Equity and Achievement in Access to Contraceptives in East Africa between 2000 and 2010

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Abstract

Contraceptive uptake has not been equal across regions and wealth strata, even within countries. This study examines recent trends in contraceptive use in East Africa from an equity perspective. We examine (1) progress in equity of CPR and (2) increases in average levels of contraceptive prevalence, two phenomena that do not necessarily progress together. Utilizing Demographic and Health Survey data collected at three time points for six East African countries, we demonstrate how regional stratification improves upon previous analyses of equity in CPR. We also highlight that though progress in CPR can be preceded by initial decreases in equity, continuous or large improvements in CPR are not possible without increases in equity. These results provide an evidence base for policy and programming recommendations for best practices from East African countries' successes in improving CPR by improving equity.

Key words: contraception, Africa, equity
Word count:

Background

Inequalities in contraceptive prevalence rates (CPR) across wealth strata are well documented throughout the world [1]. Similarly, in Africa, a woman's likelihood of using contraceptives increases with her wealth [2-4]. Providing access to contraception to those who desire it, or decreasing unmet need for contraception, decreases the annual number of maternal deaths by preventing high-risk pregnancies and unsafe abortions [5]. Access to and decreased unmet need for contraception are, accordingly, markers of Millennium Development Goal 5, which deals with improving maternal health (PRB 2013).

Within countries, dynamics of contraceptive use patterns may vary across regions and over time. Contraception uptake often occurs first among urban and richer groups, though inequities in access and uptake across regions and socioeconomic status may vary by degree across countries [6]. Discrepancies between groups within a given country beg the question of whether such differences are inequitable and therefore inherently unjust and require rectification [7-10]. Previous studies have demonstrated that such inequalities in CPR represent inequities [11, 12]. Characterization of such inequities is a critical first step to informing policy and programming to rectify these structural inequities.

Traditionally, CPR rate ratios comparing two societal strata are commonly used as measures of inequality [13]. However, CPR rate ratios comparing the richest and poorest wealth quintiles neglect the three middle quintiles of society. A preferred method, the Concentration Index (CI), takes into account information on individuals from all wealth quintiles in its analysis of inequality in health indicators [14]. It quantifies the extent to which an income-related inequality is present in a health variable after ranking individuals according to wealth or another

indicator of living standards, and it has been shown to be applicable in evaluating a variety of health indicators, including CPR [11, 15-23].

However, the CI's accuracy depends upon the quality of the living standards (wealth) indicator used to rank individuals. The wealth index score, a commonly used living standards measure in equity analysis found in Demographic and Health Surveys (DHS), is calculated using principal components analysis of household assets and is likely biased towards urban assets as indicators of wealth. Thus, ranking urban and rural individuals on the same scale based upon their household wealth index scores over-categorizes urban individuals in the "rich" quintiles and rural individuals in the "poor" quintiles. To this end, a regionally stratified analysis is a preferred method of addressing the DHS urban/rural wealth index discrepancy [24], but we know of no study evaluating equity in contraceptive use that utilizes this preferred geographical stratification.

In this paper, we aim to examine jointly 1) progress in equity of CPR and 2) trends in average levels of contraceptive prevalence in six East African countries (Ethiopia, Kenya, Malawi, Rwanda, Tanzania, & Uganda) after the year 2000. We hypothesize that the countries which are able to increase their equity in contraception use will see the greatest overall increases in CPR. We update previous analyses of equity in CPR and improve upon them by 1) examining achievement, discussed in more detail below, and 2) disaggregating the urban and rural population subsets to consider wealth disparities in each location separately. We conclude with a brief description of policy and program context in countries in which the most progress was made.

Methods and Materials

Data and Sample

Data used in this study came from nationally representative Demographic and Health Surveys (DHS). The DHS are cross-sectional household-based surveys of women aged 15 to 49 collected by ICF International in collaboration with host country governments. DHS routinely collect measures related to health, including contraceptive use. Surveys are implemented using a multi-stage cluster sampling strategy. For further information on sampling and questionnaire design see http://www.measuredhs.com. We analyzed data from the six countries in East Africa that had conducted at least three DHS between 2000 and 2010: Ethiopia, Kenya, Mawali, Rwanda, Uganda, and Tanzania. For this analysis, we examined the sub-sample of currently married and co-habiting women between the ages of 15 and 49.

Measures

The primary outcome analyzed is modern contraceptive use, defined as female and male sterilization, oral hormonal pills, the intra-uterine device (IUD), the male condom, injectables, the implant, vaginal barrier methods, the female condom and emergency contraception. In the DHS, women were first asked what methods of family planning they have heard about. For those not spontaneously mentioned by the woman, they are then asked, "Have you ever heard of [Method]." For each method, women were asked whether they had ever used and were currently using the method. We calculated the proportion of women currently using a modern method across regions in each country and wealth quintiles to calculate contraceptive prevalence rates. Our main independent variable in this analysis is the DHS wealth index, which as described above, is calculated using the principal components analysis, and is specific to each country. That is to say, wealth quintiles are relative within an individual's country and not directly comparable across countries.

Statistical analyses

We made socioeconomic comparisons within each region separately, in order to address the aforementioned inconsistencies in urban vs. rural wealth index principal components. After stratifying populations by urban or rural region, we assigned individual women in each region weighted fractional ranks in the socioeconomic distribution according to their sample weight and DHS wealth index scores. We then calculated standard concentration indexes (CI) at each of the three times points using the convenient regression method as described by Kakwani et. al [CITATION]. A CI of 1 corresponds to maximum pro-rich inequality (*e.g.*, women in the richest wealth quintile are more likely than those in the lowest wealth quintile to be using a contraceptive method). A CI of 0 corresponds to perfect distribution equality (*e.g.*, women in all quintiles are equally likely to be using a contraceptive method). Because contraceptive use is a binary variable, and such bounded variable can produce statistical inconsistencies, CIs were adjusted using the methodology established by Wagstaff to correct the CI for bounded variables [25].

We use a related measure, the achievement score, which takes the CI one step further, to measure intra-country progress over time and to make cross-country comparisons [14, 25]. Achievement (**I**) is defined as the product of CPR and (1 – CI). Thus, **I** adjusts CPR according to equality of distribution, such that a country with a lower CPR but greater equity could have the same achievement score as a country with a higher CPR but lower equity.

Results

In Table 1, we present CPR, equity (CI), and achievement (I) for all country-regions at each time point. In Figures 1, 2, and 3, the x-axes represent 1 – CI, such that equity increases moving from left to right. The y-axis represents the CPR, and results from each country are described below.

Ethiopia – Urban Achievement Out-paces Rural Achievement

Urban, rural, and national Ethiopia all demonstrate increasing CPRs and achievement between 2000 and 2010, but the urban and rural regions have diverged in terms of progress in equity (Fig. 2 and 3). Between 2000 and 2005, Ethiopia demonstrated decreasingly pro-rich CPR distributions in urban areas (CI 2000 = 0.20, CI 2005 = 0.10) and increasingly pro-rich distributions in rural areas (CI 2000 = 0.19, CI 2005 = 0.34). As the urban CI stabilized at .10 between 2005 and 2011, rural Ethiopia became more equitable (CI = 0.23), which contributed to a national improvement in CI from 0.47 to 0.34. Though initial CPR increases in rural Ethiopia came about in a pro-rich pattern, rural Ethiopia's jump from a CPR of 10.6 to 22.5 between 2005 and 2011 came along with a return to a more equitable distribution, as demonstrated by the decreased CI (Table 1).

Kenya - Unparalleled Urban Equity

Between 1998 and 2003 in Kenya, there was a stagnation in CPR at 31%, with only a slight increase in CI from 0.36 to 0.33. This improvement was due to an improvement of urban CI from 0.25 to 0.21. The improvement of national CPR to 39% in 2009 was made possible by an improvement in national CI from 0.33 to 0.26. While both rural and urban equity improvements contributed to this progress, urban Kenya most notably approached a perfectly equitable CPR distribution with a CI of 0.02 in 2009 (Table 1).

Malawi and Simpson's Paradox

Malawi's urban and rural achievement demonstrated remarkable progress between 2000 and 2010, which as appropriately reflected by national numbers. However, Malawi's trends between 2000 and 2004 highlighted a phenomenon that lends additional importance to stratifying populations by geographic location before analyzing equity. Analysis of national data in Malawi

show modestly increasing equity between 2000 and 2004 (CI = 0.18 to 0.16) (Table 1 and Fig. 1). Despite this slight apparent improvement, Malawi's urban and rural trends show decreases in equity between 2000 and 2004 (urban CI 0.26 to 0.21; rural 0.37 to 0.13) (Fig. 2 and 3). Thus, geographically aggregating equity data may not only mask differences in each region's progress, but aggregation may also reverse the trend seen in both regions independently. This is referred to as the Simpson's paradox, a statistical finding in which an apparent trend reverses after disaggregation of groups within that dataset (Wagner 1982).

Rwanda

Rwanda, much like Malawi and Kenya, demonstrated remarkable improvements in equity and achievement between 2000 and 2011. Rural Rwanda charted the largest improvements in achievement over any 5-year or 10-year period. Meanwhile, urban Rwanda, like urban Kenya, approached a perfectly equitable CPR distribution in 2011 (CI = 0.03, I = 46.07) (Table 1).

Tanzania

Urban equity in Tanzania has fluctuated from CI = 0.07 in 1999, to CI = 0.14 in 2004, to CI = 0.11 in 2010, while rural equity has steadily improved from CI = 0.27 in 1999 to CI = 0.19 in 2010 (Table 1, Fig. 2 and 3). Accordingly, national improvements in Tanzania's CPR and achievement have come in the context of urban stagnation and rural progress. Urban achievement remained at about I = 30 at all three time points, but rural achievement more than doubled from I = 8.7 in 1999 to I = 20.5 in 2010, and national achievement increased from 10.4 in 1999 to 21.8 in 2010 (Table 1).

Uganda

Urban CPR in Uganda decreased from 42% to 36% between 2001 and 2006. The reversal of this trend over the next five years came along with a significant equity improvement. Though

urban CPR only increased by 3% between 2006 and 2011, achievement improved by 8% (from I = 29.5 to I = 37) (Table 1, Fig. 3). Meanwhile, rural CPR increased by 0.3% between 2001 and 2006 at the expense of equity. In contrast, rural Uganda's the much larger CPR improvement from 15% in 2006 to 23% in 2011 came with a reversal of disparities (Fig. 2).

Overall

At all time points, in all countries studied, urban populations demonstrated higher CPRs than their rural counterparts. However, this higher CPR does not imply higher levels of equity in urban areas. Uganda (2001), Rwanda (2000 and 2005), Malawi (2000 and 2005), and Ethiopia (2000) had greater contraceptive equity in their rural regions than in their urban regions. It is notable, however, that by the third time point all urban regions had greater equity than their rural counterparts. In fact, though urban Kenya is known to have large inequities in a variety of health indicators, its 2009 DHS data demonstrate that programs to address contraceptive inequity have made 2009 urban Kenya (**CI** = 0.02) vastly more equitable than 2009 rural Kenya (**CI** = 0.32). Indeed, 2009 urban Kenya is the most equitable country-region-year of all DHS surveys analyzed in this study.

Discussion

We examined equity and achievement in CPR for six countries in Eastern Africa between 2000 and 2010. While at least one other study has examined inequities in CPR in this region [11], ours is the first to elucidate patterns in achievement and takes the additional step of separately examining urban and rural regions, which is a preferred methodology because of inappropriateness of wealth index comparisons across urban/rural regions [24].

Patterns in equity achievement were not universal. Progress accelerated in the latter part of the decade after widespread stagnation in the late 1990s and early 2000s. Equity and CPR

increased in most East African country-regions between the first and third time points, but for some country-regions with drastically low CPRs, that progress was preceded by decreases in equity (between the first and second time points examined). For example, in 2000, rural Ethiopia and urban Rwanda experienced increased overall CPR and decreased equity between 2000 and 2005. Thus, their initial improvements in CPR are distributed in a pro-rich manner. The highest socioeconomic classes had much greater access to contraceptives during this period of initial uptake. Rural Malawi and rural Uganda display similar trends. Subsequent increases in CPR in these aforementioned country-regions simultaneously occurred with a reversal in the equity trend. That is, no country-region was able to make two sequential improvements in CPR without also increasing equity along the way. Furthermore, the largest improvements in CPR were observed in country-regions that made the most progress in equity (*i.e.*, rural and urban Rwanda between 2005 and 2010, urban Ethiopia between 2000 and 2005, etc.). All country-regions that improved CPR by more than 10% simultaneously increased equity over the same time period. Thus, our data indicate that improvements in equity are the best way to improve CPR.

Though in our analyses of cross-sectional data we lack the ability to draw conclusions about causality between specific policies and subsequent changes in CPR, in the paragraphs below, we provide brief contextual information on policies and events in the countries studied which may help explain the patterns observed.

Ethiopia

Ethiopia showed significant increases in CPR in both urban and rural populations over the decade. As is the case in other east African countries, a large share of Ethiopia's reproductive health (RH) programs are funded by international donors. However, following the appointment of Dr. Tedros Adhanom as the Federal Minster of Health in 2005, family planning (FP) became a

government priority in Ethiopia. As a direct result, domestic funding for RH programs improved from 19 percent in 2005 to 30 percent in 2008 [26, 27]. This increase in government funding led to a decrease in out-of-pocket health expenditures, and could possibly explain the pro-poor increase in contraceptive use in rural Ethiopia between 2005 and 2010.

Kenya

Prior to the period studied here, from 1993 to 1998, Kenya experienced the largest overall increase in CPR in Sub-Saharan Africa and stood as a model to the continent [28, 29]. However, between 1998 and 2003, Kenya faced a significant stall in CPR rates, a trend that has shows some reversal in subsequent years.

The stall in Kenya's CPR between 1998 and 2003 may be explained two-fold: first, Kenya saw a shift of political interest away from FP policies in favor of addressing other national priorities, and second, Kenya also experienced a shift in donor priorities, away from general FP policies and towards HIV/AIDS specific programs [30-32]. Kenya saw resurgence in the uptake in contraception between 2003 and 2008. This can be attributed to a series of related events. Domestically, Kenya saw revitalized top-down political commitment to RH and increased bottom-up demand, which was increased using mass media distribution tools and an increased circulation of educational tools to consumers [33, 34]. In addition, international donors turned their attention back to funding FP programs. However, Kenya struggled to increase CPR in difficult to reach communities, leading to the relatively low equity seen in the rural subset of the population. To combat this, the Community Health Strategy was launched in 2005 with the intention to deliver basic primary care at the community level. While still not fully scaled-up by 2010, this program contributed to the increase in equity seen by 2008 in both urban and rural populations.

Malawi

Setbacks in equity observed in Malawi may have reflected growing pains of a country launching a new National Reproductive Health Policy and Essential Health Plan program in 2000. Malawi recovered from the setbacks with interventions that reduced regional and economic inequities by implementing programs such as the Malawi Growth and Development Strategy (MGDS) [35]. Over this period, Malawi boosted CPR and increased equity and achievement in a similar fashion (Table 1). These successes may demonstrate a benefit from demedicalization of injectables in 2008, which allowed the growing numbers of community health workers in the country to provide contraceptives in rural areas [36]. There were also increases in funding for public sector contraceptives and alignment of national RH funding through the Health Sector Wide Approach (SWAp) fund, which was started in 2004 to support health service delivery. Along with these policy changes, there was a 20 percent national increase in the number of government health centers thanks to both upgrading of existing maternity units to full-fledged health centers and increased partnerships with Christian Health Association of Malawi (CHAM) health facilities [37, 38].

Rwanda

Much can be learned from a close evaluation of the policies implemented in Rwanda since 2000. Following the 1994 genocide and prior to the period studied here, CPR dropped from 13% in 1992 to 4% in 2000 [39, 40]. Rwandan leadership understood that as the country began to rebuild, a subsequent rapid population growth could impede development [41]. Thus, a countrywide, multifaceted campaign was established to increase access to FP [42]. Rwanda's success in both prevalence and equity of contraceptive use can be attributed to three

programmatic changes, including (1) high-level governmental support for FP policy, (2) strengthening of health care systems to facilitate supply, and (3) government-supported increase in demand.

First, Rwanda experienced high-level governmental support for FP policy, starting in 2003. In 2006, the National Family Planning Policy required all Ministries to address population issues within their respective sectors as a way to create a multi-sectoral approach to FP [42]. Then, in 2007, the government officially declared FP to be a government priority by including a budget line item for contraceptives [41]. Second, Rwanda strengthened health care systems to ensure that a functional system was able to supply contraceptives. They accomplished this through performance-based initiatives, mandating universal health insurance in 2007, and developing a skilled task force of CHW. Finally, Rwanda facilitated an increase in FP demand by collaborating with community leaders, establishing monthly community service meetings [43]. Efforts were also made to secure the support of senior religious leaders of Catholic, Protestant, Anglican, Evangelical and Muslim faiths, some of whom had previously opposed FP policies.

Tanzania

Over the course of the decade studied, Tanzania saw an increase in CPR, though this progress remained slower than some of the other countries studied, particularly in the urban population, which saw a decrease in equity over time. As was seen in Kenya, Tanzania struggled as international donor priorities shifted away from FP and towards funding HIV services in the early 2000s. This transition was exacerbated by the downscaling of Population Services International (PSI) in 2003, which had previously been a significant driver of condom use in Tanzania. Domestically, Tanzania lacked the political will to continue funding established FP programs, and it was not until 2007 that the reproductive health program was revived [44]. As

Tanzania continues to build on this revival, it is poised to boost its success in rural regions and revitalize progress in urban regions.

Uganda

In the decade between 2000 and 2010, Uganda faced a series of difficulties in implementing a robust family planning strategy. Despite the passing of comprehensive RH policies, such as the Ministry of Health's Strategy to Improve Reproductive Health in Uganda, which was passed in 2004, the National Population Policy, which was revised in 2008, and the Health Sector Strategic Plan II, which was implemented in 2005/6, attitudes toward adopting FP practices in Uganda have been divided, both at the level of governmental officials and on the ground [45]. These beliefs hindered FP uptake, which is reflected in the stagnation of both rural and urban CPR in the first half of the decade. To address these concerns, the Health Communication Partnership (HCP) project and PLAN Uganda campaigned in 2008 to disseminate basic FP knowledge to communities in order to positively influence the views of the Ugandan population—which is reflected in rural achievement between 2006 and 2011.

There are some limitations to our analyses. First, our methodology does not allow us to make conclusions about causality between the policies described and changes in CPR. Second, a limitation of the concentration index is that it implies certain judgments of equitability. To address this limitation to the best of our ability, we utilize a classic variant of the CI with the most conservative emphasis on equity, however CI's can be generated with a greater weight applied to equitable distribution of outcomes. Such a change in CI weight would amplify the weight of trends in equity.

Conclusions

Countries across Africa have experienced drops in total fertility rates and begun to enjoy the demographic dividend (i.e., a larger proportion of the population is working as population growth slows) at different rates. However, simultaneously, this region has experienced the HIV/AIDS epidemic more acutely than any other region, which hit most heavily this same working age group, diminishing many of the benefits of the demographic dividend. In the current study, we highlight progress made by countries in East Africa in minimizing inequities in contraceptive use. Contraception uptake first occurred in a pro-rich manner in rural Ethiopia, rural Uganda, rural Malawi, and urban Rwanda, but it was only when disparities precipitously decreased that large increases in national CPR were observed.

The conclusions of this paper are two-fold. First, the importance of equal contraceptive access to all geographical and wealth strata of a given population cannot be over emphasized when considering total CPR. The goal of increasing absolute CPR levels within countries over time has been a major policy focus in the East African region. Close evaluation of the Kenyan and Rwandan case studies in the context of their equity scores shows the importance of targeting contraception uptake policy to low-income, rural portions of the population. Second, the aforementioned incidence of Simpson's paradox in the case of Malawi suggests that the current equity analysis literature that utilizes DHS wealth data without stratifying rural/urban populations potentially masks the policy-relevant nuances of such trends. We recommend that the novel methodology used in this paper ought to be the preferred method for analyses in which wealth stratification is required.

Acknowledgments

The authors of this study would like to acknowledge Ruth Musila, Violet Murunga, Juliette Mutheu, and the AFIDEP team for their feedback and contributions to this project. This project was funded by the Barry Coller International Health Research Scholarship, administered by the School of Medicine at Stony Brook University.

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Table 1.

		CPR			CI			I		
		TP 1	**TP 2**	**TP 3**	**TP 1**	**TP 2**	**TP 3**	**TP 1**	**TP 2**	**TP 3**
Ethiopia	**Overall**	6.329	13.906	27.338	0.53996955	0.46675611	0.33698483	2.91	7.42	18.13
	Urban	28.3	42.181	49.481	0.19810638	0.10329214	0.10261701	22.69	37.82	44.4
	Rural	3.28	10.559	22.505	0.1936673	0.33797158	0.22892248	2.64	6.99	17.35
Kenya	**Overall**	31.467	31.535	39.445	0.36007965	0.33742926	0.26067859	20.14	20.89	29.16
	Urban	40.976	39.893	46.623	0.25711869	0.20670905	0.0234992	30.44	31.65	45.53
	Rural	28.955	29.153	37.249	0.37356701	0.37551595	0.32116593	18.14	18.21	25.29
Malawi	**Overall**	26.118	28.146	42.236	0.17733522	0.15985047	0.11061295	21.49	23.65	37.56
	Urban	38.2	34.719	49.607	0.15695398	0.20718432	0.07135442	32.2	27.53	46.07
	Rural	24.083	26.886	40.694	0.11504625	0.1341539	0.08927771	21.31	23.28	37.06
Rwanda	**Overall**	5.666	10.275	45.146	0.42935743	0.30270867	0.10391779	3.23	7.16	40.45
	Urban	16.102	21.193	47.036	0.29373317	0.38625942	0.03365014	11.37	13.01	45.45
	Rural	3.872	8.571	44.853	0.26141199	0.19661749	0.11686906	2.86	6.89	39.61
Tanzania	**Overall**	16.856	19.984	27.374	0.38066015	0.32650244	0.20285355	10.44	13.46	21.82
	Urban	32.844	34.263	34.066	0.06863737	0.14341705	0.11024561	30.59	29.35	30.31
	Rural	11.963	15.548	25.177	0.27380633	0.23364601	0.18611441	8.69	11.92	20.49
Uganda	**Overall**	18.204	17.871	26.029	0.38648967	0.39358427	0.28530262	11.17	10.84	18.6
	Urban	41.585	36.451	39.164	0.28514958	0.19145784	0.05423477	29.73	29.47	37.04
	Rural	14.704	15.085	23.44	0.26553982	0.32944269	0.25999206	10.80	10.12	17.35

Table 1. Table 1 details CPR, CPR, equity (CI), and achievement (I) for each country at each time point.

Figure 1.

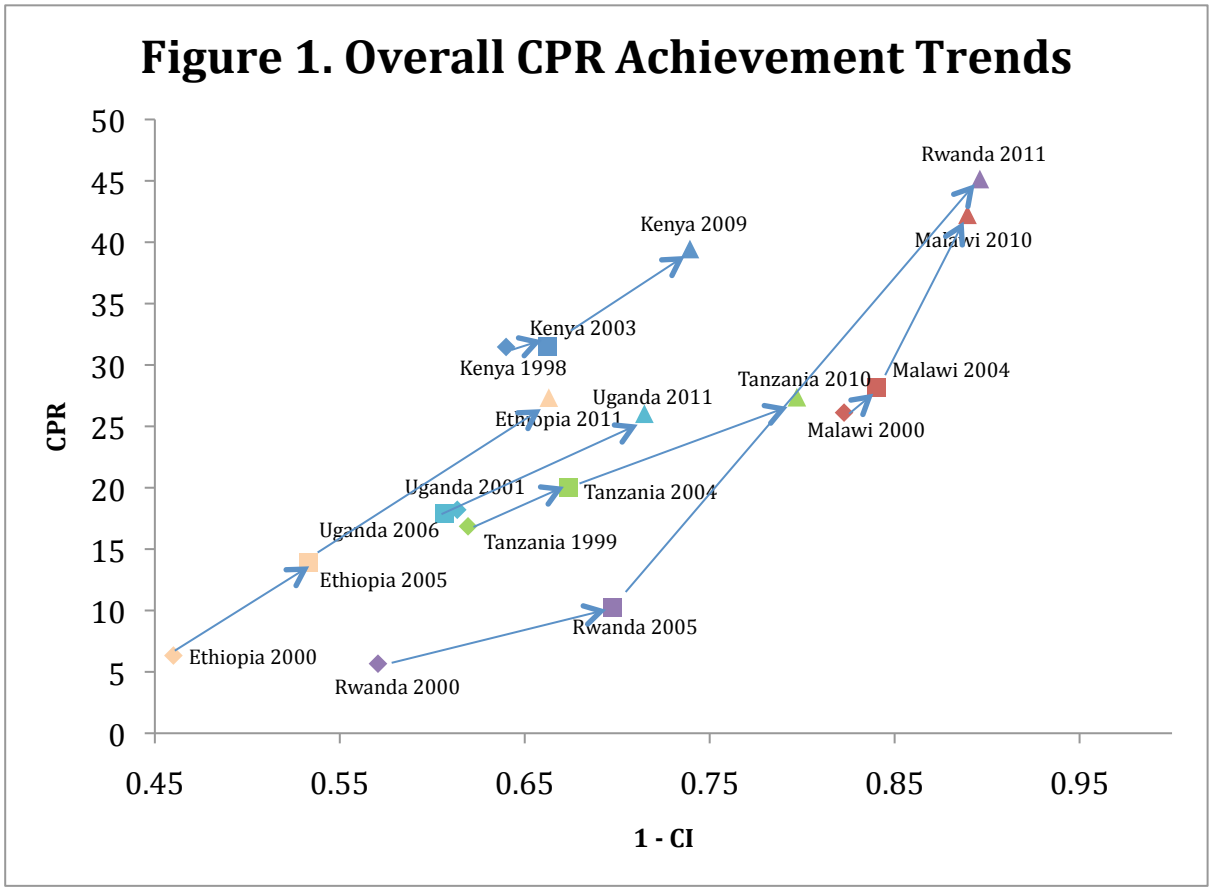

Fig. 1 Details overall CPR and equity for each country for each time point. The x-axes represent 1 – CI, such that equity increases moving from left to right. The y-axis represents the CPR.

Figure 2.

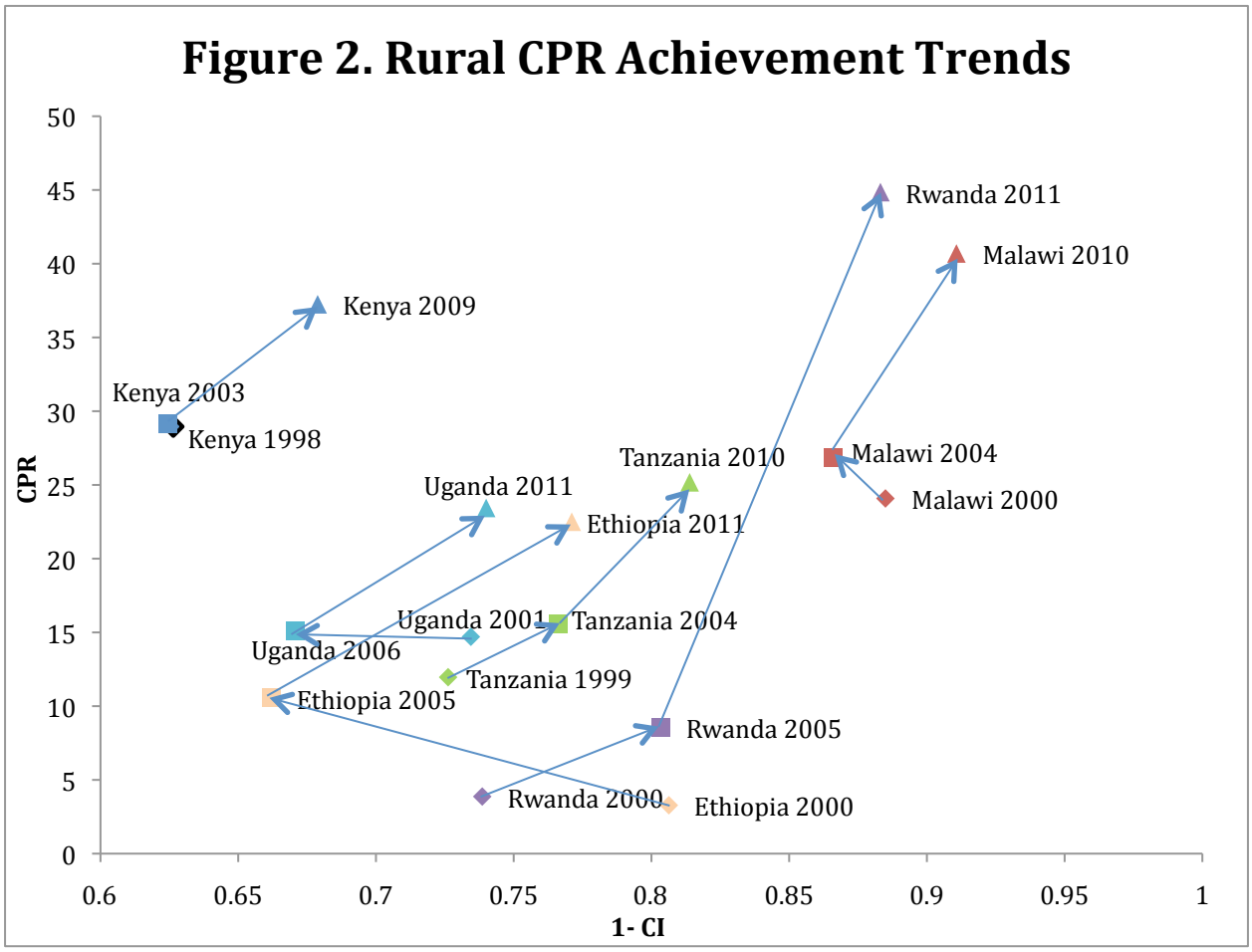

Fig. 2 Details rural CPR and equity for each country for each time point. The x-axes represent 1 – CI, such that equity increases moving from left to right. The y-axis represents the CPR.

Figure 3.

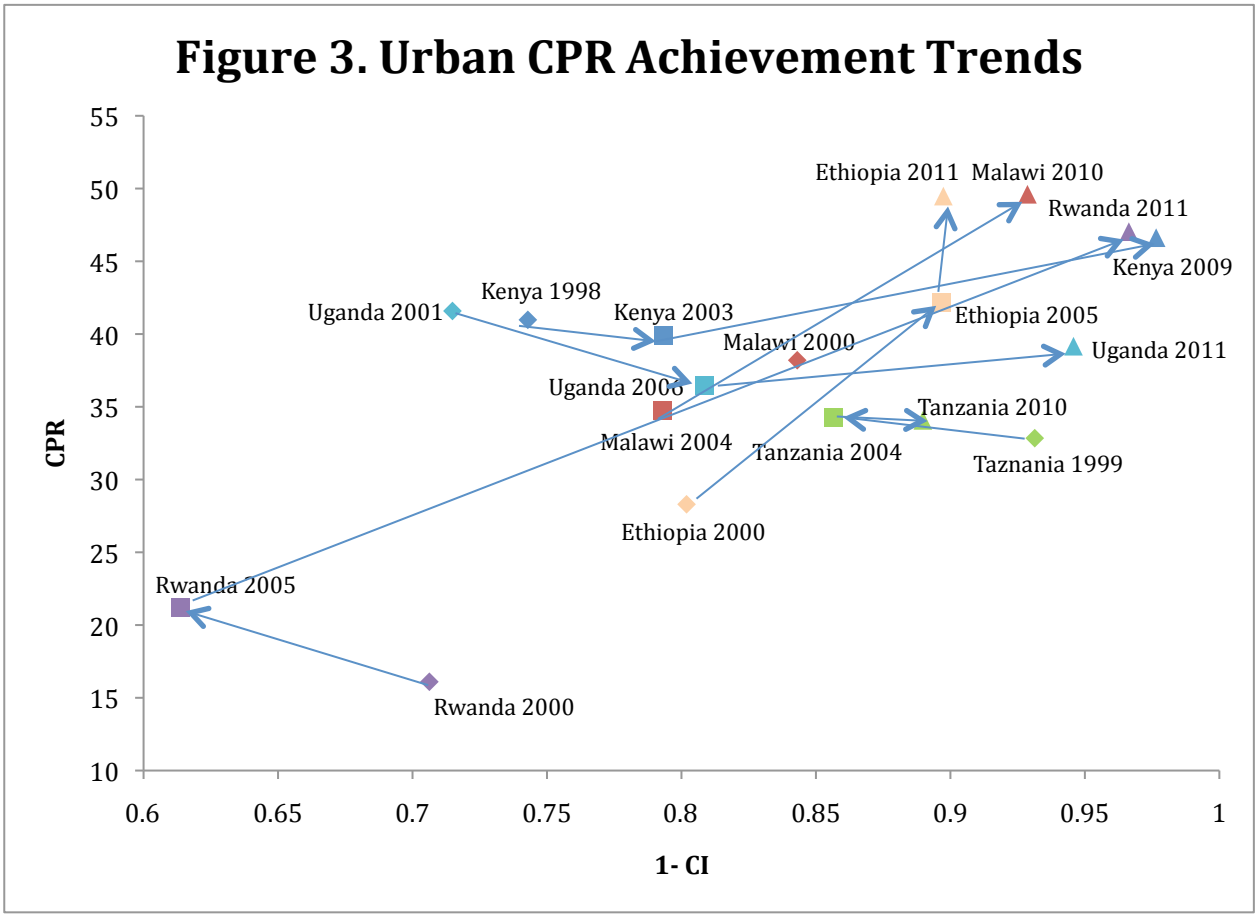

Fig. 3 Details urban CPR and equity for each country for each time point. The x-axes represent 1 – CI, such that equity increases moving from left to right. The y-axis represents the CPR.