**Fertility stalls in capital cities in sub-Saharan Africa**

Abstract for the 2019 UAPS conference

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# 1 INTRODUCTION

Capital cities have usually been at the forefront of fertility transitions. Reasons for earlier declines and lower fertility in capital cities compared to other urban and rural areas include better education, higher costs of children, lower child mortality, better availability of family planning services, or diffusion effects (Lerch 2017). In sub-Saharan Africa, very low fertility rates have been found in capital cities such as Addis Ababa (Kinfu 2000) and Accra (Blanc and Grey 2000), and fertility is lower in capital cities than in other urban areas and rural areas in most sub-Saharan African countries. In a stylized description of fertility transitions, fertility is expected to decline fairly smoothly and reach replacement level, first in urban areas (and cities), and later in rural areas (Shapiro and Tambashe 1999). Capital cities are expected to pave the way for fertility transitions, and by the end of the fertility transition fertility should be similar in capital cities, urban and rural areas.

Almost 20 years ago, Shapiro and Tambashe (1999) mentioned that the fertility decline was slowing down in urban areas in sub-Saharan Africa, suggesting that Africa could be an exception to this pattern. But while fertility stalls have received considerable attention over the last 15 years at the country level (Bongaarts 2006; Ezeh Alex C., Mberu Blessing U., and Emina Jacques O. 2009; Goujon, Lutz, and KC 2015; Kabagenyi et al. 2015; Kebede, Goujon, and Lutz 2019; Ndagurwa and Odimegwu 2019; Schoumaker 2019; Shapiro and Gebreselassie 2008a; Westoff and Cross 2006) stalls in urban areas in sub-Saharan Africa have received little attention (Garenne 2011). Recently, Lerch (2017) suggested fertility stalls in African urban areas were due to the higher fertility of immigrants, as such stalls were not found when fertility trends were estimated excluding migrants. However, this may not necessarily apply to capital cities.

In this paper, we focus on fertility trends in capital cities in sub-Saharan Africa. Trends are compared to other urban areas and to rural areas. Cities are expected to be leaders in fertility trends, indicating possible future trends for other urban areas and rural areas. We first

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reconstruct fertility trends in African capital cities, in order to identify slowdowns in fertility declines. Next, we explore trends in fertility preferences and proximate determinants to identify the demographic dynamics of these slowdowns.

We show that fertility has – on average - been stalling in African capital cities for 15-20 years. While fertility has continued decreasing in some capital cities, it has stalled in two thirds of them, often at levels well above 3 children. These stalls have been around for roughly 15-20 years in many capital cities, and they seem – at last partly – to result from a high demand for children that has not changed in recent years. And while contraception has increased, it has remained fairly low and its increase has been offset by changes in sexual exposure and postpartum infecundability. These trends suggest fertility changes in urban areas in the coming years will be limited, unless fertility preferences decrease quickly and are accompanied by a rapid uptake of contraception.

## 2 DATA AND METHODS

In this paper, all the DHS that allow distinguishing capital cities, other urban areas and rural areas are used. In total 122 surveys from 33 countries are available. In most of these countries, at least two surveys are available, and in some countries (e.g. Ghana, Kenya) up to 6 surveys are used. Place of residence is defined with three categories: (1) Capital-city or largest city (e.g. Lagos, Abidjan) (see list in Table annex 1), (2) other urban areas, and (3) rural areas[2]. While it is possible in a few countries to use more detailed classification, this 3-category definition is the only that allows comparisons over time in most countries. Yet, it allows going beyond the rural-urban dichotomy (Corker 2017)

Fertility is reconstructed by place of residence in each of the 33 countries. The method relies on creating tables of births and exposure by 5-year age groups and by single calendar year using the birth history data in each survey. When several surveys are available in the same country, these tables are appended. Fertility rates are estimated with Poisson regression, with age and time periods included as independent variables (Schoumaker 2013a). The age pattern of fertility is considered to be constant for each survey. This is done by computing a pattern of proportional age-specific fertility rates for each survey; the pattern is multiplied by exposure and controlled for in the offset. Total fertility rates are smoothed by using restricted cubic

[2] Urban and rural areas are defined using country-specific criteria. In many surveys, two or more variables need to be combined to create these three categories.

splines (Schoumaker 2013b, 2014). This method provides an average TFR estimate based on data from all the surveys combined. With this method, total fertility rate can be reconstructed over the last 15 years with a single survey; in countries such as Ghana, with six surveys, total fertility rates can be reconstructed over almost 40 years. Fertility is also reconstructed by place of residence between 1980 and 2014 for sub-Saharan Africa as a whole. This is done by pooling all the surveys together and including a random effect at the country-level in the Poisson model[3]. The impact of migration on these trends is also assessed by computing trends for different subpopulations (e.g. non-migrants only).

Trends in three proximate determinants of fertility (sexual exposure, contraception and postpartum infecundability) are also computed with DHS data, using the revised Bongaarts model (Bongaarts 2015). An index (between 0 and 1) indicates the fertility-inhibiting effect of each of these proximate determinants. The product of these three indexes indicates the overall fertility-reducing effect of the three proximate determinants combined. Trends in fertility preferences are also measured, using the median ideal number of children among women ages 15-49. All the trends are computed by place of residence for each of the 33 countries separately, as well as for sub-Saharan Africa as a whole.

Figure 1 illustrates the reconstruction of fertility trends in Harare, Zimbabwe. It shows the good consistency of estimates across surveys, as well as the stalling fertility at around 3 children. Figure 2 shows fertility trends by place of residence in Zimbabwe, indicating that stalls have occurred also in other urban areas and in rural areas. Figure 3 shows fertility trends in Lagos, Nigeria, for different subpopulations using information on migration status and timing. It confirms the stall has occurred also among non-migrants.

[3] A survey-specific age pattern of fertility is used. The data are weighted using the population of the capitals, other urban areas or rural areas). These population are obtained in the United Nations World Urbanization Prospects (United Nations 2014).

Figure 1. Reconstructed fertility trends in Harare (Zimbabwe) from 6 Demographic and Health Surveys

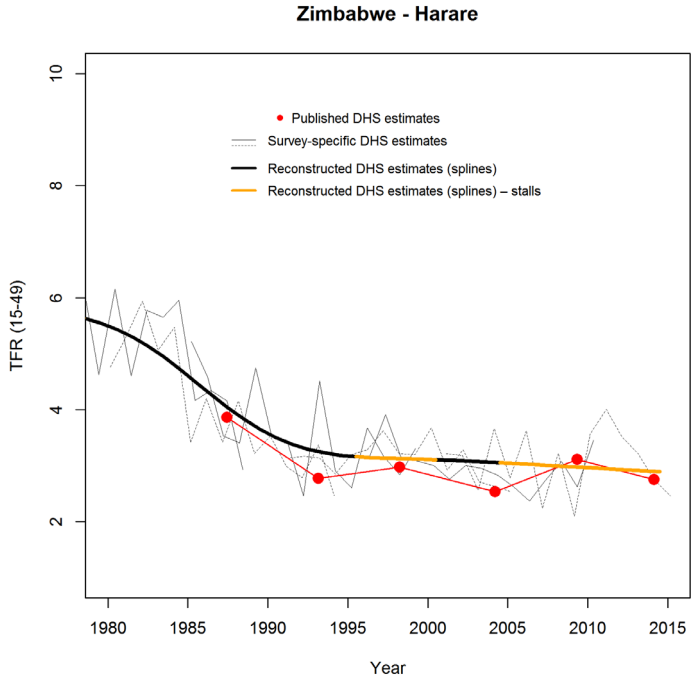



Figure 2. Reconstructed fertility trends in Zimbabwe by place of residence from 6 Demographic and Health Surveys

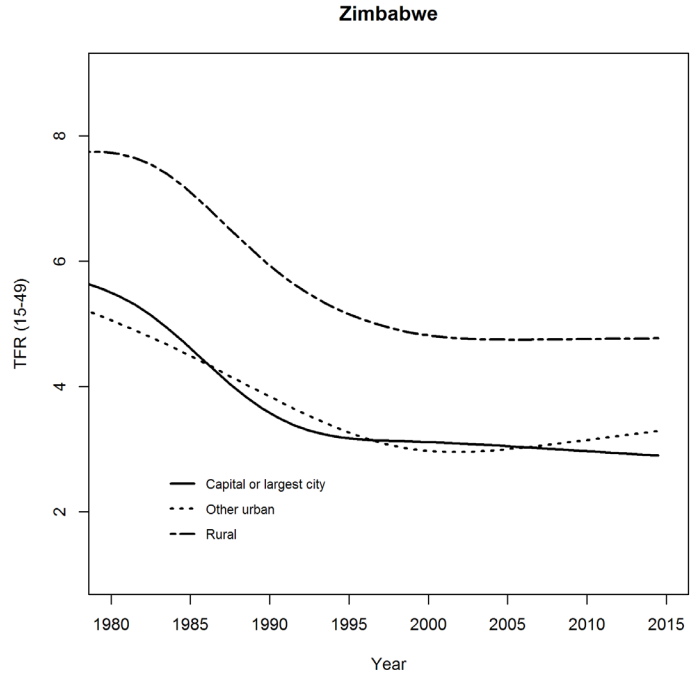
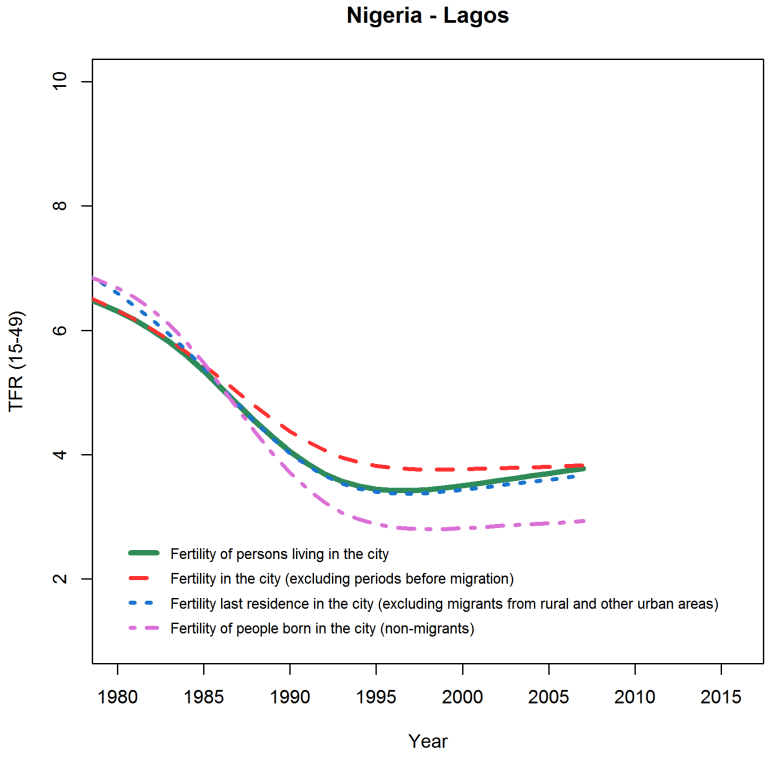


Figure 3. Reconstructed fertility trends in Lagos (Nigeria) from 3 Demographic and Health Surveys, for different sub-populations.




## 3 PRELIMINARY RESULTS

Appendix figure 1 shows reconstructed fertility trends by place of residence in 33 countries. In virtually all sub-Saharan African countries, fertility starts declining in capital cities, followed by other urban areas, and it finally decreases in rural areas – when it decreases at all. As a result, fertility in African capitals is almost always lower than in urban areas and than in rural areas. Since the 1980s, fertility has been lower on average in capital cities, and the decline has been overall faster in capitals than in rural areas and (to a lesser extent) than in other urban areas.

However, a striking feature of fertility declines by place of residence is the widespread stagnation of the TFR in capital cities. In almost two-thirds of the capital cities (20 out of 33) fertility has been stalling in recent years (Table 1). In contrast, recent stalls in rural areas are only found in two countries, Zimbabwe and Namibia. Stalls in sub-Saharan Africa are thus mainly an urban phenomenon. Stalls are found in cities from all parts of sub-Saharan Africa, and in countries at very different stages of the fertility transitions and with different levels of development. In Western Africa, the large majority of capitals have experienced fertility

stalls, including in cities at the forefront of the fertility transitions (Accra) and in very large cities (Lagos). Fertility may stall at high levels (as in Bamako and Niamey), or at lower levels (as in Accra). In many of these capitals, stalls started in the mid-1990s and in the early 2000s.

Table 1: List of countries and stalls by place of residence

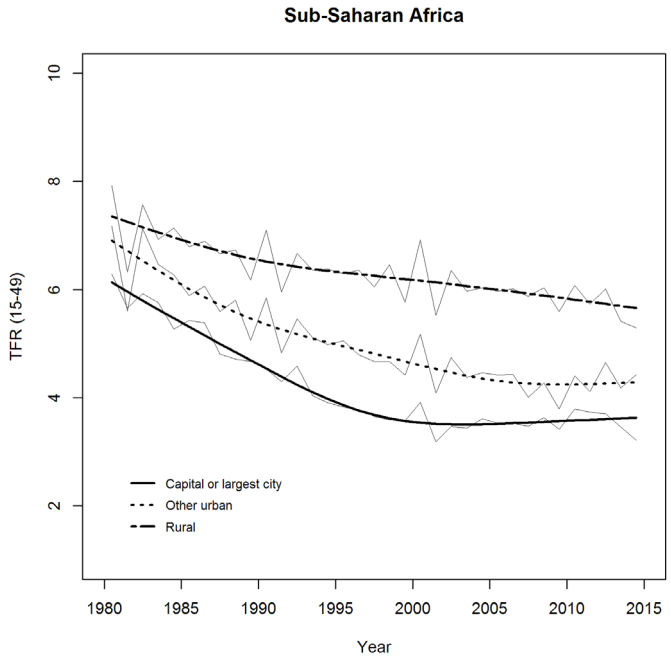
| | Capital | Other urban | Rural |
|---|---|---|---|
| Western Africa | | | |
| Benin | X | - | - |
| Burkina Faso | - | - | - |
| Côte d'Ivoire | - | - | - |
| Burundi | X | X | - |
| Gambia | X | - | - |
| Ghana | X | X | - |
| Liberia | - | - | - |
| Guinea | X | - | - |
| Mali | X | - | - |
| Niger | X | - | - |
| Nigeria | X | - | - |
| Senegal | X | X | - |
| Togo | X | X | - |
| Central Africa | | | |
| Central African Republic | - | - | - |
| DR Congo | X | - | - |
| Congo | X | X | - |
| Cameroon | X | - | - |
| Chad | - | - | - |
| Gabon | X | X | - |
| Eastern Africa | | | |
| Comoros | | | |
| Ethiopia | End | - | - |
| Kenya | X | X | - |
| Madagascar | - | - | - |
| Mozambique | - | - | - |
| Malawi | - | - | - |
| Rwanda | - | - | - |
| Tanzania | X | - | - |
| Uganda | X | - | - |
| Zambia | X | - | - |
| Zimbabwe | X | X | X |
| Southern Africa | | | |
| Lesotho | End | End | - |
| Namibia | X | X | X |
| South Africa | - | - | - |
| Number of stalls | 20 | 9 | 2 |

The fertility stall is also clear in African capitals as a whole (Figure 4)[4]. While fertility decreased by about 40% in capitals between 1980 and the early 2000s, fertility decline has

[4] Figure 4 shows fertility trends by place of residence for sub-Saharan Africa as a whole. Both smoothed fertility trends and data by single calendar year are shown, to illustrate the fit of the restricted cubic splines to the data.

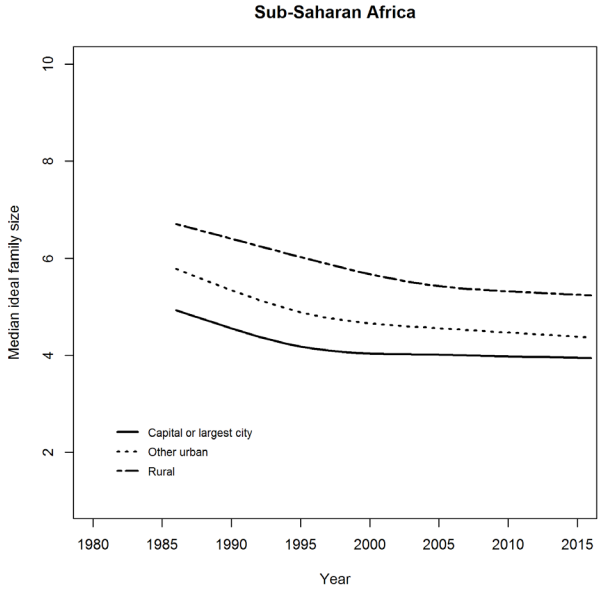
considerably slowed down in African capitals over the last fifteen years. Since the early 2000, it has decreased by only 0.15 children, almost 10 times more slowly than in the previous two decades. To be sure, the decline is expected to slow down as fertility approaches replacement level. But the level at which fertility has stalled in African capitals is not close to the replacement level (3.4 children on average). Fertility decline has also slowed down in other urban areas, roughly since 2005. In contrast, fertility has slowly but continuously decreased in rural areas.

Figure 4. Trends in total fertility rate in sub-Saharan Africa by place of residence, 1980-2014.



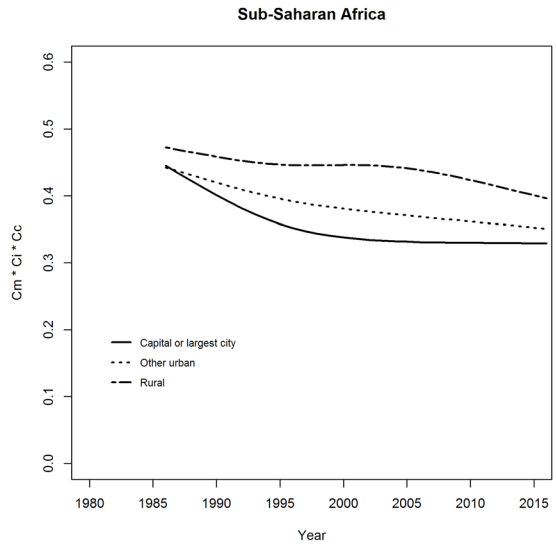

Focusing on trends in a few proximate determinants of fertility and on trends in fertility preferences gives a limited insight into the reasons for these fertility dynamics, but provides some key findings. Trends in ideal number of children show that stalls in fertility preferences are part of the explanation. In capital cities, ideal family size has stagnated at about 4 children on average since the early 2000s and at around 4.4 in other urban areas (Figure 5). While there is considerable heterogeneity across capitals, these figures indicate that preferences for small families in urban Africa are not widespread. Moderate to large families are still highly valued, even in capital cities.

Figure 5. Trends in median ideal number of children in sub-Saharan Africa by place of residence, 1985-2015




The product of three indexes of the Bongaarts model (insusceptibility, contraception, union) shows the expected trend in fertility based on trends in contraceptive use, sexual exposure and infecundability (ignoring trends in abortion for which no data is available). In capitals, trends in the proximate determinants are consistent with a fertility stall since the late 1990s (Figure 6).

Figure 6. Expected trends in fertility based on Bongaarts' indices in sub-Saharan Africa by place of residence, 1985-2015



**References**

Blanc, A.K. and Grey, S. (2000). *Greater than Expected Fertility Decline in Ghana: An Examination of the Evidence*. Calverton, Maryland, USA: Macro International. DHS Further Analysis Reports No. 32. http://dhsprogram.com/pubs/pdf/FA32/FA32.pdf.

Bongaarts, J. (2006). The Causes of Stalling Fertility Transitions. *Studies in Family Planning* 37(1):1–16. doi:10.1111/j.1728-4465.2006.00079.x.

Bongaarts, J. (2015). Modeling the fertility impact of the proximate determinants: Time for a tune-up. *Demographic Research* 33:535–560. doi:10.4054/DemRes.2015.33.19.

Corker, J. (2017). Fertility and Child Mortality in Urban West Africa: Leveraging Geo-Referenced Data to Move Beyond the Urban/Rural Dichotomy. *Population, Space and Place* 23(3):e2009. doi:10.1002/psp.2009.

Ezeh Alex C., Mberu Blessing U., and Emina Jacques O. (2009). Stall in fertility decline in Eastern African countries: regional analysis of patterns, determinants and implications. *Philosophical Transactions of the Royal Society B: Biological Sciences* 364(1532):2991–3007. doi:10.1098/rstb.2009.0166.

Garenne, M. (2009). Situations of fertility stall in sub-Saharan Africa. *African Population Studies* 23(2):173–188.

Garenne, M.L. (2011). Testing for fertility stalls in demographic and health surveys. *Population Health Metrics* 9:59. doi:10.1186/1478-7954-9-59.

Goujon, A., Lutz, W., and KC, S. (2015). Education stalls and subsequent stalls in African fertility: A descriptive overview. *Demographic Research* 33(47):1281–1296. doi:10.4054/DemRes.2015.33.47.

Kabagenyi, A., Reid, A., Rutaremwa, G., Atuyambe, L.M., and Ntozi, J.P.M. (2015). Has Uganda experienced any stalled fertility transitions? Reflecting on the last four decades (1973–2011). *Fertility Research and Practice* 1:14. doi:10.1186/s40738-015-0006-1.

Kebede, E., Goujon, A., and Lutz, W. (2019). Stalls in Africa's fertility decline partly result from disruptions in female education. *Proceedings of the National Academy of Sciences*:201717288. doi:10.1073/pnas.1717288116.

Kinfu, Y. (2000). Below-repiacement fertility in Tropical Africa? Some evidence from Addis Ababa. *Journal of the Australian Population Association* 17(1):63–82. doi:10.1007/BF03029448.

Lerch, M. (2017). Urban and rural fertility transitions in the developing world: a cohort perspective [unpublished manuscript]. Rostock.

Lesthaeghe, R. (2014). *The Fertility Transition in Sub-Saharan Africa into the 21st Century*. Population Studies Center, University of Michigan.

Ndagurwa, P. and Odimegwu, C. (2019). Decomposition of Zimbabwe's stalled fertility change: a two-sex approach to estimating education and employment effects. *Journal of Population Research*. doi:10.1007/s12546-019-09219-8.

Schoumaker, B. (2013a). A Stata module for computing fertility rates and TFRs from birth histories: tfr2. *Demographic Research* 28(38):1093–1144. doi:10.4054/DemRes.2013.28.38.

Schoumaker, B. (2013b). Reconstructing long term fertility trends with pooled birth histories.

Schoumaker, B. (2014). *Quality and Consistency of DHS Fertility Estimates, 1990-2012.* Rockville: ICF International.

Schoumaker, B. (2019). Stalls in Fertility Transitions in Sub-Saharan Africa. Revisiting the evidence. *Studies in Family Planning*.

Shapiro, D. and Gebreselassie, T. (2008a). Fertility Transition in Sub-Saharan Africa: Falling and Stalling. *African Population Studies* 23(1). doi:10.11564/23-1-310.

Shapiro, D. and Gebreselassie, T. (2008b). Fertility Transition in Sub-Saharan Africa: Falling and Stalling. *African Population Studies* 23(1):3–23. doi:10.11564/23-1-310.

Shapiro, D. and Tambashe, B.O. (1999). Fertility Transition in Urban and Rural Areas of Sub-Saharan Africa. Paper presented at Chaire Quetelet, Louvain-la-Neuve, 1999.

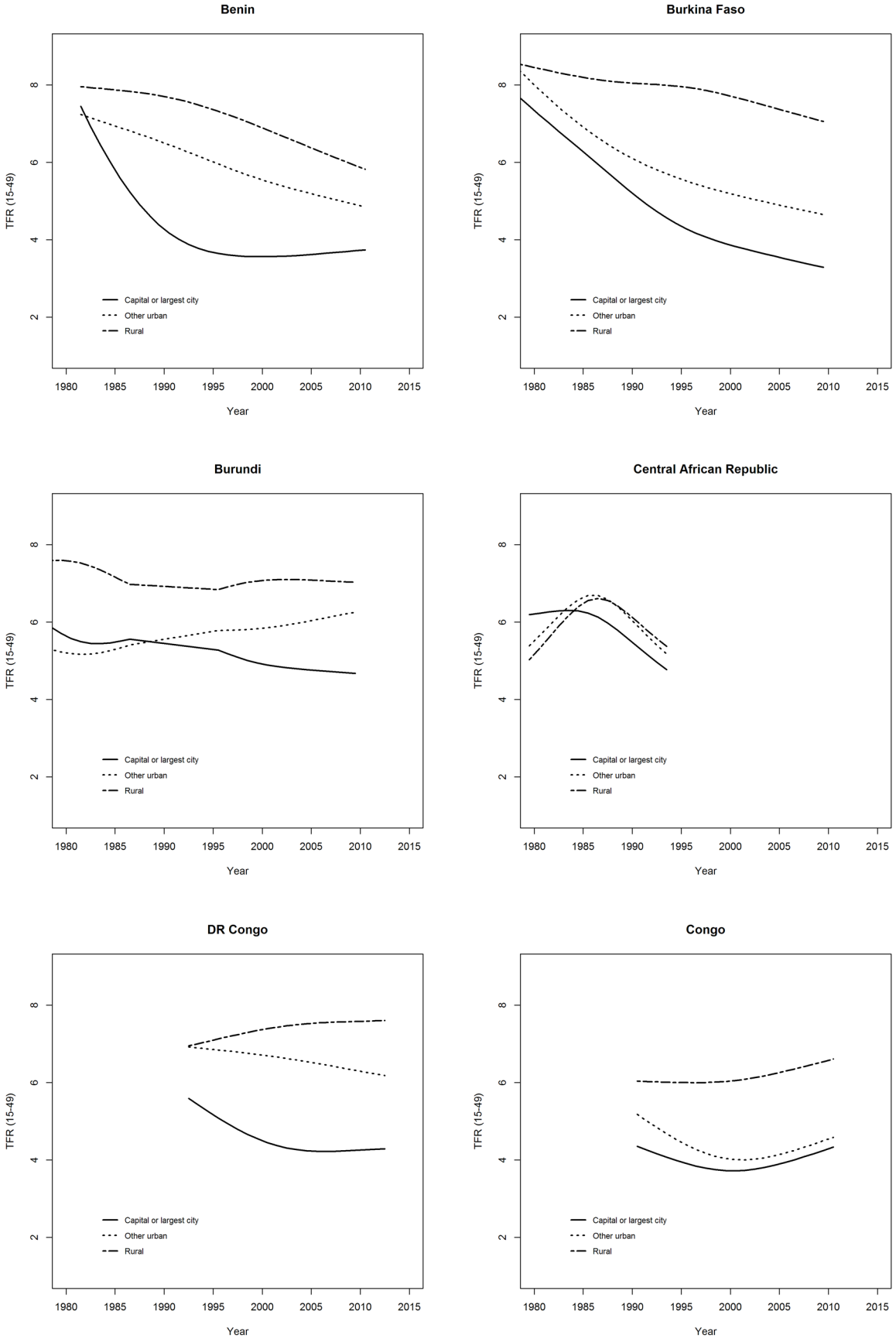
United Nations (2014). *World Urbanization Prospects. The 2014 Revision.* New York: United Nations.

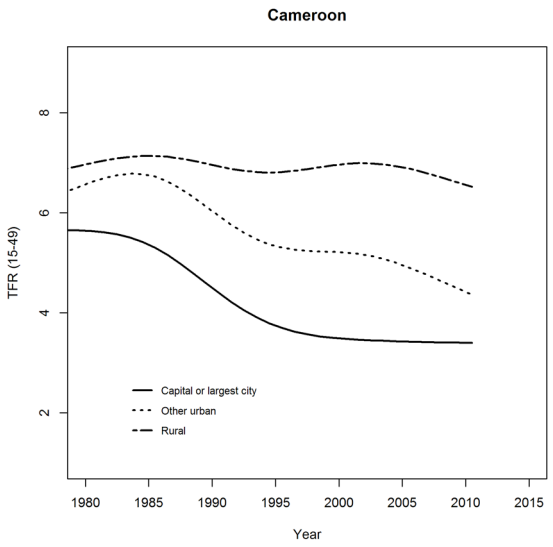
Westoff, C. and Cross, A. (2006). *The Stall in the Fertility Transition in Kenya*. Calverton: ORC Macro.

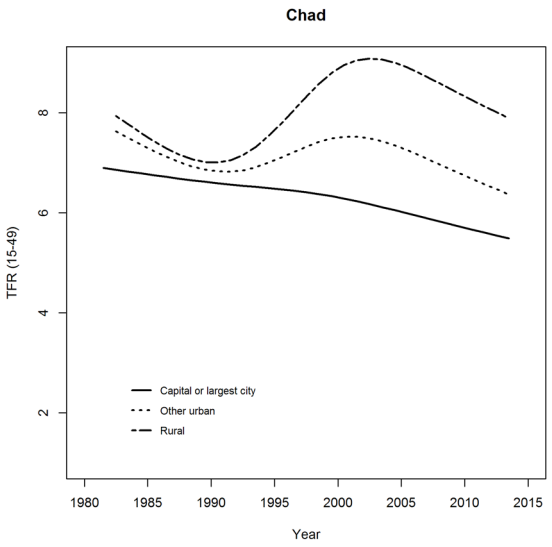
Table Annex 1: List of countries and capitals/main city

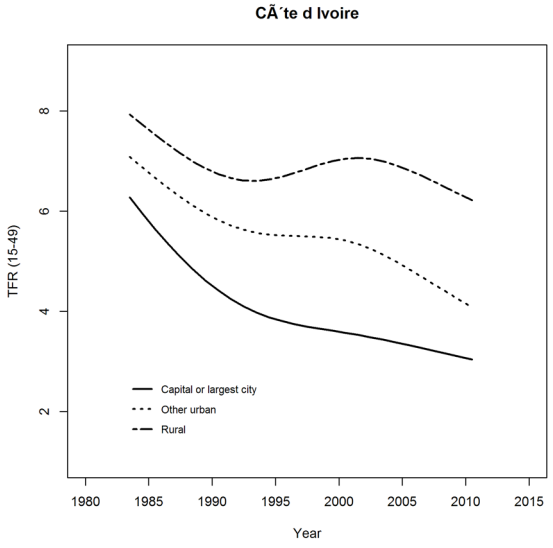
| **Country** | **Capital / Main city** |
|---|---|
| Angola | Luanda |
| Benin | Cotonou |
| Burkina Faso | Ouagadougou |
| Burundi | Bujumbura |
| DR Congo | Kinshasa |
| Central Africa | Bangui |
| Congo | Brazzaville |
| Cote d'Ivoire | Abidjan |
| Cameroon | Yaounde-Douala |
| Ethiopia | Addis Ababa |
| Gabon | Libreville-Port Gentil |
| Ghana | Accra |
| Gambia | Banjul |
| Guinea | Conakry |
| Kenya | Nairobi |
| Liberia | Monrovia |
| Lesotho | Maseru |
| Madagascar | Antananarive |
| Mali | Bamako |
| Malawi | Lilongwe |
| Mozambique | Maputo |
| Niger | Niamey |
| Nigeria | Lagos |
| Namibia | Windhoek |
| Rwanda | Kigali |
| Senegal | Dakar |
| Sierra Leone | Freetown |
| Chad | Ndjamena |
| Togo | Lomé |
| Tanzania | Dar es Salam |
| Uganda | Kampala |
| South Africa | Johannesburg |
| Zambia | Lusaka |
| Zimbabwe | Harare |

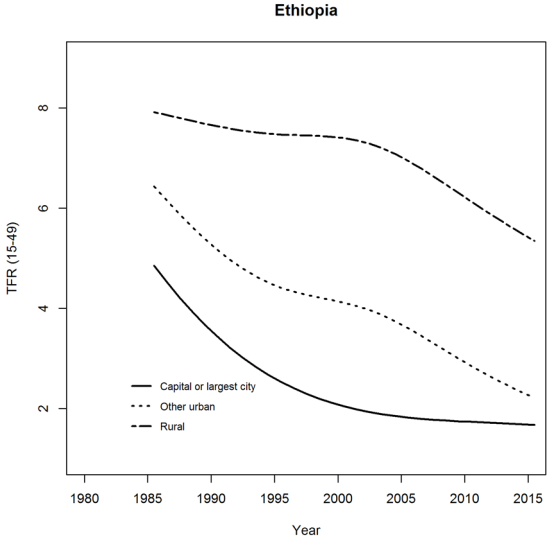
**APPENDIX FIGURE 1: TRENDS IN TOTAL FERTILITY RATE IN 33 SUB-SAHARAN AFRICAN COUNTRIES BY PLACE OF RESIDENCE**

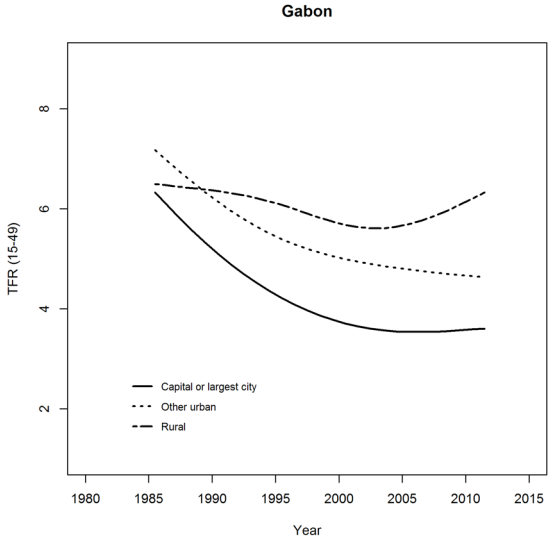


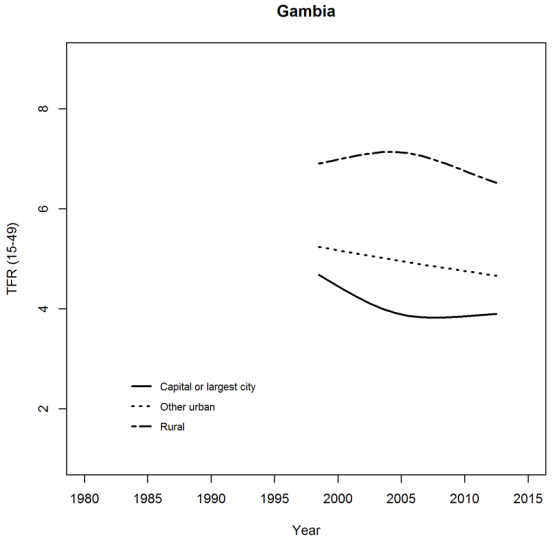

Cameroon
TFR (15-49)
Year
Capital or largest city
Other urban
Rural

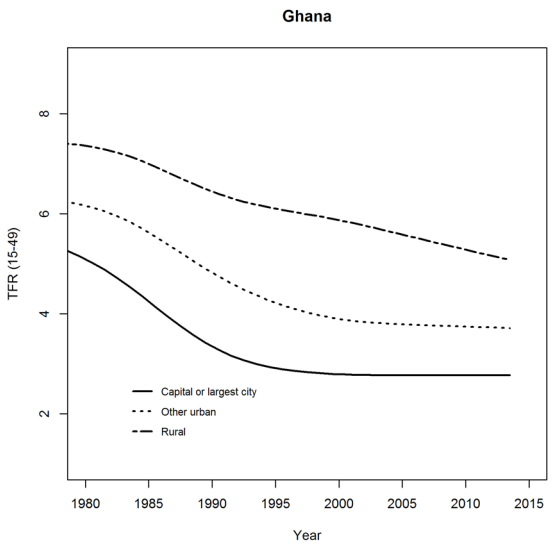

Chad
TFR (15-49)
Year
Capital or largest city
Other urban
Rural

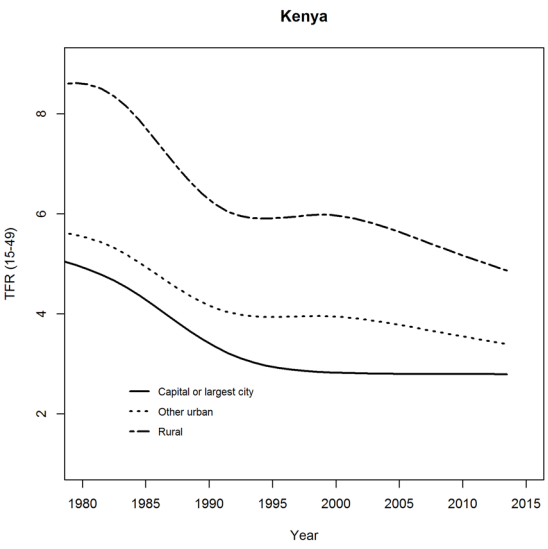

CÃ´te d Ivoire
TFR (15-49)
Year
Capital or largest city
Other urban
Rural

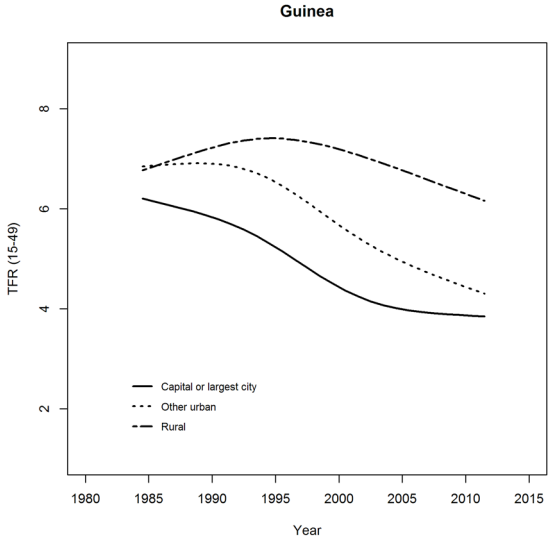

Ethiopia
TFR (15-49)
Year
Capital or largest city
Other urban
Rural

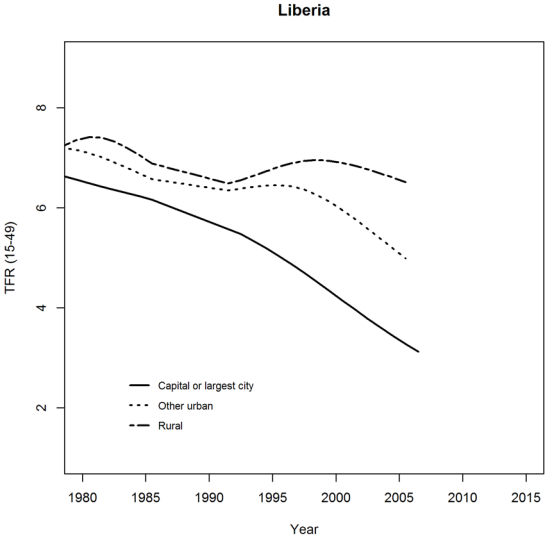

Gabon
TFR (15-49)
Year
Capital or largest city
Other urban
Rural

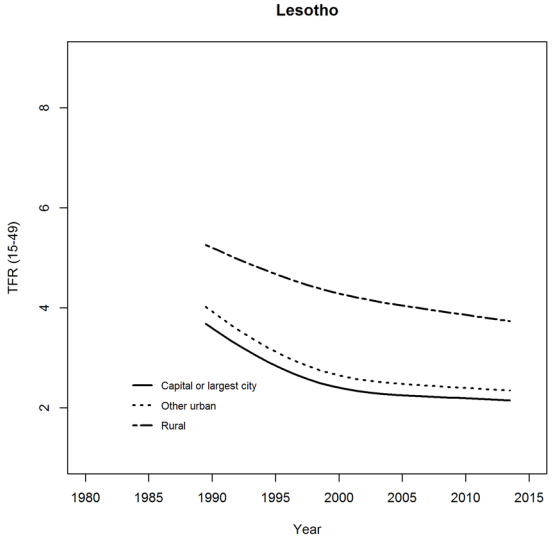

Gambia
TFR (15-49)
Year
Capital or largest city
Other urban
Rural

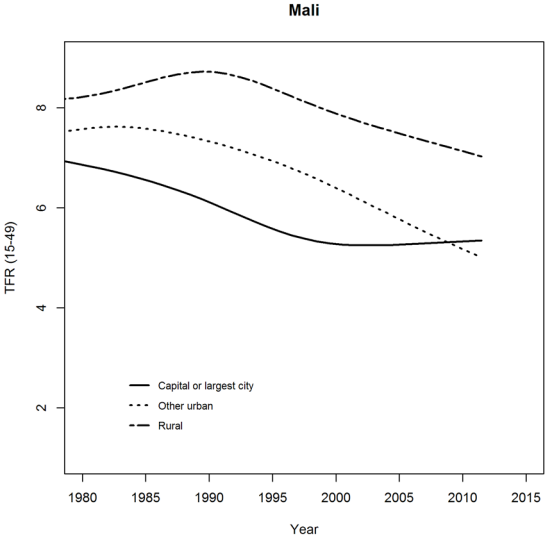

Ghana
TFR (15-49)
Year
Capital or largest city
Other urban
Rural

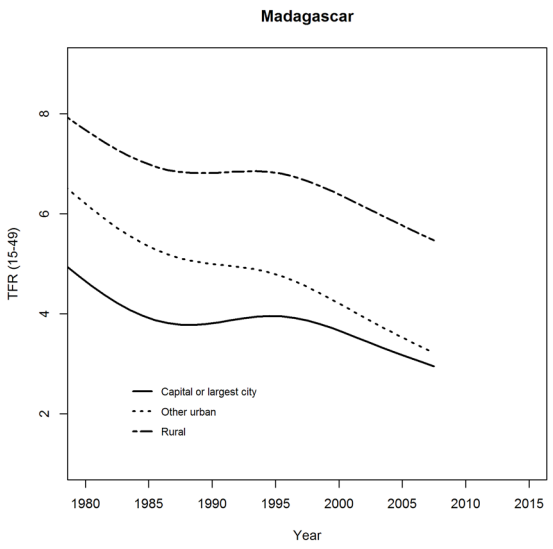

Kenya
TFR (15-49)
Year
Capital or largest city
Other urban
Rural

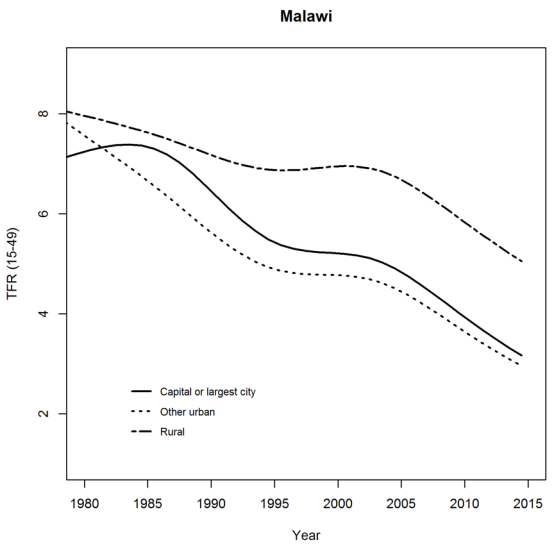

Guinea
TFR (15-49)
Year
Capital or largest city
Other urban
Rural

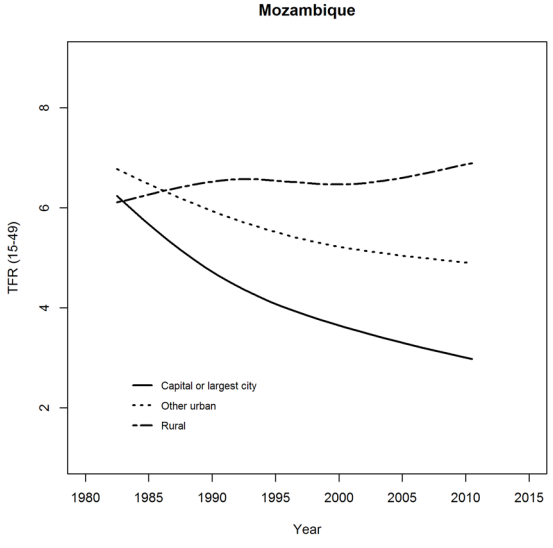

Liberia
TFR (15-49)
Year
Capital or largest city
Other urban
Rural

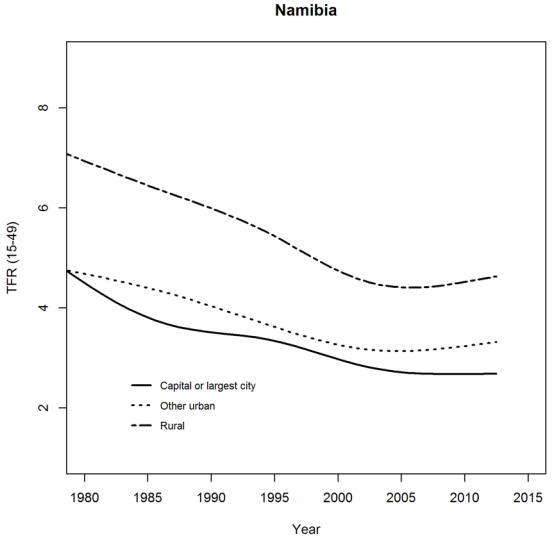

Lesotho
TFR (15-49)
Year
Capital or largest city
Other urban
Rural


Mali
TFR (15-49)
Year
Capital or largest city
Other urban
Rural


Madagascar
TFR (15-49)
2
4
6
8
1980
1985
1990
1995
2000
2005
2010
2015
Year
Capital or largest city
Other urban
Rural


Malawi
TFR (15-49)
2
4
6
8
1980
1985
1990
1995
2000
2005
2010
2015
Year
Capital or largest city
Other urban
Rural


Mozambique
TFR (15-49)
2
4
6
8
1980
1985
1990
1995
2000
2005
2010
2015
Year
Capital or largest city
Other urban
Rural


Namibia
TFR (15-49)
2
4
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1980
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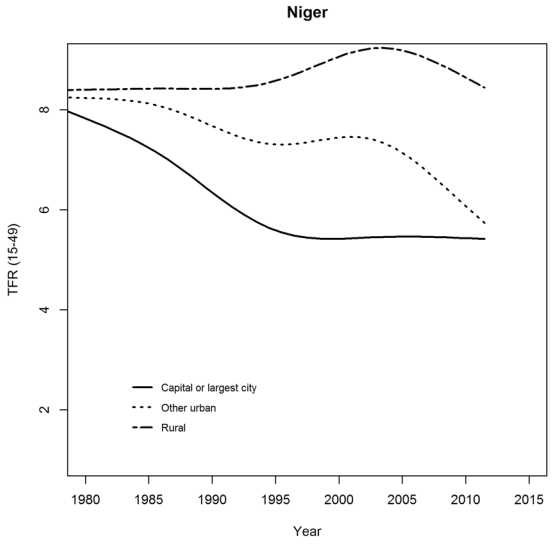
2015
Year
Capital or largest city
Other urban
Rural


Niger
TFR (15-49)
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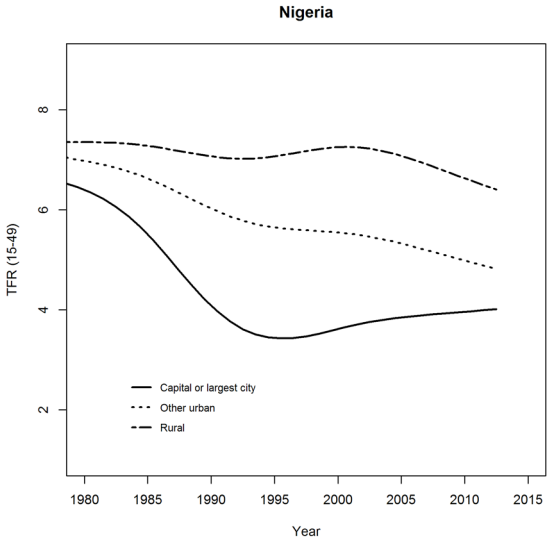
2015
Year
Capital or largest city
Other urban
Rural


Nigeria
TFR (15-49)
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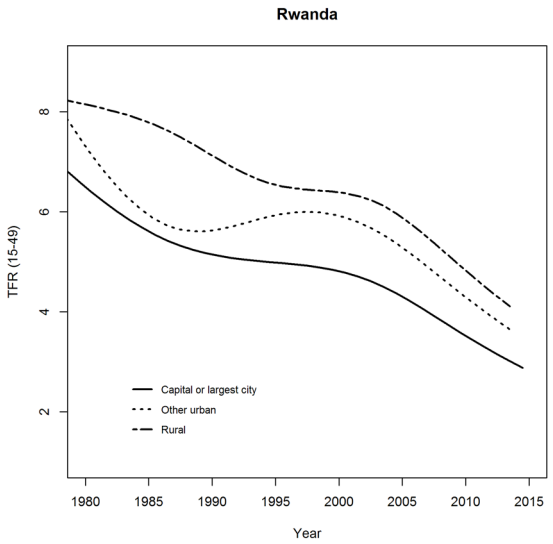
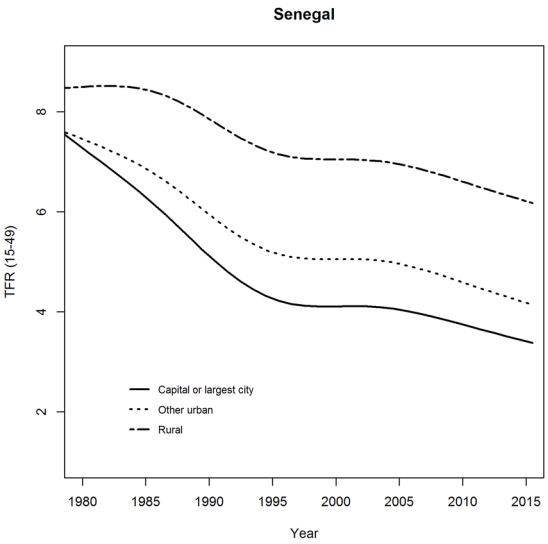
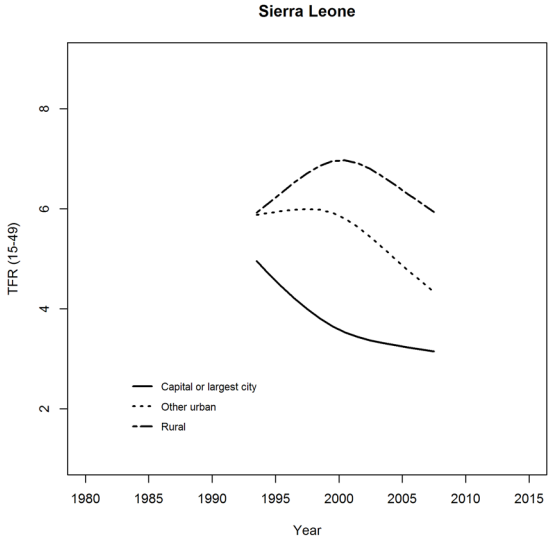
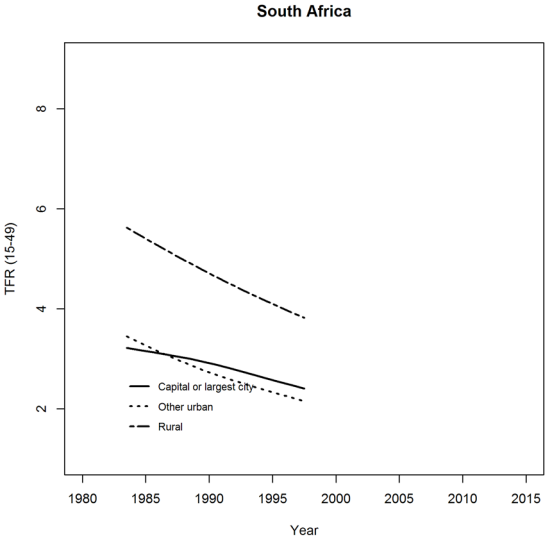
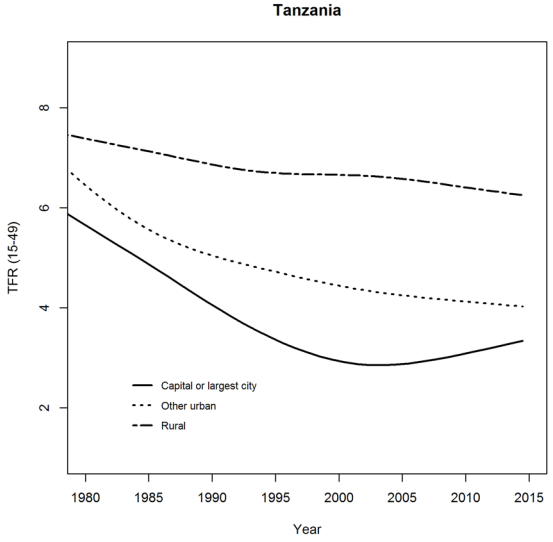
Year
Capital or largest city
Other urban
Rural

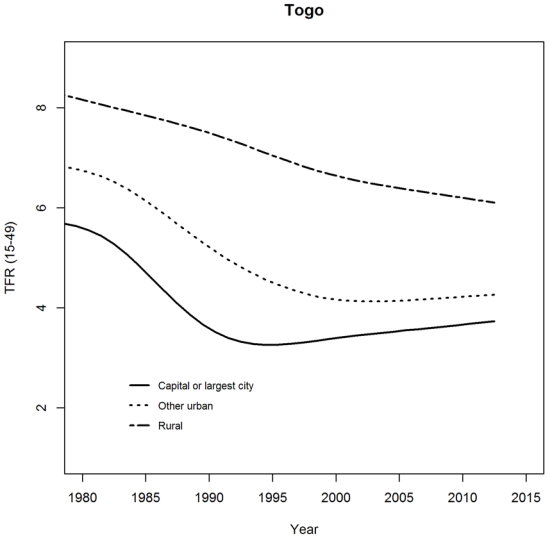

Rwanda
TFR (15-49)
Year
Capital or largest city
Other urban
Rural

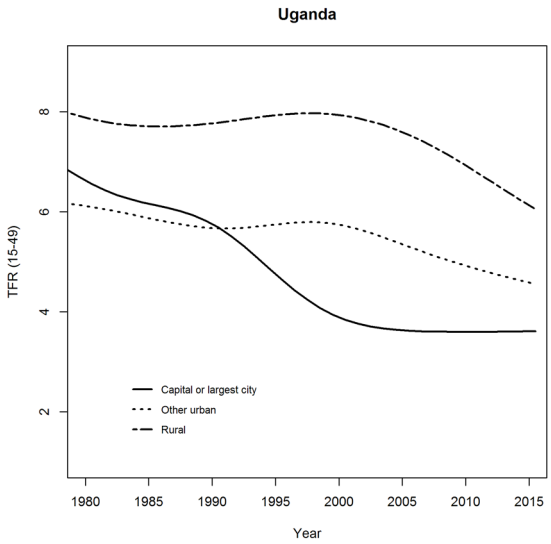

Senegal
TFR (15-49)
Year
Capital or largest city
Other urban
Rural


Sierra Leone
TFR (15-49)
Year
Capital or largest city
Other urban
Rural


South Africa
TFR (15-49)
Year
Capital or largest city
Other urban
Rural


Tanzania
TFR (15-49)
Year
Capital or largest city
Other urban
Rural


Togo
TFR (15-49)
Year
Capital or largest city
Other urban
Rural


Uganda
TFR (15-49)
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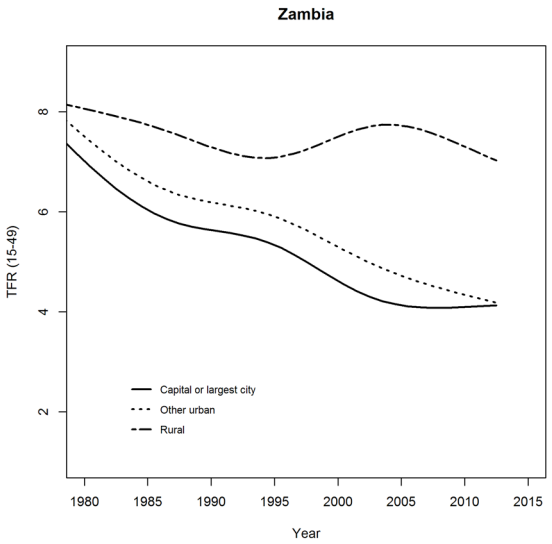
2015
Year
Capital or largest city
Other urban
Rural


Zambia
TFR (15-49)
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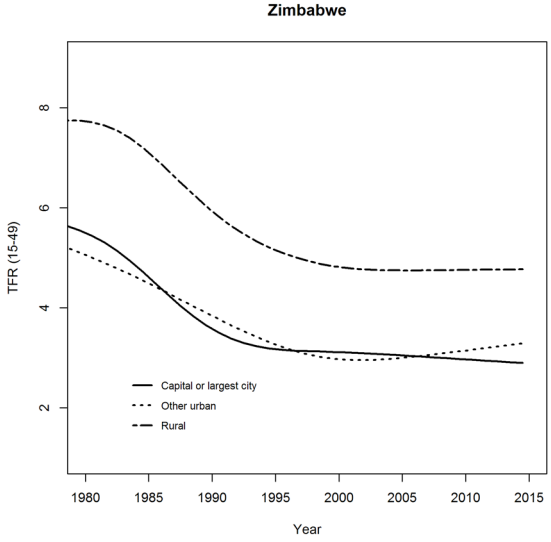
Year
Capital or largest city
Other urban
Rural


Zimbabwe
TFR (15-49)
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Year
Capital or largest city
Other urban
Rural