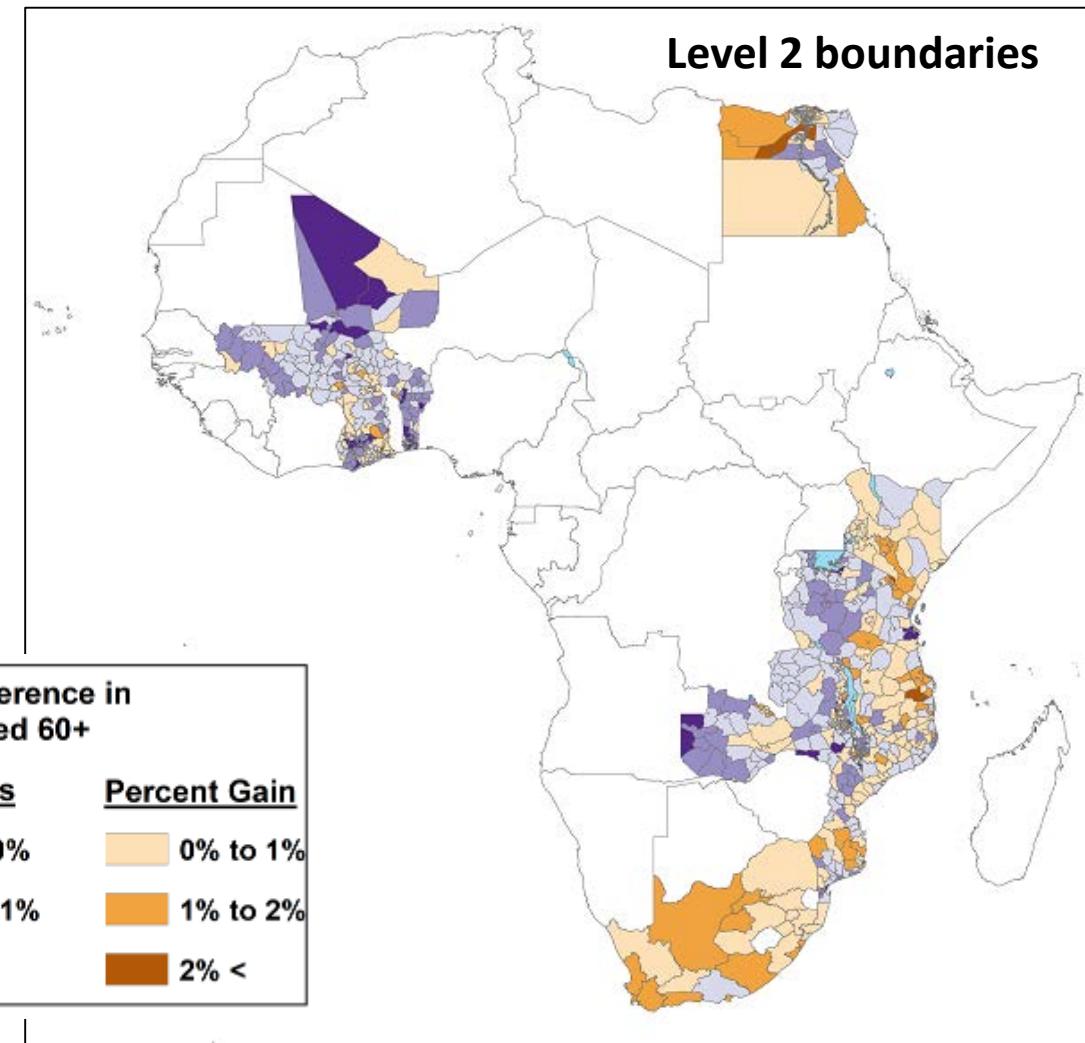
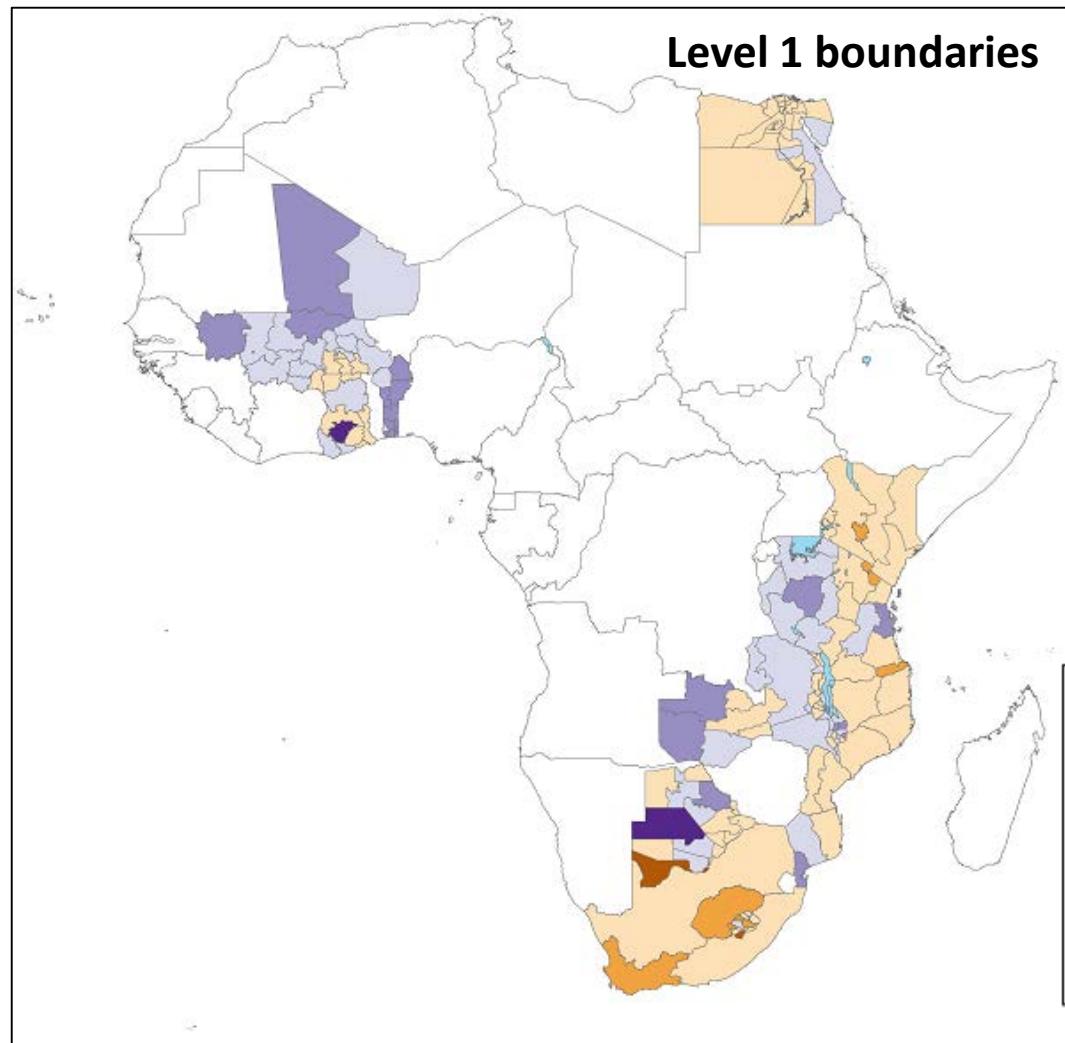
# Percent aged 60 and older, first administrative level



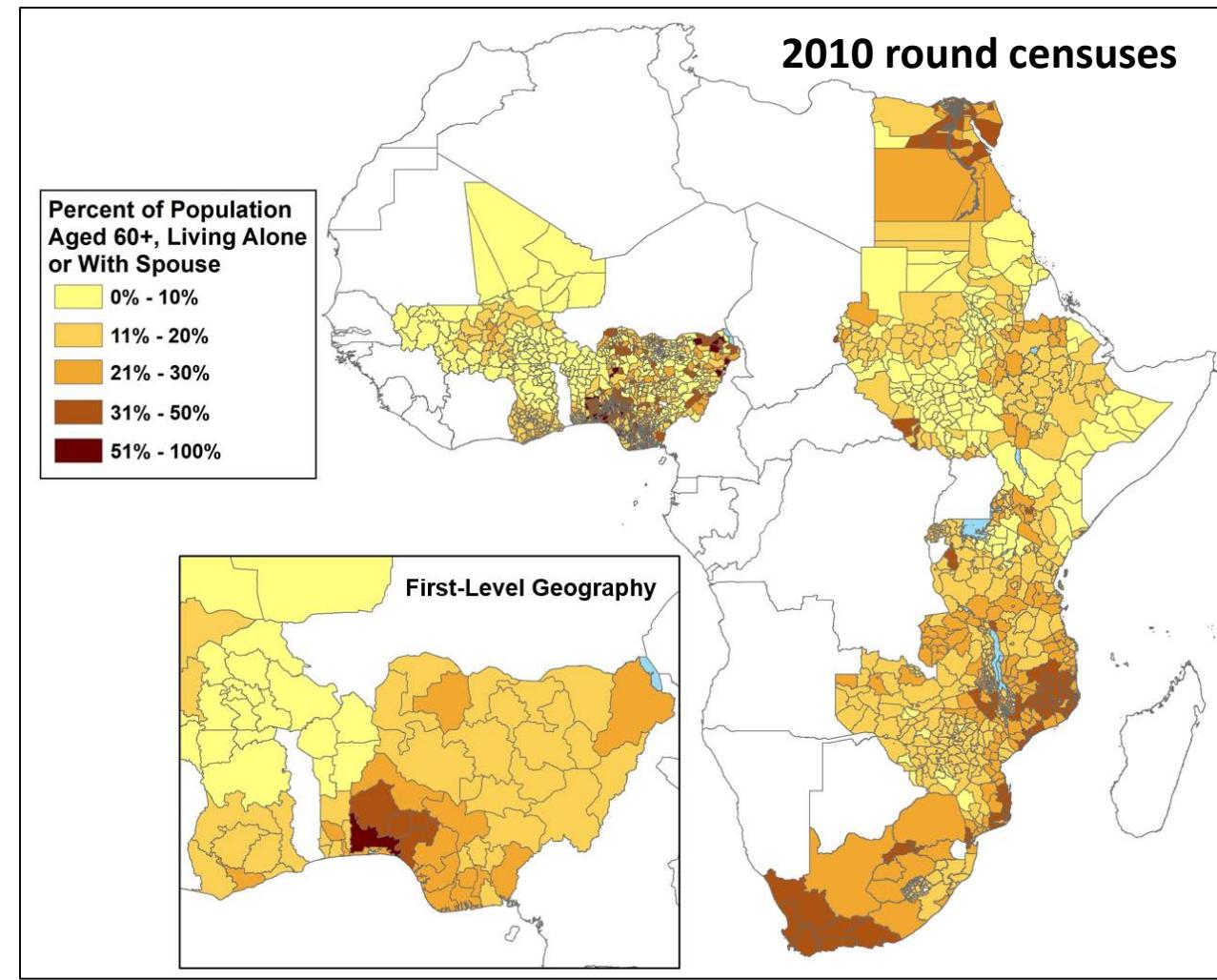
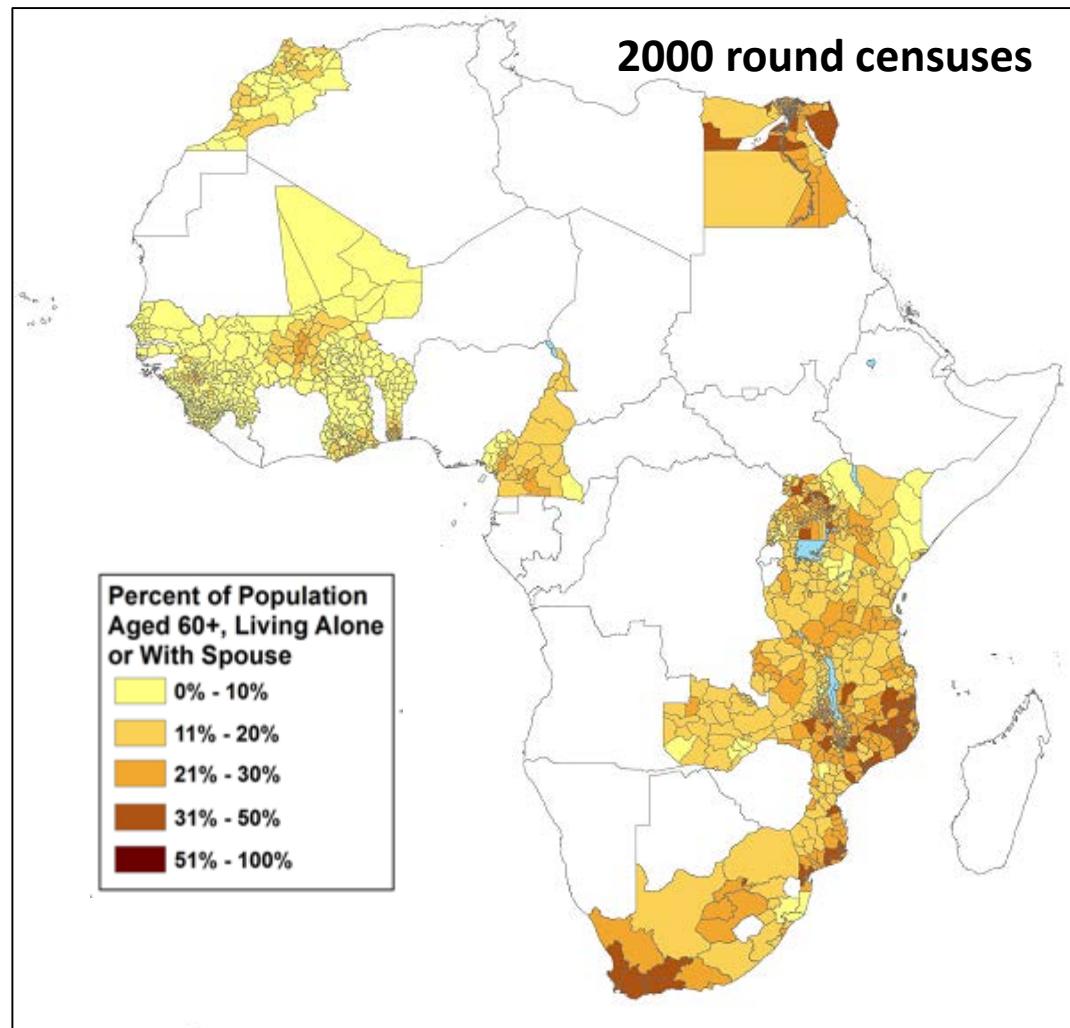
# Percent aged 60 and older, second administrative level



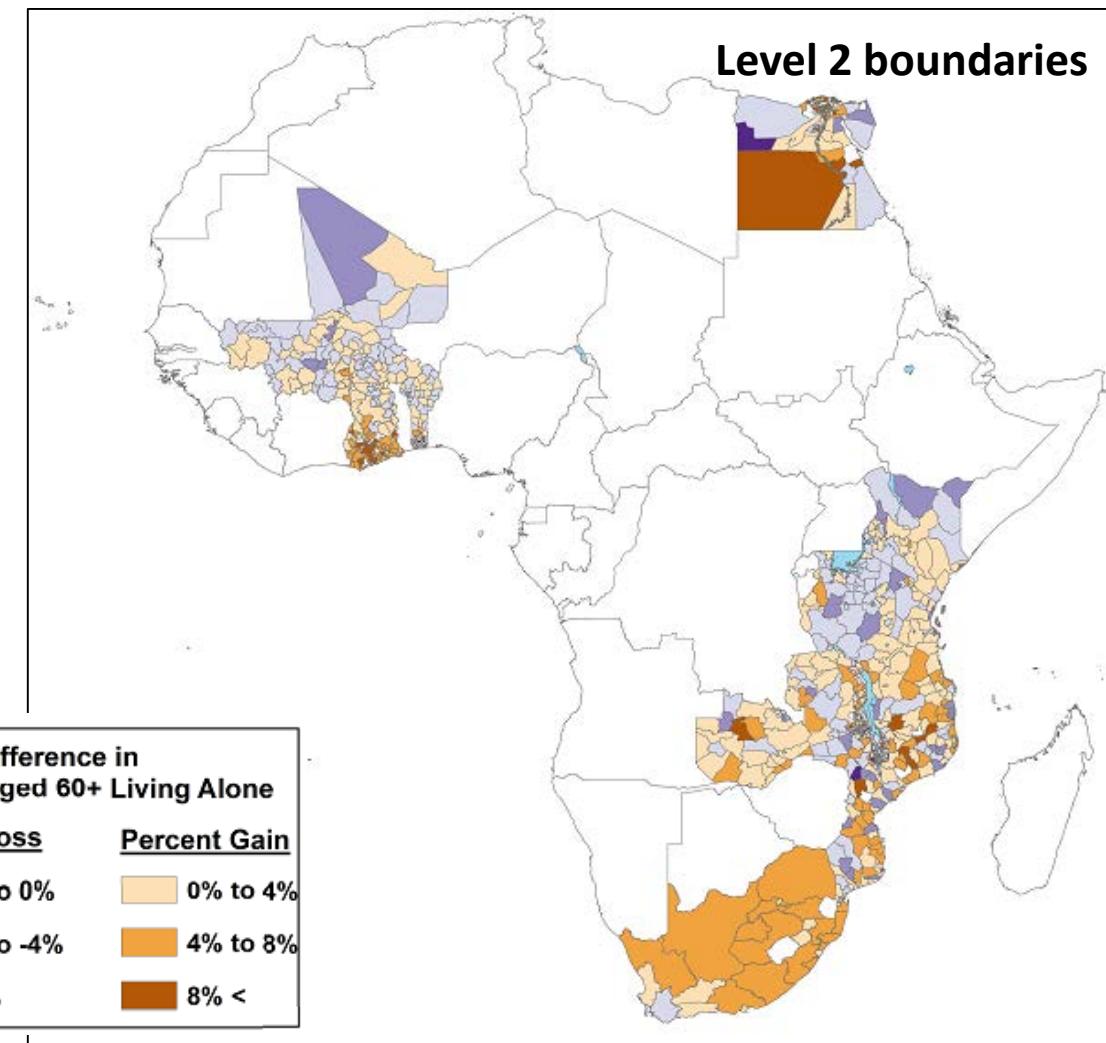
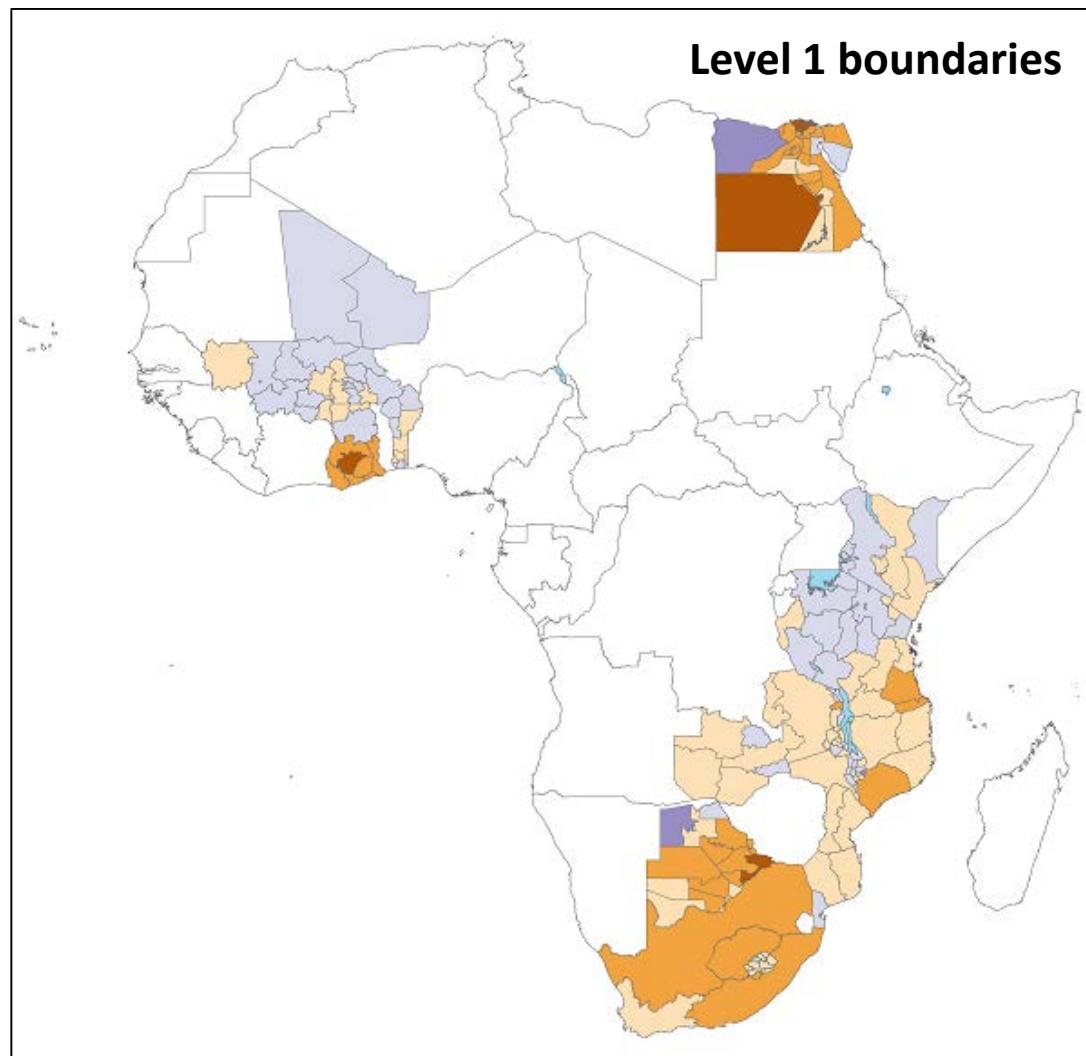
# Percent change in persons aged 60+ in Africa 2000 to 2010 census rounds at both admin levels



# Percent aged 60+ living alone, second administrative level



# Percent change in persons aged 60+ living alone in Africa 2000 to 2010 census rounds at both admin levels



# Future

- **Geographic development**
- **Harmonize variables for migration**
  - Place of birth, residence 1, 5, or 10 years ago
  - Will release Level 1 migration summer 2020
- **Further disaggregate large units**
  - Create level 2.5 or level 3, esp. for urban places
  - Seeking source maps
- **Aging**
  - Examine older adults in overall population age structure
  - Analyze living arrangements, conditions, well-being, disability
  - Create new variables to aid in aging analysis

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Thank you!

cleveland@umn.edu

 @ipumsi

*Countries disseminating data through IPUMS  
meet international best-practice standards for microdata dissemination.*